

## Simulation of Tooth Preparation: Innovating the Prosthodontics' Study in Times of Pandemic

*Simulação de Preparo Dental: Inovando o Estudo da Prótese Dentária em tempos de Pandemia*

*Simulación de Preparación Dental: Innovando el Estudio de la Prótesis Dental en Tiempos de Pandemia*

Ivone Lima **SANTANA**

PhD, Associate Professor at the Department of Dentistry I. Dental School – Federal University of Maranhão - UFMA. 65080-805 São Luís - MA, Brazil  
<https://orcid.org/0000-0003-1877-9780>

Cibelly de Fátima Vieira **FERREIRA**

Dental student. Dental School – Federal University of Maranhão - UFMA. 65080-805 São Luís – MA, Brazil  
<https://orcid.org/0000-0003-0334-5015>

Gabriel Cutrim **SILVA**

Dental student, Dental School - Federal University of Maranhão - UFMA. 65080-805 São Luís – MA, Brazil  
<https://orcid.org/0000-0003-2504-2509>

Joaquim Rodrigues **MOCHEL FILHO**

DDS Associate Professor at the Department of Dentistry I. Dental School - Federal University of Maranhão - UFMA. 65080-805 São Luís – MA, Brazil  
<https://orcid.org/0000-0001-7357-8725>

### Abstract

The aim of this study was to report a simulation active learning methodology, used in a School Clinic, from the Bachelor's Degree in Dentistry at Federal University of Maranhão (UFMA) for refining students' psychomotor capability and critical-cognitive reasoning, related to the competence to make tooth preparation. Proposed simulation was making some plaster models from a partial molding of interest region, using dental material with dimensional stability. Thus, three models were obtained, in plaster type IV, in which two models were destined to the operator and another to the assistant. Operator student made a preparation on one of the models, according to his ability, acquired in pre-clinical laboratory and after that he sought the professor to discuss possible mistakes and successes about the preparation, together to his assistant. After aligned on the biomechanical principles, operator produced a second preparation on a second model. Assistant did it too, but on an unique model. After new consultation with professor and approval of the preparation, academics are authorized to perform it in patient mouth. Through this methodology, learners could notice adequate preparation with all its peculiarities, ask questions and discuss the individualities of each case.

**Descriptors:** Learning Health System; Dental Education; Simulation Training.

### Resumo

O objetivo deste estudo foi relatar uma metodologia ativa de simulação, usada em uma Clínica Escola do Curso de Odontologia da Universidade Federal do Maranhão, que se destina a refinar a capacidade psicomotora e raciocínio crítico-cognitivo dos estudantes, relacionado à competência em realizar os preparos dentais. A simulação proposta era fazer modelos de gesso a partir de uma moldagem parcial da região de interesse, usando material dentário com estabilidade dimensional. Portanto, três modelos foram obtidos, em gesso tipo IV, nos quais dois modelos foram destinados ao operador e um outro ao auxiliar. O estudante operador fez um preparo em um dos modelos, de acordo com sua habilidade, adquirida em laboratório pré-clínica e depois disso buscou o professor para discutir, junto com o assistente, possíveis erros e sucessos do preparo mencionado. Depois de alinhados nos preparos biomecânicos, o operador realizou um segundo preparo em outro modelo. O auxiliar também reproduziu a técnica, mas em um único modelo. Após nova consulta ao professor e aprovação do preparo, os acadêmicos foram autorizados a reproduzi-lo na boca do paciente. Por meio dessa metodologia, os discentes puderam perceber preparos adequados com todas as suas particularidades, fazer perguntas e discutir as individualidades de cada caso.

**Descritores:** Sistema de Aprendizagem em Saúde; Educação em Odontologia; Treinamento por Simulação.

### Resumen

El objetivo de este estudio fue informar una metodología de simulación activa, utilizada en una Clínica Escuela del Curso de Odontología de la Universidad Federal de Maranhão, que tiene como finalidad refinar la capacidad psicomotora y el razonamiento crítico-cognitivo de los estudiantes, relacionados con la competencia para realizar preparaciones dentales. La simulación propuesta consistió en producir modelos de yeso a partir de una moldura parcial de la región de interés, utilizando material dental con estabilidad dimensional. Así que, se obtuvieron tres modelos, en yeso tipo IV, en los que dos modelos estaban destinados al operador y otro al auxiliar. El estudiante operador realizó una preparación en uno de los modelos, de acuerdo a su habilidad, adquirida en el laboratorio preclínico y, después de eso buscó al profesor para discutir, junto con el asistente, posibles errores y aciertos de la preparación mencionada. Después de estar alineado en las preparaciones biomecánicas, el operador realizó una segunda preparación en otro modelo. La auxiliar también reprodujo la técnica, pero en un solo modelo. Después de una nueva consulta con el maestro y la aprobación de la preparación, los estudiantes fueron autorizados a reproducirlo en la boca del paciente. A través de esta metodología, los alumnos pudieron observar preparaciones adecuadas con todas sus particularidades, hacer preguntas y discutir las individualidades de cada caso.

**Descriptores:** Sistema de Aprendizaje en Salud; Educación en Odontología; Entrenamiento de Simulación.

### INTRODUCTION

The COVID-19 pandemic has brought uncertainty and anxiety to dental students, who are dependent on the oral environment to consolidate the learning process. These students are the most exposed to droplets and aerosols, the means of transmitting the disease<sup>1</sup>. Allied to the difficulty imposed by the current situation, there is the Dental Prosthesis that can be a difficult subject, because requires technical skills. In this sense, students of School Clinic number IV, from the Bachelor's Degree in Dentistry at Federal University of Maranhão

(UFMA), understand that making prosthetic preparations is a problem.

First is the difficulty inherent in precision of the technique, and the insecurity and apprehension of making irreversible and necessary dental wearings to adequate the adaptation of prosthetic rehabilitation. Therefore, simulation was suggested an active teaching-learning methodology for refining students' psychomotor capability and critical-cognitive reasoning, paving the exchange of skills and competences.

Several Education Centers, of the most

varied health segments, recommend the use of simulation as a methodology<sup>2</sup>. However, in the scientific literature was not found anything applied to dental prostheses with specificity for real clinical cases. Thus, in Clinic IV at UFMA, a dental preparing simulation method was developed, made of plaster, low cost compared to other types of simulation and with potential to solve the problem. Simulation represents a “technique” or a technology focusing on recreating real-life situations<sup>3</sup>, which allows training and repetitions in a safe environment<sup>4</sup>.

#### MATERIAL AND METHOD

For the technique, entitled “Simulation of Dental Preparing of Plaster Model”, is necessary partial molding of the region, using dental material with dimensional stability (Figure 1).



Figure 1: Partial molding of interest region.

However, it is essential the tooth is re-anatomized, which means, provisionally rehabilitated. Three models were obtained, in plaster type IV. As the strategy adopted in the Dentistry Major is working “four hands”, there is an operator and assistant student, in alternation. Therefore, two plaster models (copies of the teeth area to be prepared) are destined to the operator and another to his assistant. Then, operator starts the simulation, in one of the models, following his ability, acquired in pre-clinical laboratory (Figure 2).

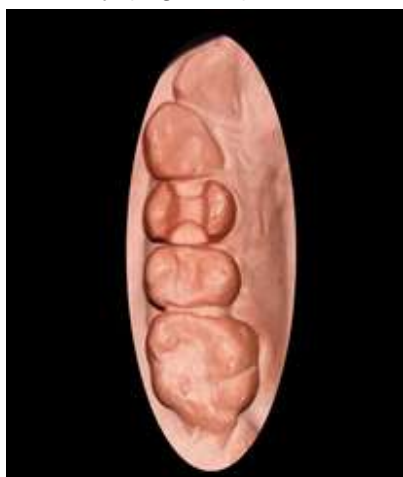


Figure 2: Operator student' simulation following his ability acquired in pre-clinical laboratory.

Subsequently, preparing is discussed together with professor and auxiliary colleague. After all the considerations, each student reproduces the preparation in their model, intact, now obeying the biomechanical principles, agreed during the professor's orientation (Figure 3).



Figure 3: Preparing of model obeying the biomechanical principles agreed during the professor's orientation.

After this new preparation by both students, and with respect to prosthetic principles, academics were authorized to perform it in mouth.

#### DISCUSSION

According to reports by professors and academics of mentioned clinic, there was an important improvement in the adaptation of indirect restorations in teeth prepared with the simulation technique. There was an increase in student self-confidence, reducing students' anxiety and optimization of clinical time, decreasing the exposure of possible Covid19 carries and others pathogens. Through this methodology, undergraduates could notice adequate preparation with all its peculiarities, ask questions and discuss the individualities of each case, resulting in learning-teaching improvement, without exacerbated contact to the patients' oral cavity.

#### REFERENCES

1. Discacciati JAC, Sander HH, Castilho LS de, Resende VLS. Verificação da dispersão de respingos durante o trabalho do cirurgião-dentista. Rev Panam Salud Pública. 1998;3(2):84-7.
2. Barreto DG, Silva KG, Moreira SS, Silva TS, Magro MC. Realistic simulation as a teaching strategy: an integrative review. Rev baiana enferm. 2014;28(2):208-14.
3. Cooper J, Taqueti V. A brief history of mannequin-based simulation and application. Simulators in critical care and beyond. Qual Saf Health Care. 2004; 13(Suppl 1):i11-8.

- Aebersold M, Tschannen D, Bathish M. Innovative simulation strategies in education. Nurs Res Pract. 2012;2012:765212.

#### **CONFLICTS OF INTERESTS**

---

The authors declare no conflicts of interests.

#### **CORRESPONDING AUTHOR**

---

**Cibelly de Fátima Vieira Ferreira**

Dental School

Federal University of Maranhão - UFMA

65080-805 São Luís – MA, Brazil

ferreira.cibelly@discente.ufma.br

**Received** 22/09/2021

**Accepted** 04/11/2021