

# Evaluation of dental students' perception and self-confidence levels regarding endodontic treatment

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## ABSTRACT

**Objectives:** The aim of this study was to obtain information about senior dental students' perceptions and self-confidence levels regarding endodontic practice. **Materials and Methods:** Anonymous survey forms were handed out to senior students at Yeditepe University, Faculty of Dentistry. The students were asked to score their level of confidence using a 5-point scale and comment about future practices. **Results:** The response rate of the survey was 88%. 11.9% expressed endodontics as the first branch in terms of difficulty. The majority (90.5%) indicated they would perform root canal treatments within their expertise limit in the future but refer difficult cases to an endodontist. Bleaching of endodontically treated teeth, managing flare-ups, placement of a rubber dam were procedures in which students reported the lowest confidence ( $2.55 \pm 1.17$ ,  $3.24 \pm 0.96$ ,  $3.24 \pm 1.19$ , respectively). On the other hand, students felt the lowest confidence in the treatment of maxillary molars followed by mandibular molars ( $3.43 \pm 1.02$  and  $3.93 \pm 0.97$ , respectively). Students also reported the lowest confidence in root resorptions, endo-perio lesions, traumas, retreatments and apexifications ( $2.93 \pm 1.16$ ,  $3.07 \pm 0.89$ ,  $3.24 \pm 0.85$ ,  $3.33 \pm 1.7$  and  $3.36 \pm 1.1$ , respectively). **Conclusions:** The results showing students' lower confidence in more challenging aspects of dentistry may be related with the attitude of dental schools to refer these cases to post graduate students and instilling information about these cases on a theoretical basis only. Though there seems to be a tendency for students to refer challenging cases to a specialist in future, authorities should give priority to enhance the way information and experience is conveyed regarding various aspects of endodontic treatment.

**Key words:** Education, endodontics, self-confidence, students

## INTRODUCTION

Endodontic treatment can be one of the most difficult dental procedures a practitioner encounters during clinical practice. Due to the increase life expectancy in the population and the desire of individuals to preserve their natural teeth, there is an increasing demand for endodontic treatment and this will presumably increase in the years ahead. This reality necessitates dental students to be satisfactorily equipped with knowledge as well as experience in endodontic procedures prior to working independently. A dental student, upon graduation should have acquired the skills to make a sound diagnosis regarding endodontic cases, implement a

reasonable treatment plan and carry out a qualified and safe endodontic treatment.

It is a fact that different dental schools have varying prerequisites for graduation in each dental discipline and endodontics is no exception. The number of endodontic treatments a student is obliged to complete to be eligible for graduation differs from school to school and various factors such as the proportion of patient frequency to the number of enrolled clinical students of the related dental school may have impacts on this difference. On the other hand, there are some requirements and established competencies advocated by dental authorities and organizations that describe the minimum number

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of cases required to be completed prior to being licensed as a dental practitioner. An example to this is the statement in the undergraduate curriculum guidelines of the European Society of Endodontology advising the completion of root canal treatments of 20 teeth including extracted teeth prior to graduation. Meanwhile, in the same report, it is regarded essential that students should have adequate experience of the treatment of endodontic emergencies.<sup>[1]</sup>

Although quality of the completed work is a very significant parameter in deciding whether a student has gained enough proficiency, it is generally accepted that the more cases a dental student encounters during educational years, the more prepared he or she will be in terms of endodontic practice in the years of working independently.

There are numerous references in the dental literature regarding the quality and outcome of endodontic treatments carried out by dental students; however, there is scarce information regarding the way students perceive the branch of endodontology and their level of self-confidence about various aspects of endodontic treatment with respect to their future practice. The aim of this survey was to gather information about the general opinion of senior dental students enrolled in Yeditepe University, Faculty of Dentistry, Istanbul, Turkey regarding endodontic treatment, to analyze their perception of this significant branch of dentistry and how they self-evaluate their confidence level in endodontic treatment a few months prior to graduation.

## MATERIALS AND METHODS

Following the approval of the institutional review board, anonymous survey forms, were handed out to 48 senior year dental students enrolled in Yeditepe University, Faculty of Dentistry.

Prior to the study, students were informed that they were not held obliged to complete and return the forms and completion of the survey would have no influence on their overall academic grading or performance. Following some demographic information such as age and gender, the students were asked to score some endodontic procedures with different diagnosis, different steps of endodontic treatment as well as types of teeth according to their self-confidence levels. The students used the Lickert's scoring system from 1-5 to indicate their level of confidence as follows: 1 = Very little confidence, 2 = Little confidence 3 = Neutral 4 = Confident 5 = Very confident.

The survey continued with questions regarding students' opinion about future endodontic practice while working independently, whether they wish to carry out all endodontic procedures by themselves or whether they would seek for the assistance of a specialist in case they felt necessary. Students were also asked to share the most adverse experience they encountered during endodontic practice so far, if any. They were also asked to pick among some choices regarding the most significant innovation introduced into the science of endodontology that would increase practitioners' performance in recent years. In the dental school where the study was conducted, students are held obliged to complete approximately 30 root canal treatments during their clinical years in order to be eligible for graduation. This number is dispersed between the clinical years, starting with a lower number of root canal treatments in the 3<sup>rd</sup> year, gradually increasing until the senior year. During the survey, they were also inquired about their opinion regarding whether this required number was satisfactory. If case students felt that it wasn't, they were asked to indicate the minimum number that they thought would be satisfactory to gain adequate proficiency. The survey was completed with a question which asked whether students wished to specialize in the branch of endodontology and additional comments.

## RESULTS

Among the 48 students who were handed out the survey, 42 (88%) returned the forms. Twenty-five students (59.5%) were females whereas 17 (40.5%) were males. The majority (42.9%) of the students rated endodontics as 3<sup>rd</sup> in terms of difficulty [Table 1] among other branches. 11.9% of the students expressed endodontics as the first branch in terms of difficulty. The scorings regarding self-confidence levels of various aspects of endodontic treatment revealed that bleaching of endodontically treated teeth was the area where students felt the lowest

**Table 1: The number assigned to endodontics in case a sequence was made among dental disciplines in terms of difficulty**

Score	n	%
1 <sup>st</sup>	5	11.9
2 <sup>nd</sup>	13	31
3 <sup>rd</sup>	18	42.9
4 <sup>th</sup>	4	9.5
5 <sup>th</sup>	1	2.4
6 <sup>th</sup>	1	2.4

confidence followed by rubber-dam application and management of interappointment flare-ups [Table 2]. While scoring different types of teeth in terms of difficulty, maxillary and mandibular molars were the types of teeth that posed the most difficulty in terms of endodontic management [Table 3]. Root resorptions, endo-perio combined lesions and trauma cases were ranked as the situations in which students reported the lowest confidence levels [Table 4]. The majority of the students (90.5%) reported that they would

**Table 2: Average scorings of students regarding self-confidence of students about various endodontic perocedures**

Procedure	Average±SD	Median (IQR)	Min	Max
Endodontic evaluation of the patients and patient history	4.02±0.72	4 (4-4.25)	2	5
Diagnosis of endodontic treatment	4±0.66	4 (4-4)	2	5
Achievement of anesthesia for endodontic treatment	4.1±0.82	4 (4-5)	2	5
Endodontic cavity preparation	3.93±0.78	4 (3.75-4)	2	5
Placement of the rubber dam	3.24±1.19	3 (2.75-4)	1	5
Measurement of the working length	4.1±0.82	4 (4-5)	2	5
Root canal shaping	4.1±0.93	4 (3.75-5)	2	5
Root canal irrigation	4.36±0.79	5 (4-5)	2	5
Root canal obturation	3.76±0.82	4 (3-4)	2	5
Management of inter-appointment flare-ups	3.24±0.96	3 (2.75-4)	1	5
Radiograph taking	4.05±0.83	4 (4-5)	2	5
Directing the patient for periodic recall after endodontic treatment and patient follow-up	3.52±0.86	4 (3-4)	1	5
Establishment of a successful communication with the patient during endodontic treatment and provision of patient trust and confidence towards the practitioner	4.21±0.75	4 (4-5)	2	5
Restoration of endodontically treated teeth	4.12±0.77	4 (4-5)	2	5
Bleaching of endodontically treated teeth	2.55±1.17	2 (2-3)	1	5

IQR: Inter-Quartile range

perform endodontic treatment of cases within their limit of expertise and skills in the future; however planned to refer to a specialist when confronted with challenging situations beyond their experience level. Only 4 students (10%) indicated that they are not planning to use any rotary instruments in the future. Thirty-one students (73.8%) found the number of teeth to be treated satisfactory. One student commented that there should not be a limitation or prerequisite in terms of number of teeth to be completed. The students ranked the top 3 innovations brought into the science of endodontology in recent years as rotary instruments, MTA and apex locators. Eleven students (26.2%) wished to specialize in the field of endodontics. Different comments were made regarding the most negative experience during educational practices in terms of endodontic treatment. Perforations, broken instruments and difficult retreatment cases that required prolonged visits were the predominant answers among students who wished to comment on this question.

## DISCUSSION

Competency-based approach has recently replaced the traditional dental education methodology in most dental education programs and the aim of this modality is described as the understanding, skills, and professional values required of a student that are essential for beginning the unsupervised practice of dentistry.<sup>[2]</sup> In the Profile and Competences for the graduating dentist released by the Association for Dental Education in Europe (ADEE),<sup>[3]</sup> the competences, at the graduation, have been defined as the basic level of professional behavior, knowledge, and skills necessary for a graduating dentist to respond to the full range of circumstances encountered in general professional practice. Consequently, the contemporary educational philosophy shows a competence fulfillment approach encompassing a wide spectrum of professional skills which is not limited to manipulative skills only. Endodontics is a very significant branch in that respect, as it is frequently directly related with patient anxiety and pain. A dentist who has acquired the necessary competences in the field of endodontics is obliged to be equipped with multiple qualifications including appropriate patient approach and pain and anxiety management.

Student self-assessments of their own proficiency serve as helpful means to make a realistic evaluation of

**Table 3: Average scorings of students regarding their self-confidence levels about the endodontic treatment of different types of teeth**

Tooth types	Average±SD	Median (IQR)	Min	Max
Maxillary anterior teeth	4.57±0.59	5 (4-5)	3	5
Maxillary premolars	4.26±0.91	4 (4-5)	1	5
Maxillary molars	3.43±1.02	4 (3-4)	1	5
Mandibular anterior teeth	4.48±0.83	5 (4-5)	1	5
Mandibular premolars	4.4±0.83	5 (4-5)	1	5
Mandibular molars	3.93±0.97	4 (3.75-5)	1	5

IQR: Inter-Quartile range

dental curricula and the assessment of the effectiveness of specific courses.<sup>[4,5]</sup> Meanwhile, scholarship in teaching and learning has started to be frequently pronounced recently and it has been indicated that this aspect of education should not be disputed in dentistry as well as other kind of higher learning. Also, from the standpoint of training dentists as legitimate members of a learned profession, scholarship has been indicated to play a very important role.<sup>[6]</sup> Student surveys are significant in that respect as well and assist to unfold many issues that need to be resolved and reconsidered for better assimilation of knowledge and development of practical skills. Though there are various studies that aim to evaluate the preparedness of the new graduate for clinical practice in general, to our knowledge there is no study that specifically focuses on endodontics and its clinical content. Therefore, it is anticipated that the present study will be contributory in drawing a general picture regarding students' self-evaluation of themselves in a branch they will very frequently be involved in when they start working for the community.

Comments have been made by some authors regarding factors that may influence students' self-confidence levels in clinical dental practice. Murray, et al.<sup>[7]</sup> defined one of the limits to developing confidence in performing clinical practices as insufficient clinical exposure within the undergraduate curriculum. Lynch, et al.<sup>[8]</sup> on the other hand, suggested that insufficient number of patients, lack of adequate physical space within the dental school, limitations posed by the busy curriculum and lack of well-trained staff are major obstacles, which may hamper high clinical self-confidence levels. In the dental school where the present study was conducted, it is not anticipated that the abovementioned parameters may be causative of

**Table 4: Average scorings of students regarding their self-confidence levels during the management of different endodontic indications**

Indications	Average±SD	Median (IQR)	Min	Max
Vital pulp treatments (direct pulp capping, amputation)	4.02±0.78	4 (3.75-5)	2	5
Irreversible pulpitis	4.05±0.83	4 (4-5)	2	5
Acute apical periodontitis and abscess	3.52±0.83	4 (3-4)	2	5
Chronic apical lesions (Chronic apical periodontitis, abscess and cysts)	3.67±0.82	4 (3-4)	2	5
Endo-perio combined lesions	3.07±0.89	3 (3-4)	1	5
Traumatic cases	3.24±0.85	3 (3-4)	1	5
Root resorptions	2.93±1.16	3 (2-4)	1	5
Teeth with immature apices	3.33±1.07	3 (3-4)	1	5
Endodontic retreatment	3.36±1.1	3 (3-4)	1	5
Emergency cases in general	3.76±0.98	4 (3-4.25)	1	5

IQR: Inter-Quartile range

lower confidence levels regarding various aspects of endodontic treatment. A significant proportion of the curriculum is dedicated to clinical practices, beginning from 23 out of 40 h/week in the 3<sup>rd</sup> year, reaching 32 h/week in the second semester of the 5<sup>th</sup> year. There are sufficient number of cubicles that serve students' needs where a daily rotation is established, when clinical students share their practical hours. An integrated clinical system is instilled where a student is responsible of all the dental treatment of a patient assigned to him/her, executing a holistic approach, which is not limited to only one single discipline. The student has the opportunity to disperse the allotted clinical period to any type of treatment necessary for the patient. Moreover; the clinical instructive staffs are all full-time employees specialized in the field of endodontics, with high level of clinical experience. There is also a high circulation of patients who are referred for their dental needs.

When the graphs summarizing the results of the study are evaluated, it is observed that it is not generally the regular steps of endodontic treatment but rather more sophisticated aspects and indications related with endodontic treatment that lead to the reporting of relatively lower confidence levels. This is not quite unexpected as more challenging cases such as root resorptions, apexification procedures, retreatment and emergency cases and bleaching of endodontically

treated teeth were those that were associated with relatively lower self-confidence levels. In case these types of cases are encountered at the student clinic, they are generally referred to the post-graduate clinic to be managed rather than undergraduate clinics. It is debatable whether students should be introduced to challenging cases during their educational years. It is quite likely that they will somehow encounter these situations in the future when they start to work independently. On the other hand, the Profile and Competences described by the Association for Dental Education in Europe<sup>[3]</sup> indicates the acquisition of adequate competence by the undergraduate to perform endodontic treatment on uncomplicated single and uncomplicated multi-rooted teeth. Recognizing indications for surgical and complicated non-surgical root canal therapy and taking appropriate action is also one of the competences a student is expected to acquire. This implies that the student should at least adopt the skills to differentiate between cases within his/her level of expertise and refer to a specialist in case necessary. Therefore, the relatively lower ratios reported in this study for more challenging cases should not create concern from an educational perspective, but should rather be regarded as a reflection of the current limitation of expertise expected from an undergraduate.

When the types of teeth were scored in terms of self-confidence levels regarding endodontic treatment, molar teeth yielded relatively lower values consistent with the results of some other authors.<sup>[9-11]</sup> Bartlett, *et al.*<sup>[10]</sup> indicated that dental schools might have the opinion that students can develop their skills in challenging cases better in general practice rather than the clinical environment offered by dental schools; therefore, they might prefer to provide students with the knowledge of basic principles of these cases only. This comment may not be valid for the school in which this survey was conducted as students are expected to dedicate a significant proportion of their endodontic practice to molar endodontics. The lower result obtained may be rather the manifestation of inherent problems related with the management of molar teeth which may pose difficulty both in terms of their location and morphological characteristics.

Bleaching of endodontically treated teeth, rubber dam application and management of flare-ups were endodontic situations where students reported the lowest confidences. In the faculty where the study is conducted, bleaching is not a procedure that is required from students and it is generally a

procedure undertaken by post-graduate students, so it is understandable that students may not feel themselves very confident over this type of practice about which they are generally theoretically instilled. However, rubber dam application is a prerequisite and students are not allowed to complete their treatments without the use of this significant adjunctive tool. A survey of the literature reveals a general underuse and some sort of resistance by dental practitioners as well as students regarding the use of the rubber dam.<sup>[12-16]</sup> Various factors have been proposed for the reluctance in the usage of this tool, including the difficulty of application and patients' dislike. On the other hand, rubber dam is an indispensable element of contemporary endodontic practice and is not only a valuable tool but an ethical and medico-legal prerequisite for the dental practitioner. Development of skills in terms of rubber dam application including management of difficult clinical cases with extensive tissue loss should be given priority by faculty and instructive staff in order for students to report higher levels of confidence in the future.

Flare-ups are undesirable situations that may arise during the course of endodontic treatment, requiring an unscheduled visit in some cases.<sup>[17]</sup> It is also true that, flare-ups do not directly influence the outcome of the endodontic procedure, but are rather distressful situations resulting from the disruption of the balance between the host defense mechanism and irritating agents. One of the reasons for the occurrence of inter-appointment flare-ups may be procedural errors during the execution of endodontic treatment, such as extrusion of intracanal content inadvertently into the periradicular tissues. It can be speculated that flare-ups may be encountered more frequently in the students clinic, possibly due to inexperience of students allowing them to make some procedural errors such as overinstrumentation or extrusion of irrigants and intracanal debris. One possible explanation of this is that the students' tactile skills have not developed as adequately as an experienced dentist. Moreover, the patients need to be informed beforehand about the possibility of interappointment pain by the doctor and if they are done so, it may be easier for them to tolerate this complication. The students might have missed this detail during their communication with the patient, which may end up with negative reactions from the patient, making the treatment procedure more troublesome for the managing student.

In terms of the most adverse occurrence students experienced in the clinics, perforations seemed to

outnumber other complications. However; not all students made a comment regarding this question. Broken instruments and prolonged visits for retreatment cases were among the next most common statements by those who preferred to make a comment. In a study by Balto, *et al.*,<sup>[18]</sup> root perforations in the 5<sup>th</sup>-year students' treatments were higher (3%) compared to the 4<sup>th</sup> year (0.3%). The authors commented that the relatively higher self-confidence and less clinical supervision of senior students might contribute to the high-risk of procedural errors during clinical practice. They also attributed the low percentage of adequate root canals assessed in their study to the fact that some of the supervision for undergraduate students was undertaken by non-specialists and not totally by endodontists. The clinical circumstance in the faculty where the study was conducted requires the complete monitorization of students by specialist endodontists. In spite of that, mishaps are always likely to occur probably due to relatively higher confidence of 5<sup>th</sup> year students enabling them to be more risk taking during difficult cases.

It is generally traditional among dental schools to complete a threshold of clinical cases before they can be admitted to final examinations. It is also a widely accepted concept that repetition of clinical procedures is necessary to achieve clinical competence. Chambers<sup>[19]</sup> indicated that it is sometimes held that practice *per se* without regard for quality of outcomes, is a necessary if not sufficient condition for learning. The author also commented that the rationale for choosing the correct number of procedures and cases to ensure clinical competence is a traditional mystery. Another point Chambers drew attention was the different conceptual approaches between competency-based and the traditional systems towards achieving the adequate skills and competence. In the competency-based approach to dental education, individual student learning curves were allowed to vary based on practicality and the competence is fixed whilst in the traditional "requirements" system, a suggested or mandatory number of procedures were fixed but competence was permitted or expected to vary.<sup>[18]</sup> The majority of the students who participated in the study stated that the number required for eligibility to graduate was satisfactory. On the other hand, based on the above-mentioned presumptions regarding the ambiguity of the number of necessary treatments before competence can be reached; the reliability of the students' comments is somewhat debatable. While it is true that students can make a better judgement of their clinical adequacy, there

seems to be the necessity of very close and careful monitorization of each individual student and the development of an assessment strategy which is not dependent on numerary basis only.

The question regarding students' intention of using rotary instruments in clinical practice was presented in an attempt to acquire a general idea regarding their attitude towards contemporary aspects of endodontic care, same as the question which asked them to select in their opinion the best innovation brought into the science of endodontology recently. It is promising that almost all students expressed their wish in utilizing rotary instrumentation in their future practices. Since rotary instrumentation techniques have gained widespread usage in dentistry, students' willingness to incorporate these useful and time-saving tools in their routine care is an indication of their tendency towards using contemporary methodologies. This is also reflected in their ranking rotary instrumentation systems as the top in terms of beneficial innovations introduced in the branch of endodontology recently. The students also stated mineral trioxide aggregate and apex locators as the next 2 beneficial innovations brought recently. This result is rather pleasing from an educational perspective as these are noteworthy innovations and developments that have gained widespread attention and students seem to have gained adequate judgement abilities from what they have learned so far to appreciate contemporary methodologies developed to ease their performances.

In summary, it can be stated that this study is conducted on a group of students and definitely reflects the opinions of only a limited group. On the other hand, it provides a general picture regarding students' assessment of their abilities and limitations in the field of endodontics on the verge of graduation. There seems to be a tendency for students few months away from graduation to refer challenging cases to a specialist in future, however, this does not deny the fact that authorities should give priority to enhance the way information and experience is conveyed regarding various aspects of endodontic treatment.

## CONCLUSION

Studies comprising other dental schools will be helpful in precisely determining the extent of instillation of adequate skills in endodontology and major missing areas that need further improvement.

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