

# Student perception about efficacy of preclinical fixed prosthodontic training to facilitate smooth transition to clinical context

Satheesh B. Haralur, Abdullah Edrees Al-Malki<sup>1</sup>

Department of Prosthodontics, College of Dentistry, King Khalid University, Abha, <sup>1</sup>Department of Orthodontics, Majmaah University, Al Majma'ah, Kingdom of Saudi Arabia

## ABSTRACT

**Background:** Studies indicate that the initial transition period between preclinical and clinical phases are the most stressful. The students have experienced the difficulty in performing clinical procedures due to the vast difference in the clinical and preclinical setup. It is better to identify the particular skill found poorly correlated, enabling educators to address the concerns. We sought the opinion and suggestion from the beneficiary student on fixed prosthodontics steps difficult to practice in clinical setup at the initial stage, their suggestion to overcome these shortcomings was also sought. **Aims:** To determine the fixed prosthodontics skills difficult to perform in a transition period due to poor correlation between preclinical and clinical training from our focus group study on the student's perception, and their suggestion regarding alternative methods to improve the preclinical training. **Materials and Methods:** Focus groups in the study were the students involved in clinical practice of fixed partial denture procedure. A well-constructed Questionnaire, designed to evaluate the difficult clinical steps in a transitional period and suggestion to improve the existing preclinical training was distributed to all focus group students. The response to the questionnaire was based on the five-point Likert scale. **Statistical Analysis Used:** Medians, frequencies were used to assess their perception on preclinical training and suggestion. **Results:** A total of 97 students participated in the study, 88% response received during the survey. The clinical steps student felt difficult during a transition period from preclinical to clinical phase were positional variations of teeth (52.6%-63.9%), fluid control (48.5-67.1%), shade selection procedure (29.9%-50.5%), subgingival cervical finish line preparation (38.1-51.5%), and gingival retraction procedure. The students felt that the inclusion of problem-based learning, preclinical patient exposure, and better simulation will alleviate the stress during the transition period. **Conclusions:** This study highlighted the tooth preparation steps found difficult to practice in a transition period between

preclinical and clinical phases. This study also obtained suggestions from the students for innovative upgradation of the course curricula.

**Key words:** Fixed partial denture, preclinical training, transition period

### Address for correspondence:

Dr. Satheesh B Haralur,  
Department of Prosthodontics, College of Dentistry, King Khalid University,  
Abha, Kingdom of Saudi Arabia.  
E-mail: hb\_satheesh@yahoo.com,

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## INTRODUCTION

Dental curriculum is continually developed to improve the knowledge, skill, attitude, and professional values before beginning the career as a practicing dentist.<sup>[1]</sup> This development is possible only from the feedback from beneficiary students regarding the perception and evaluation of the courses.

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Development of fine motor skill is as important as knowledge gain in dental education. Psychomotor skill development is usually achieved by incremental training in preclinical courses before declaring the student competent for clinical training.<sup>[2]</sup> Effective preclinical training is also ethical and extremely important for patient safety. Tooth preparation procedures are irreversible in nature, once a wrongly prepared tooth can never be repaired.<sup>[3]</sup> Simulators are used in the dental education to develop the skills among the students in prosthodontic, endodontic, operative, and pedodontic dentistry preclinical courses. There are varieties of simulation equipments in modular, bench, or chair configurations, the main intention is to mimic the real patient condition. Better preclinical training helps the students for a smooth transition from preclinical to clinical condition.<sup>[4]</sup> The literature clearly suggests that the transition period from preclinical to clinical situation is highly stressful.<sup>[5]</sup> Stress during the transitional stage is the result of multiple factors such as a large difference between learning environment, applying their knowledge and skills to real patient problems, and the need to adopt different learning strategies as well as meet the performance expectation.<sup>[6]</sup>

Adequately preparing the students for smooth clinical transition still poses a great challenge for educators. The preclinical training provides a learner-centered education without clinical responsibilities, sometimes far away from the situation it wants to imitate. We believe that task-based preclinical training more similar to clinical practice will help the students to overcome the stress during initial clinical practice. Hence it was decided to know the individual steps involved in the fixed prosthodontics preclinical training different from clinical settings, in which such procedures will be performed. Identifying poorly correlated tasks makes it easy to address them with appropriate corrective measures. Beneficiary students' feedback is an important tool to identify them and their opinion on alternative improved methods of training is vital in curriculum development.

The purpose of the present study was to determine the fixed prosthodontics skills difficult to perform in a transition period due to poor correlation between preclinical and clinical training. The study included the focus group study on the student's perception, and their suggestion regarding alternative methods to improve the preclinical training.

## MATERIALS AND METHODS

### Subjects

King Khalid University has two didactic preclinical fixed partial denture courses comprising lectures to impart knowledge and simulation training on the bench-top manikins to develop the skill. The courses are requirement-based curriculum where the students should complete the required number of typodont tooth preparations. The examination is designed to measure the student's knowledge and psychomotor skill; it will help in identifying whether the student is competent enough to be progressed to clinical courses.

Predoctoral dentistry degree comprises 12 semesters followed by 1 year of internship training programs. Students above the ninth semester are involved in the fixed partial denture clinical training. All the students above ninth semesters are a beneficiary from preclinical training; hence they formed the focus group for this study along with students in an internship program.

### Questionnaire

An 18-item survey was developed by the researchers after a lengthy interaction with the students, and it was divided into two segments. The first part included 13 questions on tooth preparation maneuvers found difficult during a transition period from a preclinical to clinical setup. The second part of the questionnaire had five questions regarding suggestions to facilitate better transition to clinical setup. Questions were closed and to be answered with a 5-point Likert scale (1 strongly disagree; 5 strongly agree). Reliability and validity of the instrument were addressed by a pilot study and statistical testing of the instrument. Cronbach's alpha coefficient (0.813) was determined to ascertain internal consistency.

### Procedure

Approval from the Institutional Committee of Ethics Research was obtained for the study. A total of 110 students and interns were included in the cross-sectional study; a self-administered anonymous questionnaire was distributed to the students during their clinical training period. Before the questionnaires were distributed, students were given information about the study, and written informed consent was obtained from all the students participated in the study.

The responses to a questionnaire were computed; data were analyzed with the assistance of SPSS version 19 (IBM Corporation, Armonk, New York, USA), median, frequencies were determined to assess the perception of the students.

## RESULTS

The survey response was 88%; 97 students returned the completed survey forms out of the 110 forms distributed. Responses from the students were analyzed using absolute numbers, median, percentages, and frequencies.

Table 1 shows the descriptive statistics of students' feedback on the skills found difficult to incorporate in the clinical environment. The majority (71.1%) of the students thought that there is not much difference in the tactile sense between natural teeth and the typodont teeth. And 40.4% of the respondents expressed difficulty in correlating pulp size and position in a clinical situation. Pulp health preservation is vital for all restorative procedures, hence this response from the students should be considered more carefully.

More than half of the respondents (52.6%-63.9%) thought that clinical variation of tooth position is the difficult

challenge during the transition stage. Tooth position variations such as supraeruption, tilting, and drifting is common in clinical situation, and the students opined that it was a formidable challenge in the initial stage of clinical training. Fluid control includes salivary control, elimination of water coolants used during the tooth preparation, 48.5%-67.1% respondents found it demanding in a transition phase. Another skill, 38.1%-51.5% students felt difficult was subgingival cervical finishline preparation and gingival retraction procedure. Clinical procedures such as impression making, occlusal evaluation, and luting cement handling were rated as relatively easy by 45.4%, 53.6%, and 42.3% of students, respectively. A 44.3% subjects also felt it was comfortable to self-evaluate the tooth preparation to enable them to identify and correct the limitation in tooth preparation. Some students (29.9%-50.5%) felt that teeth shade selection procedure taught at the preclinical teaching was inadequate for clinical practice.

The students' feedback [Table 2] was sought for improving the existing preclinical training. They were asked about their opinion on inclusion on problem-based learning (PBL), expert live demonstration, preclinical patient exposure, peer evaluation, and better simulation methods for improvement of curricula.

Students participated in the study were strongly in favor of (median, 5) including PBL, preclinical patient exposure, and better simulation methods to improve preclinical training.

Approximately 73.2% agreed to inclusion of peer evaluation, while 76.3% of the participants felt expert live demonstration is beneficial.

## DISCUSSION

Preclinical training is helpful in the development of competency, confidence, and expertise before the students are to perform on the real patients. This training is a mandatory to identify those students who should not be proceeding to the clinical training. Tooth preparation is an irreversible procedure; hence it will be highly unethical to allow the students with less proficiency to learn on live human patients. It is obligatory on the part of instructors to continuously evolve the course to make the students ready to practice safely and effectively on the patients.<sup>[7]</sup> Students who performed well in preclinical courses may not excel at clinical procedures due to multiple factors involved.<sup>[8]</sup> Although it is well established that students are under extreme stress during the initial clinical rotation, it is imperative on the part of the educators to identify the steps students feel difficult/unsure during this period. Feedback from the beneficiary students in the study regarding learned skills showed a major gap between the preclinical and clinical phases. This feedback is an important tool for the educators to improve the preclinical training.

The clinical steps in fixed partial denture fabrication that the students felt difficult during transitional period

**Tables 1: Descriptive statistics of students' feedback on the difficult skills during transition period**

Question	Frequency					Percentage					Median
	1	2	3	4	5	1	2	3	4	5	
Tactile sense difference between natural teeth and ivory teeth	4	20	45	10	18	4.1	20.6	46.4	10.3	18.6	3.00
Relative size and position of pulp	4	12	38	23	20	4.1	12.4	39.4	23.7	20.7	3.00
Clinical variation: Supraeruption, tilting, etc.	0	6	29	51	11	0	6.2	29.9	52.6	11.3	4.00
Fluid control	0	8	24	47	18	0	8.2	24.7	48.5	18.6	4.00
Subgingival cervical margin/gingival retraction	0	12	35	37	13	0	12.4	36.1	38.1	13.4	4.00
Impression procedures	1	12	44	29	11	1.0	12.4	45.4	29.9	11.3	3.00
Occlusion evaluation and correction	2	25	52	11	7	2.1	25.8	53.6	11.3	7.2	3.00
Self-evaluation of preparation	2	20	43	28	4	2.1	20.6	44.3	28.9	4.1	3.00
Handling/selection of various luting cements.	3	26	41	22	5	3.1	26.8	42.3	22.7	5.2	3.00
Positioning of patient	7	25	39	19	7	7.2	25.8	40.2	19.6	7.2	3.00
Retracting and protection of surrounding soft tissues	2	16	32	39	8	2.1	16.5	33.0	40.2	8.2	3.00
Tooth shade selection procedures	3	14	31	29	20	3.1	14.4	32.0	29.9	20.6	4.00
Preparation of cervical margins	3	14	40	34	6	3.1	14.4	41.2	35.1	6.2	3.00

**Table 2: Students' feedback for the improvement in existing conventional preclinical training**

Suggestions	Frequency					Percentage					Median
	1	2	3	4	5	1	2	3	4	5	
Involving problem-based learning	2	3	9	29	54	2.1	3.1	9.3	29.9	55.7	5.00
Showing expert live/video demonstration	1	3	19	33	41	1	3.1	19.6	34.0	42.3	4.00
Preclinical patient exposure	2	3	10	32	50	2.1	3.1	10.3	33.0	51.5	5.00
Inclusion of peer evaluation	0	9	17	31	40	0	9.3	17.5	32.0	41.2	4.00
Better simulation methods closer to clinical situation	3	2	12	26	54	3.1	2.1	12.4	26.8	55.7	5.00

were clinical variation of tooth position (52.6%-63.9%), fluid control (48.6%-67.1%), subgingival cervical finishline preparation (38.1%-51.5%), and tooth shade selection (29.9%-50.5%).

Preclinical courses are taught on the manikin jaws, in which teeth are set in the normal, perfect manner. Preparation is mostly learnt on the teeth positioned normally. In clinical situations, in most probability teeth are not in perfect position. Individual variations such as supraeruption, tilting, drifting is common due to loss of arch integrity. Students are not trained on these commonly found above-mentioned clinical situations. An important observation of the study, in the opinion of the author, is that these commonly found clinical variations should be included in preclinical training. Students not trained according to the expected clinical variations, and they generally feel stressful and anxious at initial stages. And 67.1% of the students found that saliva-fluid control is difficult to master from existing preclinical training. Saliva varies in its amount and consistency in patients. There is an increase in salivary flow during stressful dental procedures. Learning the effective communication skill is important for active patient co-operation for this procedure. Preclinical patient exposure can be helpful in overcoming this difficulty.

Preparation of the subgingival cervical finishline needs extreme dexterity from the dentist, to avoid irreversible damage to a periodontium.<sup>[9]</sup> There is a large difference between the simulated periodontal tissues in manikins from the natural periodontium. Simulated periodontium is devoid of attachment, proper gingival sulcus width and length. A total of 38.1%-51.5% of the respondents felt subgingival cervical finishline preparation and gingival retraction procedure learnt at preclinical training were difficult to practice on real patient in the initial period. This observation indicates a need for improvement in manikins to replicate natural periodontium or alternative training methods.

Surprising find from the study is 29.9%-50.5% of the student felt shade selection training need to improve for easy clinical transition. The best of the restorations fail due to the color mismatch between restoration and adjacent teeth. Only theoretic class with training on the ivory teeth is inadequate for the shade selection procedure. There is a need to improve this procedure by including preclinical patient exposure, alternatively training to select the shade among students can be included.

In their opinion on the steps needed to improve the preclinical training, 55.7% of the students strongly felt PBL should be adopted for the preclinical training. It is suggested by researchers, transition is easy for the students in a problem-based learning curriculum.<sup>[10,11]</sup> PBL inculcates the ethics of team work and encourages self-directed learning. It will help the student to gain required psychomotor skill in addition to skill of critical thinking and decision making, which are important for clinical practice.

An 84.5% of the students were of the opinion that preclinical patient exposure will be helpful. Many medical educationists have suggested this procedure will alleviate the stress and prepare the student well during early clinical practice.<sup>[12-14]</sup> Conventional preclinical training encourages the student to only memorize the steps; they fail to apply the concepts learnt in preclinical training in clinical practice. Preclinical patient exposure helps the student to understand the clinical reasoning and encourage them to pursue the training in the right spirit.

The objective of simulators is to create the clinic-like setting. The overwhelming majority (82.5%) also suggests the improvement in simulation methods. The majority of contemporary manikins can be positioned similar to a patient with average mouth opening and mandibular movements. Still, there is a scope for improvement regarding development of periodontium, tongue, and the surrounding soft tissue, pulp chamber, and so on. A recent trend in many dental schools across the world is to introduce virtual reality computer-assisted simulation. The study showed 41.2% of the respondents strongly suggested the importance of self-peer evaluation similar to studies conducted by Rees C and Musolino GM.<sup>[15,16]</sup> It will help the students develop the critical thinking and enable them to identify the tooth preparation limitations. The ability to identify these mistakes in tooth preparation is important to overcome or avoid them in the future.

Preclinical training is the most challenging for the educationist. It is imperative to evaluate the effectiveness of the training regularly. The feedback will help in needed development and implementation of different curricula innovations.

## CONCLUSION

Managing the transition for students from preclinical learning to providing patient care in the clinic is an important issue for oral health care educators. The participant's response on the difficult steps during the transition stage to clinical phase indicated the demand for further development of curriculum. The negative experiences felt by the students during the transition period were clinical variation in tooth position, fluid control, gingival retraction, and shade selection.

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