

Evaluation of the Confidence Levels in Treatment Planning Decisions among Dental Students

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Academic Editor: Wilton Wilney Nascimento Padilha

Received: January 31, 2023 / Review: October 29, 2023 / Accepted: June 20, 2024

How to cite: Peixoto ACN, Freitas TS, Corrêa JD. Evaluation of the confidence levels in treatment planning decisions among dental students. *Pesqui Bras Odontopediatria Clín Integr*. 2025; 25:e230008. <https://doi.org/10.1590/pboci.2025.034>

ABSTRACT

Objective: To evaluate confidence levels in treatment planning decisions among dental students. **Material and Methods:** A questionnaire about difficulties in diagnostic and performing procedures was distributed to dental students in their third to final year at a private university in Brazil. Respondents rated their confidence on a scale from "none to mild" to "moderate to maximum". The Chi-square test was used to assess whether there was a difference in the students' responses according to the stage they were in in the course. Statistical significance was set at $p < 0.05$. **Results:** 137 students participated, and 40% did not consider social data essential in treatment planning. The highest difficulty levels were reported in the diagnosis of Temporomandibular Disorders (TMD) (83%) and oral lesions (79%). The main difficulties in the treatment were reported as therapy for TMD (84%), rehabilitation therapy (70%) and patients with medical conditions (65%). 91% do not feel confident in handling emergencies. When comparing senior students to those in mid-course, significant differences were noted in diagnosing carious lesions (24% vs. 58%) and TMD cases (95% vs. 75%). **Conclusion:** This study highlighted that a significant portion of dental students do not consider social determinants of health as relevant to treatment planning, as well as issues related to student confidence in TMD treatment and managing patients with medical conditions. Dental schools should monitor the confidence levels of their students, creating an opportunity to address these deficits.

Keywords: Self-Assessment; Education, Dental, Graduate; Dental Students; Patient Care Planning.

■ Introduction

In dentistry, the dental regulatory body in each country sets accreditation standards (learning outcomes) for dental training to ensure that newly qualified dental graduates are capable of delivering high-quality dental care to patients. The new Curriculum Guidelines for Dentistry Courses in Brazil, published in 2021, recommend that dentist training should encompass comprehensive healthcare, with graduates of dentistry being envisioned as generalist professionals equipped with a solid technical and scientific foundation [1]. Consequently, providers of dental education need to equip graduates with the confidence and competence to work effectively as healthcare professionals.

Confidence in providing successful treatment for patients is an important outcome of our institution teaching strategy, as confidence can be defined as: 'freedom from doubt; belief in yourself and your abilities' [2]. Students' perception of their confidence in performing clinical treatments serves as an essential measure of the success of dental education, as low self-confidence can adversely affect the daily practice of healthcare professionals. Conversely, overconfident individuals may jeopardize patient safety by attempting tasks beyond their competence [3].

In this context, evaluating students' confidence in performing fundamental dental activities, such as diagnosing and treating oral diseases, is imperative. Assessments are widely employed in dental education to record the academic progress of students and ultimately determine whether they are ready to begin independent dental practice [4]. However, building ways to assess confidence linked to competence in health professionals is challenging.

A fundamental characteristic of adult learners is their capacity to construct, execute, implement, and self-assess their own learning [3]. The ability to self-assess one's clinical skills and identify gaps in knowledge is an essential skill developed during dental training [2]. Especially in dentistry, graduates must be able to self-assess their diagnostic and treatment capacity to offer relevant and safe clinical planning for their patients [5]. Literature is diverse on this topic, with some studies investigating student confidence in different dental areas [3,4,6-8]. Previous studies have shown that, overall, students have greater confidence in performing restorative and periodontal procedures, while they exhibit lower confidence levels in carrying out prosthetic procedures, handling emergencies, and diagnosing mucosal lesions [3,7]. Notably, one significant finding was that self-confidence scores in clinical procedures were positively correlated with clinical and academic performance [6]. In this way, the use of student perspectives has been successful in improving curriculum content, delivery, and assessment in higher education [9]. However, no study has been conducted in Brazilian institutions to evaluate all the foundational components of dental generalist training.

The objective of this study was to evaluate confidence levels in treatment planning decisions among dental students in Brazil, comparing students in the middle of the course with students from the final year. The findings from this study will contribute to planning curriculum changes in dental schools across Brazil.

■ Material and Methods

Ethical Clearance

The present study was conducted in accordance with the Declaration of Helsinki 2013, and the approval of the Research Ethics Committee of the Pontifical Catholic University of Minas Gerais (Opinion Number 4.712.842) was obtained. Students were invited and had their participation approved by signing the informed consent form.

Data Collection

The survey questionnaire with twenty multiple-choice questions was designed online by the authors using Google Forms. A link was sent to the students between the third year and the end of the course (fifth year). The survey was anonymous, and the participants were able to fill out the Google form only once, and they could not see the responses from the other participants.

The questionnaire was designed to address the key knowledge areas relevant to clinical planning in general dentistry. It encompassed questions on patient health history, diagnosis, and the treatment of various conditions, including caries lesions, pulpal pathologies, periodontal diseases, temporomandibular disorders, and oral mucosal lesions. The questionnaire was divided into two sections; one focused on questions related to the perception of diagnostic challenges (8 questions), and another section dealt with difficulties encountered in performing procedures (11 questions). The assessment of the perceived difficulty level was categorized using the Likert scale where 0=none, 1=mild, 2=moderate, 3=high and 4=very high. An exploratory analysis was applied to the collected data, and additionally, the difficulty level was dichotomized into none to mild (scores 0 and 1) and moderate to maximum (scores 2 to 4). For each area, respondents were also asked to identify the primary challenges they faced in treatment. This questionnaire was designed based on previous studies [3,7] and was administered to a group of 10 students beforehand to investigate any uncertainties and validate our model.

Data Analysis

The students were also categorized based on their academic year in the program. Those studying in the third and fourth years were classified as "mid-course," while those in their final year were grouped as "senior". Data items were computed in percentages. The Chi-square test was used to assess whether there was a difference in the students' responses according to the stage they were in in the course. Statistical analyses were carried out using SPSS, version 20.0 (IBM SPSS, Chicago, IL, USA). Statistical significance was set at $p < 0.05$.

■ Results

A total of 137 students participated in the study, representing a response rate of 68.5%. The majority (62%) were in the middle of their dental program, while 38% were in the final year. In the initial patient assessment, nearly all students indicated that they consider the patient's health history as essential for treatment planning. However, approximately 40% do not consider the social data of the patient, including factors like education, profession, and income, as essential for the planning process. Additionally, almost 13% do not believe that the patient's chief complaint should be considered in the integrated planning (Table 1).

Table 1. Students' opinion about the role of anamnesis in the treatment planning in Dentistry.

| Questions | Agree | Does not Agree |
|--|-------|----------------|
| The health history of the patient is essential for treatment planning. | 98% | 2.0% |
| The patient's social data, such as profession, marital status, education, and residence, are an essential part of the diagnosis. | 59.6% | 40.4% |
| The patient's chief complaint must always be taken into account in the treatment planning. | 87.0% | 13.0% |

Regarding diagnosis, the most significant challenge was reported in the field of Temporomandibular Disorders (TMD), with 83% of students expressing moderate to very high levels of difficulty. This was closely followed by the diagnosis of mucosal lesions, where 79% reported moderate to very high difficulty (Figure 1).

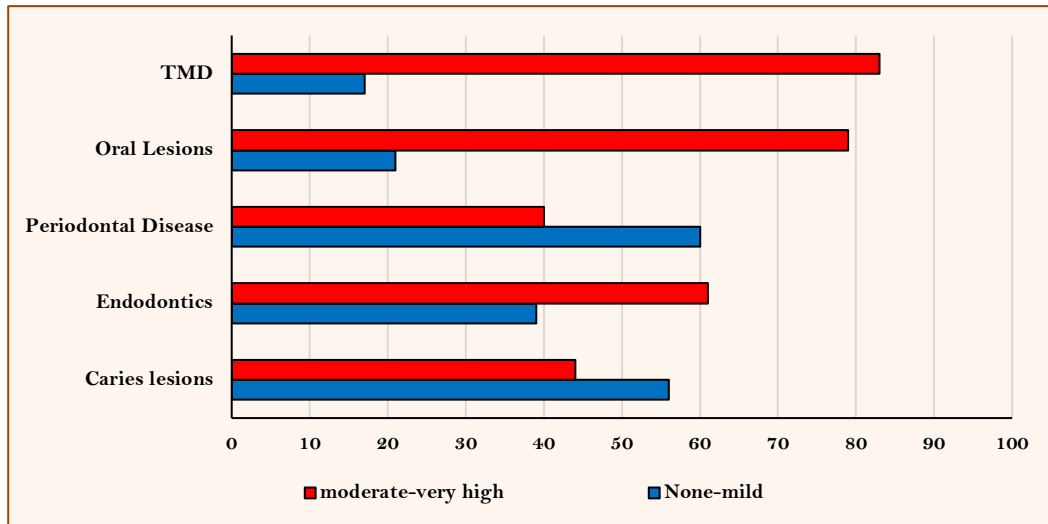


Figure 1. Self-confidence of dental students regarding the diagnosis.

Consistent with the diagnostic challenges, the most substantial uncertainties about treatment were related to selecting the most appropriate therapy for TMD, with 84% of students indicating moderate to very high difficulty in this regard (Figure 2). Two other areas that presented significant difficulties for students were the choice of the most suitable rehabilitation therapy, with 70% reporting very high difficulty, and the treatment of patients with systemic conditions, where 65% felt moderate to very high levels of difficulty.

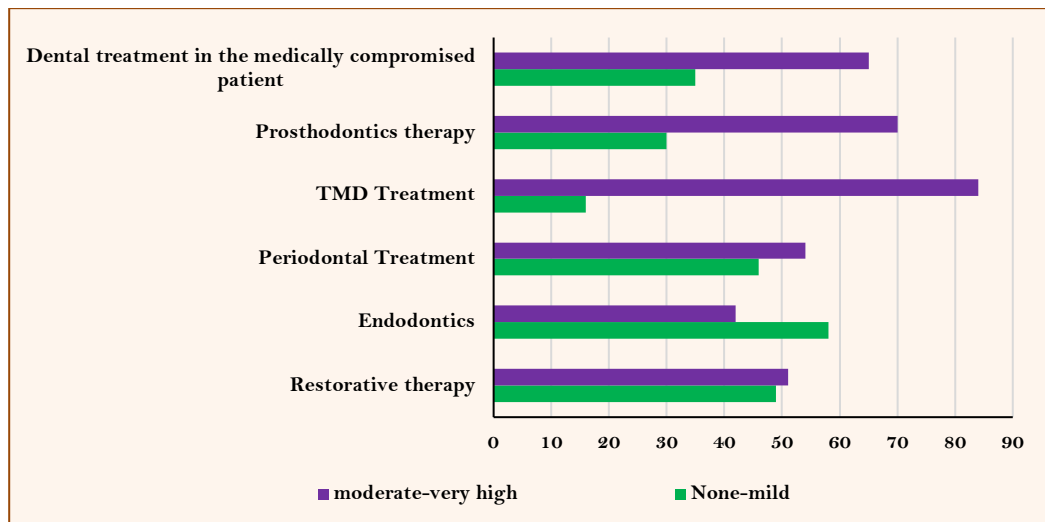


Figure 2. Self-confidence of dental students regarding choosing the best treatment options.

Figure 3 illustrates the primary areas of concern in treatment planning and highlights a significant number of students (91%) who lack confidence when addressing emergencies that may arise during the treatment of patients with medical conditions. The most prominent sources of uncertainty regarding treatment choices revolved around the selection of prosthesis materials (65%) and the type of cement for fixed prostheses (56%), as well as the decision between surgical and non-surgical approaches in periodontal treatment (56%).

When comparing the reported difficulties between senior students and mid-course students, we observed noteworthy differences in the diagnosis of caries lesions and Temporomandibular Disorders (TMD). Twenty-four percent of seniors reported the highest level of difficulty in diagnosing caries lesions, in contrast to

58% of mid-course students ($p=0.001$). Interestingly, for TMD cases, 95% of senior students reported significant difficulty in correctly diagnosing TMJ alterations, as opposed to 75% of mid-course students ($p=0.023$).

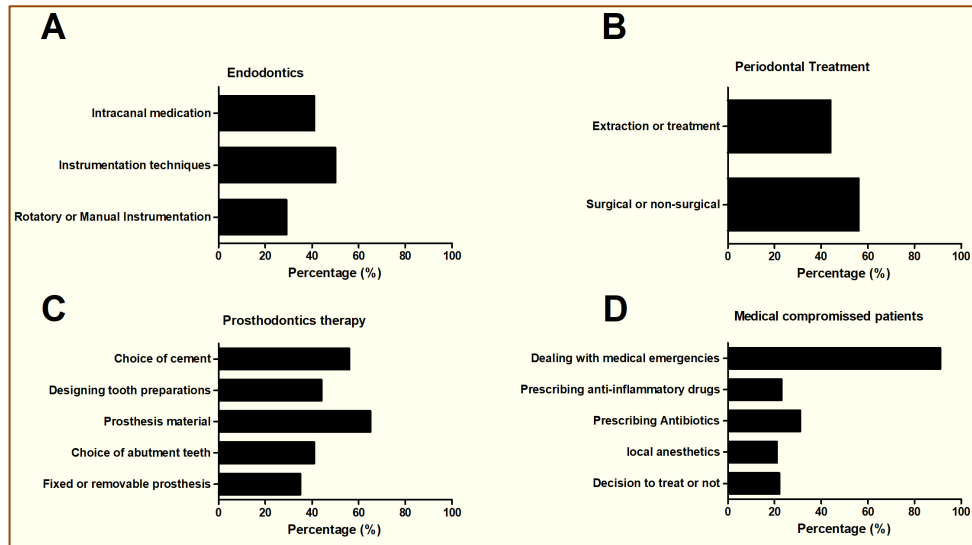


Figure 3. Main doubts regarding the choice of treatment options in each area of dentistry. (A) Endodontics (B) Periodontal Treatment (C) Prosthodontics (D) Medical compromised patients.

■ Discussion

According to the results presented here, there is great insecurity among students when diagnosing temporomandibular disorders and mucosal lesions, as well as treating TMD patients with systemic diseases and choosing the best rehabilitation therapy for each patient. One of the most significant findings in our study was the fact that 40% of dental students do not regard the patient's social data, such as education, occupation, and income, as important for dental treatment planning. The findings underscore the necessity of directing the education of future professionals toward comprehending the patient holistically without isolating oral health from the broader systemic and social context.

The definition of oral health provided by the FDI World Dental Federation (FDI) emphasizes that oral health is interconnected with various individual factors, including individual experiences, values, the surrounding community, and the patient's social circumstances [10]. Moreover, ample evidence has demonstrated the impact of social determinants on oral diseases. Individuals with low income may encounter challenges in accessing regular dental care, potentially resulting in untreated oral health issues. Those with higher levels of education typically possess a better understanding of the significance of oral hygiene and are more inclined to embrace healthy dental care practices. Social factors, such as the availability of nutritious foods and nutrition awareness, impact food choices and, consequently, oral health [10-13]. Therefore, it is imperative to train future dental professionals to understand the implications of social determinants of health. This training is crucial to enable them to gain a comprehensive understanding of each patient, identify risk factors for oral diseases, and prevent potential treatment complications [5,14].

Dental students have consistently expressed strong self-assurance in their self-assessed abilities for caries diagnosis and treatment as well as periodontal diagnosis and management. These clinical procedures receive more substantial exposure in their training, commencing from the first year, where they initiate their study of microbiology related to caries lesions and periodontal disease. This exposure continues throughout their academic journey, encompassing five integrated clinical disciplines, alongside substantial coursework in

dentistry and periodontics, which cumulatively amount to more than five hundred hours of instruction. Consequently, this extensive exposure equips students with clinical competence, and this competence is mirrored in their self-assured assessment of their capabilities.

Conversely, the majority of students expressed feelings of insecurity when it came to diagnosing and treating Temporomandibular Disorders (TMD). TMD is an umbrella term for various clinical issues that impact the masticatory muscles, the temporomandibular joint (TMJ), and associated structures. It manifests as pain and fatigue in the masticatory muscles, TMJ pain, headaches, earaches, clicking sounds, and limitations in mandibular movement [15].

Studies have revealed that, besides the high prevalence of TMD in the global population, both dentists and dental students exhibit insufficient knowledge about TMD, which leads to their lack of confidence in diagnosing and treating it [16-18]. The TMD curriculum is typically offered in the final year of undergraduate training, encompassing a total of 85 hours. This might elucidate the lower confidence levels reported by senior students when dealing with TMD patients in comparison to their counterparts in the middle of the program, as mid-course students may have had limited exposure to this patient profile and may not fully comprehend the intricacies of the condition. However, a pertinent question arises: Should general dentists be expected to possess competence in diagnosing and managing TMD cases? In this regard, dentists will need to decide whether each case is within their capabilities; otherwise, referral to the appropriate specialty.

In relation to the treatment of patients with systemic diseases, 65% of students reported experiencing moderate to high levels of difficulty in caring for these patients, with 91% indicating that their primary concern is managing potential treatment complications. This finding is concerning because in Brazil, chronic diseases, such as hypertension and diabetes, account for 73% of all causes of mortality. Other studies revealed that dental students and professionals do not exhibit sufficient knowledge regarding the specialized care required for patients with systemic conditions [19] and dentists often feel ill-prepared to handle medical emergencies that may arise while treating patients with systemic issues [20-23]. In the undergraduate curriculum of Brazilian dental students, there is no mandatory subject that covers the necessary content for managing complications that may occur when caring for patients with systemic conditions. The results obtained in this study reinforce the need for comprehensive training in basic life support and emergency procedures in dental education. However, due to the infrequent occurrence of such events, practical training in this content is challenging. The implementation of simulation training may prove highly beneficial in enhancing self-assessed confidence in this area, given the unpredictable nature of these cases in real-time clinical practice [24].

Another concerning result is that 80% of the students expressed low confidence in diagnosing mucosal lesions. Several studies have highlighted the challenges faced by dentists in diagnosing oral mucosal lesions [25,26]. This data is particularly concerning because a solid understanding of oral lesions is crucial for the timely and accurate diagnosis of oral cancer [27]. Unfortunately, more than 50% of patients present at oral diagnostic services with advanced oral cancer. Late diagnosis is often attributed to the lack of preparedness among dental professionals [27]. Previous studies support this notion, demonstrating that Brazilian general dentists have limited knowledge of oral cancer [25], and they may struggle to identify precancerous lesions [26]. In our curriculum, the oral pathology course is offered in the third year and comprises a total of 238 hours. While we consider this to be a substantial exposure period for students in practice, the wide range of lesions affecting the oral mucosa can make it challenging for students to develop greater confidence in this area. However, it is crucial for dentists to be able to recognize potentially severe injuries, identify risk factors, and promptly refer patients to specialized services, even if they are uncertain about the diagnosis.

In terms of prosthodontics, our study revealed that students had a low level of perceived confidence, which is in line with findings from previous studies [4,8]. This outcome was expected, considering the relatively limited number of fixed prosthodontic cases compared to operative cases. The fixed prosthesis course is offered in the third year of the program, and each case often spans an entire semester for completion. In this scenario, a pertinent question is whether the undergraduate curriculum should focus on basic skills and ensure the graduation of safe and competent dentists in those areas of diagnosis and treatment of the most common oral diseases. We recognize that insufficient time was devoted to these long procedures; nevertheless, competency in complex procedures might be consolidated in the future with post-graduation courses.

Is expected from a newly graduated dentist that they perform with confidence most of the basic clinical procedures. Confidence is defined as "the feeling or belief that one can have faith in their abilities", and its perceived level might have a direct impact on clinical performance. Indeed, self-confidence in clinical procedures was shown as a predictor of future clinical success [6]. The final objective of dental education should be to graduate dentists qualified and confident to carry out diagnoses and general treatments. Literature is diverse about the reasons for low levels of student confidence. It is expected that the confidence to diagnose and perform a treatment will come with more practical experience [7,28-30], as the perception of competence is usually greater amongst senior students [7]. This was demonstrated in our study when most participants in the final year of graduation reported an increased level of confidence in caries diagnosis compared to students in the middle of the course. However, it is not possible to have the same level of experience in all procedures due to the wide range of treatment possibilities demanded in dentistry and the specificity of the patients that students are able to treat during graduation.

Previous studies have highlighted that different teaching methods and education standards may influence the graduates' confidence and competence in a particular subject [29,30]. Thus, it is our job to ensure efficient preparation and exposure to clinical cases, which can take place through a variety of didactic resources, not just in the operation room. Nowadays, educational methodology is moving away from traditional lecture-based teaching to more interactive problem-based learning, which includes group discussions, case-based learning approaches, simulation and others [24,32,33].

Some limitations of our study need to be discussed, including the fact that we assessed confidence rather than competence and the fact that self-assessment of the student's confidence is not a reliable measure of true clinical competence [2]. The perception of clinical competence can be influenced by the student's self-esteem, and even if they possess the necessary skills to perform procedures, they may not feel capable of doing so. Caution is warranted in situations where the confidence of graduating dentists surpasses their competence. What is preferable is an accurate self-assessment of competence and the corresponding confidence level. Another limitation of our study was the absence of questionnaire validation, and open-ended questions could have yielded more comprehensive insights into the issues discussed here. Another weakness of the study was its sole focus on clinical therapy, which excluded behavioral science components such as health promotion. However, in our institution, we employ a distinct evaluation questionnaire that addresses this matter. According to our students, they express a moderate to high level of confidence in conducting health promotion activities.




Despite these limitations, this study will serve as the basis for refining the questionnaire since, to the best of our knowledge, a well-defined scale for confidence in dental education has yet to be established. It is always challenging to think of the best approach in the curriculum of a health profession to train complete professionals. In the questionnaires, we addressed the most essential areas in which a dental professional should be trained as a general practitioner: Diagnosis of caries, periodontal diseases, mucosal lesions, and the systemic

disease patients' treatments. These areas are the most prevalent in the day-to-day practice of general practitioners and must be mastered and trusted by recent graduates. If we cannot train professionals with this well-structured base, how can we move on to more complex areas of oral rehabilitation? The objective of the work was to know the situation of the students in relation to their doubts in these areas to discuss ways to improve our teaching and learning process. Dental schools should monitor the confidence of their students in completing clinical tasks, thereby allowing an opportunity to address these deficits in confidence in their graduating students.

■ Conclusion

A significant portion of dental students do not consider social determinants of health as relevant to treatment planning. They will be at a major disadvantage if they solely analyse anatomical and physiological data. Understanding and incorporating social determinants of health is essential to promote oral health and reduce oral health inequalities. This study also highlights concerns related to student confidence in performing clinical tasks, such as managing medically compromised patients, dealing with Temporomandibular Disorders (TMD), and prosthesis treatment. There exists a complex interplay between clinical experience, competence, and the self-confidence perceived by the student. Developing methods to assess this relationship could yield significant benefits for the training of dental professionals and raise important questions for future research.

■ Authors' Contributions

| | | | |
|------|---|---|---|
| ACNP |  | https://orcid.org/0000-0002-2711-4038 | Conceptualization, Methodology, Investigation, Writing - Original Draft and Writing - Review and Editing. |
| TSF |  | https://orcid.org/0000-0002-7471-233X | Formal Analysis, Investigation, Writing - Original Draft and Writing - Review and Editing. |
| JDC |  | https://orcid.org/0000-0003-0170-6163 | Conceptualization, Methodology, Formal Analysis, Writing - Original Draft, Writing - Review and Editing, Visualization and Supervision. |

All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

■ Financial Support

None.

■ Conflict of Interest

The authors declare no conflicts of interest.

■ Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

■ Acknowledgements

We would like to thank the students who participated in this study and professors that helped to send the questionnaire.

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