Original Research

Challenges Of Realizing Clinical Education, Knowledge Transfer, And Facilitators Of Knowledge Transfer From Pre-Clinic To Dental Clinics: The Endodontics Dentistry Group

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Abstract

Background: In Health Professions Education, coordination between what is learned and what is used in the clinic is essential (18). The present study aimed to investigate the challenges of knowledge transfer from pre-clinic to dental clinics.

Methods: In the current qualitative-quantitative investigation, dental students of Ardabil University of Medical Sciences were examined in the endodontics department. A semi-structured interview was resorted to collect data. Concurrently with conducting the interviews, data analysis was done based on the method proposed by Lundman and Graneheim. To ensure the accuracy and reliability of the data, the validity, verifiability, and reliability criteria were assessed according to the opinions of Linclon and Gouba.

Results: After coding and prioritization, the results of the study unravel the nine challenges of realizing clinical training as support issues, poor study, poor clinical skills, lack of patients, poor educational planning, student stress, poor communication between students and professors, student under-work, and professors' unnecessary strictness. The challenges of transferring knowledge from the pre-clinical phase to the clinical phase in the present study were lack or shortage of training equipment, weakness in covering the practical educational needs, differences between dentistry and the actual clinical field of the patient, weakness in covering principles of practical work, stress in contact with the patient, weakness in practical training (skills), weak training in the treatment plan, and weak physical presence of professors for training. In addition, the results of the present study revealed that there was no significant difference in most of the questions on the challenges of realizing clinical education, knowledge transfer, and facilitators from the pre-clinical phase to the clinical phase according to gender, grade point average, and academic semester.

Conclusion: Dental students of Ardabil University of Medical Sciences encounter many challenges in transferring knowledge from pre-clinic to clinics, which can be reduced with careful planning.

Keywords: Pre-clinical phase, Clinical phase, Dental education, Endodontics group.

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Introduction

Previous studies have shown that there is a significant difference between the theoretical courses taught in the university and their use in clinical work. This leads to the academic materials presented in the classroom being less transferred to clinical situations, and the student needs help to use what he learned at the patient's bedside (1,2). The educators of clinical professions attempt to change education to answer this duality of theoretical data presented in classes and what is learned or experienced in practice. However, this issue still needs to be solved in courses with clinical training (3). Students of professions with clinical training receive training different from what they have learned in the classroom. That is why the students in these fields experience anxiety in their clinical work, which can influence their performance. The gap between theory and practice is a long-standing debate that can interrupt learning (4). This gap between theory and practice causes the new student not to be able to adapt to the mentioned conditions appropriately due to the conflicts between the expectations and the realities of the working environment and, in effect, show adverse reactions in physical and mental dimensions, such as feelings of helplessness, depression, lack of security due to lack of efficiency in the working environment, and finally, withdrawal from the profession (5). The ultimate goal in education is to create desirable changes in students who are the primary beneficiaries of a curriculum (6). To achieve the purposes of the curriculum, the needs of the learners should be determined, suitable knowledge and skills teaching methods should be set, and a proper evaluation method should be considered to preserve the quality of the curriculum (7,8). Many definitions are proposed to elaborate the gap between theory and practice; however, the one which most sources agree with and attribute the difference between classroom learning and its clinical application in clinical situations is crucial (1). With an extensive study of the dimensions of this distance, which undergoes the title of "the gap between theory and practice," Cheraghi declares that: "The gap between theory and practice is influenced by the imbalance between the volume of theoretical and practical units; lack of suitable laboratory facilities and equipment in the hospital for practical training; the lack of active involvement of postgraduate professors and students at the bedside" (9). Since the medical sciences trends are constantly changing and evolving, it is obvious to emphasize the necessity of reforming education and revising curricula (10). After acquiring the necessary skills from the pre-clinical phase, the students enter the clinical phase and test the skills learned from the pre-clinical phase combined with the clinical skills on patients (11). The practical dental units of endodontics (tooth root canal treatment) and orthodontics have clinical and pre-clinical courses during their training. The challenges of transferring from the pre-clinical phase to the clinical phase encompass problems such as confusion, stress, and loss of knowledge and educational opportunities for both students and professors. Thus, identifying these obstacles and challenges can help prevent these problems for future students. Taking these factors into account, the present study aims to investigate the challenges of realizing clinical education, knowledge transfer, and facilitators of knowledge transfer from pre-clinic to dental clinics in the endodontics dentistry group.

Methods

The present qualitative-quantitative study was conducted in Ardabil from November to February 2021. The statistical population of the study was the dental students who completed the pre-clinical course of endodontics and were currently studying in the clinical course at Ardabil University of Medical Sciences. The inclusion criteria in the research were dental students who had completed the pre-clinical course of endodontics and their willingness to participate in the study. On the other hand, the exclusion criterion was unwillingness to participate in the study. The purposeful sampling method was used. To have

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maximum variation, the following variables of the total and previous academic semester grade point average (GPA), gender, and academic semester were considered. Like other qualitative studies, sampling continued until data saturation was reached; the interview participants provided no new data.

Data collection materials

A semi-structured interview was used to collect data. Furthermore, exploratory questions were asked during the interview. All the interviews were recorded in a quiet place. Like other qualitative studies, sampling continued until data saturation was reached. After creating the initial codes, the participants' opinions were used to ensure the correctness of the codes and interpretations. If the codes contradicted their views, the codes were modified. To control the research, two faculty members and experts in qualitative research and dental education were resorted, and consensus was reached on the selection and classification of codes. In the quantitative part of the study, six priorities with the highest scores were compared by GPA, semester, age, and gender.

Data analysis

Concurrent with conducting the interviews, the data were analyzed using the method proposed by Lundman and Graneheim (12). The criteria of validity, verifiability, and reliability were calculated according to Lincoln and Gouba to evaluate validity and reliability (13). An independent t-test and one-way analysis of variance between groups in SPSS version 22 software were used to analyze the quantitative part of the study. A significance level of less than 0.05 was taken into account.

Results

The results of the research revealed that support problems (laboratory, lack of turbines, and unit breakdowns), lack of patients, student stress, weak clinical skills, and poor study are among the most critical challenges in realizing clinical training in the endodontics dentistry group, respectively (Table 1). The results showed that lack or shortage of training equipment (phantoms, set forth.), weakness in covering practical training needs, the difference between dentistry and the actual patient field, weakness in covering the practical educational needs (sterilization), and stress in contact with the actual patient are among the most critical challenges of transferring knowledge from the pre-clinical phase to the clinical phase is in the endodontics dentistry group (Table 2). Table 3 demonstrates the results of knowledge transfer from the pre-clinical phase to the clinical phase in the endodontics dentistry group. Practical training on natural teeth, sufficient practice, creating a suitable atmosphere for stress-free training, individual study, and ethics and proper communication of professors are among the most important facilitators of knowledge transfer. Generally, the results of the investigations showed that there is a significant difference in the knowledge transfer facilitators from the pre-clinical phase to the clinical phase in the endodontics dentistry group, according to the GPA in the questions of practical training on natural teeth and sufficient practice (P=0.05). Nevertheless, no significant difference was observed in the realization of clinical education, knowledge transfer challenges, and knowledge transfer facilitators from the pre-clinical phase to the clinical phase in the endodontics group by gender, GPA, and academic semester (except for student stress and clinical skill weakness) (P>0.05).

Discussion

Clinical training, both in initial and continuous training, should be in sync with clinical situations. Students should be able to gain sufficient learning experiences, both from the theory and the clinical point of view, and the clinical professors should provide this situation so that the student can become competent in the theory and clinical skills (14). Due to the importance of this issue, reviewing the literature revealed that no study has been conducted to investigate the challenges of knowledge transfer from pre-clinics to dental clinics; it also revealed that such studies have been

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conducted in other fields, such as hospital management and nursing.

Therefore, the present study aimed to unravel the challenges of knowledge transfer from the pre-clinical to the dental clinics among dental students of Ardabil University of Medical Sciences through a qualitative study. The results of the survey showed that the challenges of realizing clinical training in the support issues (laboratory, lack of turbines, and unit breakdowns), poor study, weak clinical skills, lack of patients, weak educational planning, student stress, poor communication between students and professors, student under-work, and professors' unnecessary strictness. Support problems (laboratory, lack of turbines, and unit breakdowns), poor study, and weak clinical skills were observed among the students; the need for more patient variables was one of the challenges of clinical training realization. In addition, student stress was observed in the endodontics group. In the previous studies, researchers implicitly examined the challenges of realizing clinical training. For instance, Naram et al. (15), in a study in 2021, investigated the attitude and perception of dental students about the transition from preclinical to clinical training.

The research revealed the following results: 61% of students stated that they had moderate confidence in patient surgery, 14% of participants reported shallow confidence in patient surgery, and most students reported that exposure to the clinical field had contributed significantly to clinical surgery. Also, 39 percent of the students were stressed when admitted to the clinical training course. The students experienced practice shock, high anxiety, and stress while transferring from pre-clinical training to clinical training.

Farhad et al. (16), in a study in 2020, identified the influential factors and components in transferring learning to the workplace in the in-service training of nurses in hospitals under the Social Security Organization. Their study demonstrated that the factors affecting the transfer of education can be in four dimensions, including individual, educational, organizational, and extra-organizational or environmental factors. In another qualitative study, Jamshidi et al. (17) 2016, investigated the challenges of nursing students in the clinical learning environment and found the three issues of ineffective communication, inadequate preparation, and emotional reactions. Qaraei et al. (18), in 2015, investigated the educational problems from Mashhad Dental School students' viewpoint. These students pointed out the following as the most critical educational problems of Mashhad Dental School: Lack of adequate training, inadequacy of the number of students and educational facilities in phantom and department, poor condition of scientific library, failure to use student participation techniques, inadequacy of some clinical units, and grading according to taste and without criteria.

In a descriptive-analytical and cross-sectional study (2012), Sanatkhani et al. (19) investigated the students' perception of clinical training and examination in Mashhad School of Dentistry. Their research sample was the fourth-, fifth-, and sixth-year students of the School of Dentistry. The findings of the study showed that the students' perceptions were positive in most of the training fields, the performance of the clinical professors, the facilities and equipment of the clinical environment, clinical evaluation, the evaluation of the student's activity by the professors, the cooperation between the nursing personnel, the educational goals of the department, and set forth. However, there were some areas for improvement in this field, especially regarding selecting the students' units, the professors' supervision of the students' work, and the professors' presence time in several departments.

Taking the results of the previous studies and the present study into account, the challenges of clinical training in dentistry can be presented as follows: Support problems (laboratory, lack of turbine, and unit breakdown), poor study, poor clinical skills, and lack of patients and student stress. In student stress, Naram et al. (15) 2021

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studied the attitude and perception of dental students about the transition from pre-clinical to clinical training. The results revealed that 39% of students experience high stress when admitted to the clinical training course.

To transfer from pre-clinical training to clinical training, the students experienced practice shock, and their anxiety and stress levels were high. In the field of weakness in covering the practical educational needs and the principles of practical work, in 2017, Yaghini et al. evaluated the challenges of implementing the general dentistry curriculum from the student's viewpoint. They underscored the lack of resources to raise problems and provide practical solutions and getting used to the previous curriculum.

Considering the scientific support and the results of the current study, the challenges of transferring knowledge from the pre-clinical phase to the clinical phase can be presented as follows: lack or shortage of training equipment (phantoms, and set forth), weakness in covering the practical educational needs, differences between dentistry and the actual clinical field of the patient, weakness in covering principles of practical work (sterilization, set forth.), and stress in contact with the patient.

Sharif and Masoumi (2005) believe that combining theory and practice in a clinical situation along with appropriate clinical supervision can provide students with sufficient competence to care for patients (21) if students are allowed to combine clinical experiences with evidence-based practice found in theory classes, they can develop their decision-making process and performance (22).

Regarding the scientific support and the results of the present study, the knowledge transfer facilitators from the pre-clinical phase to the clinical phase can be presented as the following: Practical training on natural teeth, sufficient practice, ethics and proper communication of professors, and creating a suitable atmosphere for stress-free training.

Conclusion

Taking the limitations of the study into account, the current study showed that the challenges of realizing clinical training in the present study after coding and prioritization include the nine challenges of knowledge transfer from the pre-clinical phase to the clinical phase and eight challenges and facilitators of knowledge transfer from the pre-clinical phase to the clinical phase. They included practical training on natural teeth, sufficient practice, creating a suitable atmosphere for stress-free training, individual study, and ethics and proper communication of professors.

Limitations of the study

The present qualitative research depends on the conducted interviews, so the validity of the results depends on the accuracy of the answers of the interviewed people. The mental and psychological conditions of the interviewees may influence the results of the interview and question the reliability of the results.

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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.

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References

1. Salehi S, Abedi HA, Alipour L, Najafipour S, Fatehi N. Learning activities and clinical nursing services gap and the related factors: a comparative study. Iran J Med Sci.

[Downloaded from intjmi.com on 2026-11-16]

2001;1(3):43-9.
2. Alipour Haydari M, Hasanzadeh GR, HajiSeied Javadi Z. Attitude of dentistry students at clinical sections of Qazvin Medical University towards the application of basic sciences courses. Inflamm Bowel Dis. 2002;6(2):38-42.
3. Landers MG. The theory–practice gap in nursing: the role of the nurse teacher. J Adv Nurs. 2000;32(6):1550-6.
4. Sharif F, Masoumi S. A qualitative study of nursing student experiences of clinical practice. BMC Nurs. 2005;4(1):1-7.
5. Abedi HA, Heidari A, Salsali M. New Graduate Nurses' Experiences of their Professional Readiness During Transition to Professional Roles. Iran J Med Sci. 2004;4(2):69-78.
6. Naderi E, Seifnaraghi M. Measurement and Evaluation in educational and psychology: Analytical foundations of its instruments. Tehran: Arasbaran; 2016. P: 17-9.
7. Allen D, Caffesse R, Bornerand M, Frame J, Heyboer A. Participatory continuing dental education. Int Dent J. 1994;44(5):511-9.
8. Moosavi H, Maleknejad F, Shariati A. Comparison of Restoration Types Requirements in Dentistry Curriculum with the Practiced Restorations by Dentistry Students of Mashhad Dental School during 2007-2008. Stride dev med educ. 2011;8(1):14-21.
9. Gheraghi MA. Theorize on Theoretical Knowledge Transfer into Practice in Nursing: A Grounded Theory Approach. Avicenna J Nurs Midwifery Care. 2009;17(12):24-34.
10. Levine R. Experience, skill and knowledge gained by newly qualified dentists during their first year of general practice. Br Dent J. 1992;172(3):97-102.
11. Ansari Moghadam S, Shokoohinia R, Hosseini Tabatabaei S, Risbaf Fakour S, Ansari Moghaddam A, Naebi M. Evaluation of the Achievement of Educational Objectives in Restorative Dentistry and Periodontics Departments in Zahedan Faculty of Dentistry during 2014-2015. J Mashhad Dent 2017;41(2):91-106.
12. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. Nurse Educ Today. 2004;24(2):105-12.
13. Heydari H, Kamran A, Novinmehr N. Nurses' perceptions about causes of medication errors: A qualitative study. Hayat. 2015;20(4):19-34.
14. Roshan Essani R, Ali TS. Knowledge and Practice Gaps among Pediatric Nurses at a Tertiary Care Hospital Karachi Pakistan. Int Sch Res Notices. 2011;3(5):1-8.
15. Naram A, Antony DDP. Attitude and perception of dental students on transition from preclinical to clinical training. Int J adv Res Innov Ideas Educ. 2021;7(3):419-23.
16. Farhad S, Pardakhtchi MH, Sabbaghiyan Z. Identifying the effective factors and components in transferring learning to the work environment in in-service training of nurses in hospitals affiliated to the Social Security Organization. Iran J Med Sci (Islamic Azad Univesity-Tehran). 2020;30(1):82-91.
17. Jamshidi N, Molazem Z, Sharif F, Torabizadeh C, Najafi Kalyani M. The challenges of nursing students in the clinical learning environment: A qualitative study. Sci World J. 2016;2016:1846178.
18. Sh G, Kargoza S, Amirchakhmaghi M, Gholami H. Students' Viewpoints of Mashhad Dental School about educational problems a qualitative study. MED EDUC J 2015;8(2):123-30.
19. Sanatkhani M, Molla Z, Akbari M. Evaluation of the students' perception about clinical training and examination in Mashhad School of Dentistry (Iran) in 2009. J Mashhad Dent Sch. 2012;36(3):211-22.
20. Yaghini J, Faghihi A, Yamani N,

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Daryazadeh S. Challenges for Implementing General Dentistry Curriculum from Students' Viewpoint: A Qualitative Study. J Mashhad Dent Sch. 2018;42(4):356-69.
21. Sharif F, Masoumi S. A qualitative study of nursing student experiences of clinical practice. BMC Nurs. 2005;4(1):1-7.
22. Scully NJ. The theory-practice gap and skill acquisition: An issue for nursing education. Collegian. 2011;18(2):93-8.

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Tables:

Table 1- Challenges of realizing clinical education

Challenges of realizing clinical training Endodontics dentistry group	N	Total	M	SD	Priority
Poor study	6	47	8/7	2/3	5
Weak guidance from their fellow majors in university one year ahead	6	7	1/1	4/0	12
Support problems	6	63	5/10	2/1	1
A large number of course units	6	26	3/4	8/2	11
Poor communication between students and professors	6	44	3/7	8/0	6
Student under-work	6	29	8/4	7/1	9
Lack of patients	6	53	8/8	3	2
Student stress	6	50	3/8	5/3	3
Weak clinical skills	6	49	1/8	9/3	4
Weak educational planning	6	44	3/7	5/2	7
Professors' unnecessary strictness	6	33	5/5	9/2	8
Inappropriate behavior of personnel/supervisor	6	29	8/4	2/1	10

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