**Original Research**

# Challenges of Knowledge Transfer from Pre-Clinic to Dental Clinics in the Endodontics Department: A Qualitative Study

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## Abstract

**Background:** This study aimed to qualitatively evaluate knowledge transfer challenges from pre-clinic to dental clinics in the endodontics department among Ardabil University of Medical Sciences dental students.

**Methods:** A semi-structured interview was used to collect data, and six dental students were interviewed. The data were analyzed based on the method suggested by Lundman and Graneheim. Validity, verifiability, and reliability criteria were used according to Linclon and Gouba to ensure the reliability of the data. A questionnaire was prepared after coding the factors and distributed to all 30 dental students studying in Ardabil Dental Faculty with the inclusion criteria. The identified factors were prioritized, and finally, the first six priorities were reported based on the ranking to present the results.

**Results:** The essential challenges of realizing clinical training in the endodontics department were support problems (laboratory, lack of turbine, failure of units), lack of patients, student stress, weak clinical skills, and poor study.

**Conclusion:** Based on the results, dental students of Ardabil University of Medical Sciences face many challenges in transferring knowledge from pre-clinic to the clinic, which can be reduced with careful planning.

**Keywords:** Challenge, Clinical Education, Endodontics.

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## Introduction

Coordination between what is learned in training medical professionals and what is used in the hospital is critical (1). Therefore, the content of the curriculum should be adapted to the clinical situations as much as possible. Both initial and continuous clinical training should be coordinated with clinical cases. Students should be able to gain sufficient learning experiences, both from the theory and clinical point of view, and the clinical professors should provide this situation so that the student becomes proficient in the clinic and theory (2).The transition from the pre-clinical to the clinical period is associated with challenges. The way patients respond to treatment by responding to treatment in the phantom, due to the difference in the mechanical and biological characteristics of the patient's mouth with the samples and the intervention of mental conditions, causes a series of challenges for students (3,4). Different professors in the pre-clinical course may treat students in the clinical course, which causes other problems for students (5). The challenges of transitioning from pre-clinic to clinic cause problems such as confusion, stress, loss of part of knowledge, and educational opportunities for both students and professors. Identifying obstacles and challenges can help prevent these problems for future students. Therefore, this study aimed to evaluate the challenges and obstacles in transitioning from the pre-clinic period to the clinic for Ardabil University of Medical Sciences dental students.

## Methods

The present study was conducted qualitatively after receiving the research ethics code (IR.ARUMS.REC.1400.257) from Ardabil University of Medical Sciences. A semi-structured interview was used to collect data. The participants' opinions determined the time and place of the interview after obtaining oral consent to participate in the study. All the interviews were recorded quietly; like other qualitative studies, sampling continued until information saturation was reached. Finally, after six interviews with dental students who had passed endodontics practical and theoretical courses, theoretical saturation was reached, and the interview participants provided no new information. The analysis of the interviews was done based on the method proposed by Lundman and Graneheim after the interviews, who proposed five steps for qualitative data analysis as follows: 1. Writing the entire interview immediately after each interview; 2. Reading the entire text of the interview to get a general understanding of its content; 3. Determining meaning units and primary codes, 4. Classification of similar direct codes in more comprehensive classes, and 5. Determining the hidden content in the data (6). According to Linclon and Gouba, reliability was used to ensure the accuracy and reliability of the data from the validity criteria (7). The researcher had a long-term relationship with the participants, and by winning their trust, he helped more people get involved in the study. After forming the initial codes, the participants' comments regarding the correctness of the codes and interpretations were confirmed. They were modified when the codes were inconsistent with the participants' opinions. Two faculty members and experts in qualitative research and dental education used the control method, and consensus was reached on the selection and classification codes. After coding the factors, a questionnaire was prepared for this purpose and distributed among 30 dental students in Ardabil Dental Faculty. The identified factors were prioritized, and finally, the first six priorities were reported based on the ranking to present the results.

## Results

The essential challenges of clinical training in the endodontics department included support problems (laboratory, lack of turbines, unit failures), lack of patients, student stress, weak clinical skills, and poor study, respectively (Table 1). Further, the critical challenges of transferring knowledge from the pre-clinic to the clinic period in the endodontics department were the lack or shortage of educational equipment (phantoms,

etc.), weakness in covering practical training needs and work principles (sterilization), dental differences with the real field of the patient's clinic, and stress in contact with the real patient (Table 2). Facilitators of knowledge transfer from the pre-clinic course to the clinical course in the endodontics group included practical training on real teeth, sufficient practice, a suitable atmosphere for stress-free training, individual study, and proper ethics and communication of professors (Table 3).

**Discussion**

This study aimed to qualitatively evaluate knowledge transfer challenges from pre-clinic to dental clinics in the endodontics department among Ardabil University of Medical Sciences dental students. The fundamental challenges of realizing clinical education in the present study included support problems (laboratory, lack of turbines, unit failures), lack of patients, student stress, weak clinical skills, and poor analysis after coding and prioritization. Researchers have implicitly examined the challenges of realizing clinical education in past studies. Naram et al. (8) considered student stress the most critical challenge in realizing clinical education. Downey et al. (9) pointed to weakness in clinical abilities, Khakrah et al. (10) mentioned financial and physical resources, and Yaghini et al. (11) considered the factors of physical facilities and the inability to employ expert professors for new courses. Jamshidi et al. (12) stated that the fundamental challenges in realizing clinical education are ineffective communication, insufficient preparation, and emotional reactions. Gharaei et al. (13) noted the need for adequate training, an adequate number of students, and educational facilities in phantom and department. Sanatkhani et al. (14) reported the facilities and equipment of the clinical environment as the most critical challenges in realizing clinical education.Further, the critical challenges of transferring knowledge from the pre-clinic to the clinic period in the endodontics department were the lack or shortage of educational equipment (phantoms, etc.), weakness in covering practical training needs and work principles (sterilization), dental differences with the real field of the patient's clinic, and stress in contact with the real patient. The factors extracted from this study have theoretical and practical support. Regarding the lack of educational facilities and equipment, Yaghini et al. (11) showed that physical facilities are one of the challenges of transferring knowledge from the pre-clinic period to the clinic period. Gharaei et al. (13) indicated that the need for more students and educational facilities in the phantom and department is one of the challenges of transferring knowledge to the bedside. Sanatkhani et al. (14) found that there needed to be more facilities and equipment in the clinical environment that affected practical training from the student’s point of view.Regarding student stress, Naram et al. (8) showed that 39% of students have high stress during the clinical training course Students experience practice shock by transitioning from preclinical training to clinical training with increased anxiety and stress levels. Yaghini et al. (11) mentioned the need for a source to propose problems and provide practical solutions, the habit of the previous curriculum in the context of weakness in covering practical educational needs, and the principles of experimental work. Regarding the weakness in practical training (skills) and inadequate training of the treatment plan, Yaghini et al. (11) stated the lack of sufficient information resources to justify students, limited time to provide training, inability to employ expert professors for new courses, and unfairness in training as challenges. The other found challenges were the inappropriateness of integration, the use of non-dominant and untrained residents in the education of students, the method of presenting topics, inappropriate content in new courses, non-compliance with educational and preparatory prerequisites, non-compliance with medical education standards by professors. Farhad et al. (15) identified influential factors in the transfer of learning to the work environment in the in-service training of nurses in hospitals affiliated

with the Social Security Organization and considered the educational factor necessary. Regarding the weak physical presence of professors for training, Sanatkhani et al. (14) concluded that the student's point of view on the supervision of professors on how students work and the professors' presence time in several departments had problems, which affected their learning and knowledge transfer from pre-clinic to the clinic. Gheraghi (2009) pointed out that the disconnection between theory and practice is affected by the imbalance between the amount of theoretical and practical units, the lack of suitable laboratory facilities and equipment in the hospital for practical training, and the lack of active involvement in professors and postgraduate students in the bedside (16). Facilitators of knowledge transfer from the pre-clinic course to the clinic included practical training on real teeth, adequate practice, creating a suitable atmosphere for stress-free training, individual study, and proper ethics and communication of professors. In line with these results, Torres-Calixto et al. (17) investigated the trends and challenges of medical education in a study. The researchers have emphasized the importance of designing curricula that cover all aspects of health care, considering the supply and demand of medicine, and emphasizing professionalism and adherence to quality standards in the face of change. Malau-Aduli et al. (18) showed that workload and professional socialization were identified as disruptive elements. In this study, educators should consider developing social and developmental strategies emphasizing nurturing. In addition, empowering clinical learning environments and facilitating lifelong and transformative learning opportunities for students were suggested. Abu Salah et al. (19) showed that the medical equipment available at the clinical training site, and many students, found policies provided at the clinical training site, simulation laboratories, and suitable training environment help to fill the gap. Ward et al. (20) investigated the development of a framework for knowledge transfer to literature practice. Five common components of the knowledge transfer process were identified: problem identification and communication, knowledge/research development and selection, context analysis, knowledge transfer activities or interventions, and knowledge/research utilization. Sharif et al. (21) believe combining theory and practice in a clinical situation with appropriate clinical supervision can make students competent enough to care for patients. The opportunity to combine clinical experiences with evidence-based practice presented in theory classes can develop their decision-making process and performance (22). The challenges and facilitators of knowledge transfer from the pre-clinic period to the clinic in the endodontics group can be presented as follows, considering the scientific support and the results of the present study.

**Conclusion**

The results showed that knowledge transfer from pre-clinic to dental clinics in the endodontist group faces various challenges. These challenges can be solved by practical training on real teeth, sufficient training, a suitable atmosphere for stress-free training, individual study, and proper communication with professors. The experiences of prosperous countries in this field should be used to solve the mentioned challenges with detailed planning and holding educational workshops for professors to transfer knowledge from the pre-clinic course to the clinic course.

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Ardabil University of Medical Sciences **Authors Contributions:**

UZ, AK, RF conceptualized the study objectives and design. FH, UZ are infectious disease specialists who contributed to data collection from patients along with RF. AK, UZ and FH drafted

the study design protocols to be submitted to research centers. Data were was analyzed by UZ and RF. Manuscript was drafted by UZ, RF, and FH. All authors contributed in revisions.

**Ethical Consideration:**

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**Tables:**

**Table 1. Challenges of realizing clinical training in the endodontics department**

| Challenges of realizing clinical education in endodontics | Mean | SD | Priority |
|---|---|---|---|
| Poor study | 7.8 | 3.2 | 5 |
| Weakness of senior student guidance | 1.1 | 0.4 | 12 |
| Support issues (lab, lack of turbines, and unit failures) | 10.5 | 1.2 | 1 |
| A large volume of study units | 3.4 | 2.8 | 11 |
| Poor communication between students and teachers | 7.3 | 0.8 | 6 |
| Lack of student work | 4.8 | 1.7 | 9 |
| Lack of patients | 8.8 | 3 | 2 |
| Student stress | 8.3 | 3.5 | 3 |
| Weak clinical skills | 8.1 | 3.9 | 4 |
| Weakness in educational planning | 7.3 | 2.5 | 7 |
| Unnecessary strictness of professors | 5.5 | 2.9 | 8 |
| Inappropriate behavior of personnel/department manager | 4.8 | 1.2 | 10 |

**Table 2. Challenges of knowledge transfer from pre-clinic to dental clinics in the endodontics department**

| Challenges of knowledge transfer from pre-clinic to dental clinics | Mean | SD | Priority |
|---|---|---|---|
| The weak physical presence of professors in training | 8.5 | 4.1 | 13 |
| Lack of cases (patients) | 8 | 9.4 | 10 |
| A large number of course units in the pre-clinic course | 5 | 8.1 | 14 |
| Poor study of students | 8.8 | 3.2 | 8 |
| Poor teaching of the treatment plan | 6.11 | 3.2 | 7 |
| Weakness in practical training (skills) | 6.12 | 5.1 | 6 |
| Weak student motivation | 8.8 | 6.2 | 9 |
| The long time interval between pre-clinic and clinic | 4 | 2 | 16 |
| Weak monitoring and management of education | 1.6 | 9.3 | 12 |
| The difference between dentistry and the real field of the patient's bed | 1.14 | 2.3 | 3 |
| Stress in contact with the real patient | 13 | 2.2 | 5 |
| Providing training by technicians | 1 | 0 | 17 |
| lack or shortage of educational equipment (phantom) | 15 | 6.1 | 1 |
| Weakness in covering practical training needs | 6.14 | 9.2 | 2 |
| Weakness in covering the principles of practical work (sterilization, etc.) | 6.13 | 3 | 4 |
| Poor compatibility of education with the curriculum of the field | ¾ | 1.2 | 15 |
| Differences in professors' tastes in procedure training | 1.6 | 3 | 11 |

**Table 3. Facilitators of knowledge transfer from the pre-clinic to the clinic period in the endodontics department**

| Facilitators of knowledge transfer from the pre-clinic to the clinic period | Mean | SD | Priority |
|---|---|---|---|
| Ethics and proper communication of professors | 6 | 2 | 5 |
| Good senior student guidance | 1.3 | 0.5 | 10 |
| Interest of professors | 3.5 | 2.5 | 8 |
| Good educational videos | 2.8 | 1.1 | 9 |
| Appropriate feedback from professors | 5.8 | 0.9 | 6 |
| Creating a suitable atmosphere for stress-free training | 7.5 | 1.6 | 3 |
| enough practice | 8.6 | 8.6 | 2 |
| Individual study | 6.8 | 6.8 | 4 |
| Serious follow-up of professors | 3.6 | 3.6 | 7 |
| Practical training on real teeth | 8.8 | 8.8 | 1 |