

# STUDENTS' PERCEPTION AND SATISFACTORY LEVEL FOR PREPARATION OF PORCELAIN FUSED TO METAL CROWN IN PRECLINICAL FIXED PROSTHODONTICS

(PERSEPSI DAN TINGKAT KEPUASAN MAHASISWA TERHADAP PREPARASI MAHKOTA PORSELIN DI PREKLINIK PROSTODONTI CEKAT)

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## Abstract

Preclinical session is one way of training dental undergraduates to prepare teeth for restorations. The aims of the study were to evaluate students' perception and satisfactory level in preparing tooth for porcelain fused to metal crown in preclinical fixed prosthodontics sessions. A total of 104 fourth year dental undergraduates students participated in this study. Lecture consisted of the diagrams of step-by-step procedure in preparing porcelain fused to metal crown on tooth 24. Video demonstration was also conducted. After they were satisfied with the preparation, they were asked to answer a series of multiple choice questions on their performance. Only 92 students completed the questionnaire. Majority of the students taught that their occlusal and axial reductions were about right. As for the margin, 50 students claimed that the margin was located on gingival margin while 88 students said that they prepared shoulder margin buccally and 4 students created chamfer margin buccally. Seventy four out of 92 students were slightly satisfied with their crown preparations. Twenty five students said that they were very competent and confident in doing crown preparation to patients. Almost all fourth year dental students could perform porcelain-fused-to-metal crown preparation with confidence. As conclusion, exposure to our teaching methods and aids appears to help them in preparing these tasks.

**Key words:** student's perception, satisfactory level, porcelain fused to metal

## INTRODUCTION

Preclinical teaching in clinical dentistry is the vehicle to provide foundation knowledge and develop clinical skill in the basic dental procedures. Students gain input and clinical skills from preclinical practice to become comfortable with clinical procedures and gain adequate feedbacks about the quality of their effort, therefore they can perform these procedures independently. The students must also develop the ability to make clinical decision to meet patients need, interpretation, and treatment. There are many preclinical teaching modalities to achieve students' competency but yet some of these modalities are not clearly defined and their outcomes are elusive.<sup>1-3</sup>

Faculty of Dentistry, The University of Hong Kong has introduced and evaluated the preclinical fixed prosthodontics course that used student-centred, small group problem-orientated discussion

activities as the main medium of instruction. Small-group student-centred learning activities were reported as creating an active, safe learning environment with beneficial opportunities for peer to peer interaction such as questioning, teaching and learning from students. However, students still expressed a preference for teacher-centred information dissemination and activities.<sup>1</sup>

Due to significant changes in prevention, esthetics, and dental materials place significant time constraints have become part and parcel of educational system. Teaching of traditional intracoronal and extracoronal restorations alone is considered inadequate in preparation for the modern dentistry. Concurrent with today's changes, Harvard School of Dental Medicine (HSDM) developed a shortened preclinical restorative training curriculum to make time available for training opportunities in other areas, such as aesthetic dental procedures and new biomaterials.<sup>2</sup> Ferguson reported that eventhough major

\* This article was presented at the 14<sup>th</sup> FDI/MDA Scientific Convention and the 64<sup>th</sup> Malaysian Dental Association Annual General Meeting.

ality of students felt the course was too short at the beginning but retrospectively, in terms of clinical preparedness, 55 percents felt adequately prepared and 35 percent felt well prepared to treat their patients.<sup>2</sup>

Gray in 2003 conducted a study to determine if a computerized simulated exercise predicts students' performance on preclinical laboratory exercises. The results showed a significant correlation between the simulator scores and DAT sub-test scores of Academic Average and Total Science.<sup>3</sup> Based on these results, the simulator appears to be a good measure of general cognitive ability, including cognitive ability required to complete uncomplicated preclinical exercises.<sup>3</sup>

In Faculty of Dentistry Universiti Kebangsaan Malaysia, our preclinical fixed prosthodontics training started at the beginning of the fourth year. It is focused on procedures that are discipline-based and the students have the opportunity to work closely with the supervisors or lecturers in every step in the required exercise. Here, students would gain more experiences during the training sessions. During this period of trainings, students should develop high self-confidence and competence as well as high level of satisfaction before they treat patients in the real clinical setting. The aim of this study was to evaluate students' perception, self evaluation and satisfactory level in making tooth preparation for porcelain fused to metal crown in preclinical fixed prosthodontics.

## MATERIALS AND METHODS

The fourth year dental undergraduates, with the total number of 104 students were involved in these preclinical sessions. These sessions were conducted in Faculty of Dentistry, UKM simulation laboratory. It housed 61 dental simulation units that has multi-position torso and adjustable phantom head with hard cranium, soft rubber face and anatomically maxillary and mandibular dentaforms and screwed plastic teeth. Individual operating lights, handpieces with water coolant, air/water spray syringes and central suction function are attached to each unit to simulate the clinical setting. Before the sessions started, they were given a preclinical manual that consisted of diagrams and pictures of all the procedures that they had to perform, evaluation criteria and multiple choice questionnaires on their performance. The students were asked to participate in this study and written consent from them was conducted.

Students were taught on preparing PFM on tooth 24. Lecture on PFM tooth preparation, impression

taking, provisional restoration and diagnostics wax-up was one-hour length each. It consisted of diagrams of step-by-step procedure for each task. Video demonstration was conducted before students were asked to prepare the tooth. After they had completed and were satisfied with their tasks, with the help of clinical instructors, either prosthodontics lecturers or tutors, they were asked to answer a questionnaire. The investigators were interested in measuring the students' perception of the effectiveness of their preclinical task and their satisfaction toward teaching fixed prosthodontic. Questionnaire incorporated Likert scaled type questions, 'Yes or No' type and multiple choice questions. The variables evaluated were: occlusal reduction (clearance, cusp orientation, and form/contour); axial reduction (dimension, orientation, taper/parallel and undercut); finishing margin (location, type, continuity, and integrity); secondary impression surface (void/defect, and detailed reproduction of prepared teeth/adjacent tissues); provisional restoration (margin contour and adaptation, structural durability, surface polish, and occlusion); diagnostic wax up (surface and contour, detailed production, and occlusion) and satisfaction level (level of difficulty, and level of satisfaction toward tasks and teaching methods).

Data collection took place on the second week after the preclinical sessions ended. The data were processed and analyzed by means of the Statistical Package for the Social Sciences (SPSS version 12.0). Out of 104, 92 students returned the completed questionnaire, resulting in a response rate of 80%. The result section will include a description of the crown preparation, the secondary impression, the provisional restoration and the diagnostic wax-up. Questions were chosen to address issues related to their level of satisfaction in performing the tasks, level of difficulty of each task, their level of competence and confidence and teaching methods and aids.

## RESULTS

With regards of occlusal reduction, 91.3% students thought that the reduction was about right while 6.5% students admitted that the reduction was too much. The remaining said the reduction was insufficient.

As for axial reduction, 85.6% students had about right reduction buccopalatally and 84.7% had right reduction mesiodistally. Eight preparations were too tapered buccopalatally and 10.8% preparations were too tapered mesiodistally. Table 1 showed 5.4% students had created undercut on the axial wall buccopalatally and 4.5% mesiodistally. Majority of

students did not damage mesial or distal surfaces of adjacent teeth (61.9% mesial and 62.5% distal) but 35.8% (mesial) and 32.6% (distal) students created flat facets. Unfortunately, 2.2% students damaged adjacent teeth badly leaving deep gouge mark on mesial and distal surfaces (Table 1).

Table 1. Condition of prepared tooth after axial reduction

Axial reduction	Too tapered N (%)	Right N (%)	Under cut present N (%)	Total
Buccolingual	8 (9.00)	79 (85.6)	5 (5.4)	92
Mesiodistal	10 (10.8)	78 (84.7)	4 (4.5)	92

As for the location of margin 62.5% students claimed that the margin was located on gingival margin, while 41.3% students placed the margin supragingivally. The rests of them placed the margin subgingivally.

In preparation of porcelain fused metal crown, shoulder margin should be placed on buccal while lingual margins should be chamfer. As illustrated in Figure 4, 95.6% students claimed that they prepared shoulder margin buccally while the other 44.3% students prepared chamfer margin. There were 93.4% students prepared chamfer margin on the palatal, 5.4% students claimed they prepared shoulder margin and 1.2% student prepared knife-edge margin (Table 2).

Table 2. Type of margin prepared by the students

Type of margin	Knife-edge N (%)	Shoulder N (%)	Chamfer N (%)	Total
Buccal	0 (0)	88 (95.5)	4 (4.5)	92
Palatal	1 (1.2)	5 (5.4)	86 (93.4)	92

A total of 87 students thought they had achieved detailed reproduction of prepared tooth 24 but 5 of them failed. As for soft tissue and adjacent teeth, most students claimed their impressions were successful but the rests failed to do so.

Students were expected to produce good provisional restoration. During preclinical session for PFM provisional restoration, a total of 38% students claimed the provisional margin was not opened while 34.8% students reported that they detected gap of less than 0.5mm. Unfortunately, 21.7% students detected marginal gap of more than 0.5mm and the remaining created gap bigger than 1mm

(Table 3). In term of provisional contour, majority of students 48.9% reported they had good provisional contour but needed some adjustments to make it acceptable. Only 43.5% students achieved acceptable provisional contour, and 7.6% failed to achieve adequate provisional contour. More than half of the class produced good provisional restoration with acceptable durability while the rest created poor provisional restoration but it can be repaired except one which damaged badly and cannot be repaired. Almost all subjects thought they have created good occlusal contacts. One contact per tooth is considered acceptable.

Table 3. Form of the margin of provisional crown

Provisional: Margin	Students	%
>1mm	5	5.5
>0.5mm	20	21.7
Not open	35	38.0
<0.5mm	32	34.8
Total	92	100

A total of 4, 94.6% students claimed they created detailed production of cuspal area, and the rest (5.4%) failed to produce good cusps. The similar pattern was seen in the area of central fossa and marginal ridges. Marginal ridges rated the most unacceptable detailed production by subjects followed by central fossa and cusps (Tabel 4).

Table 4. Detailed production of the diagnostic wax-up

Type of margin	Acceptable N (%)	Unacceptable N (%)	Total
Cusp	5 (5.4)	87 (94.6)	92
Central fossa	9 (9.8)	83 (90.2)	92
Marginal ridges	12 (13.0)	80 (87.0)	92

A total of 80.4% students were slightly satisfied with the crown preparation; 17.4% of them were very satisfied and only 2.2% students were not satisfied with their preparation. The similar pattern of distribution was seen in satisfaction level of impression taking, provisional restoration and diagnostic wax-up. Exception for diagnostic wax-up, one student chose 'I do not care'.

Only two students claimed that preparing PFM on tooth 24 was easy. A total of 50% students pointed out that the level of difficulty was moderate for this task while the other 42.4% said it was difficult. Adversely, 5.4% of them claimed that overall procedure was very difficult (Tabel 5).

Table 5. Student's perception on level of difficulty for each task

Level of difficulty	Number of students	%
Very Easy	-	-
Easy	2	2.2
Moderate	46	50
Difficult	39	42.4
Very Difficult	5	5.4
Total	92	100

A total of 48.9% students declared that diagnostic wax-up for tooth 24 was the most difficult task compared to crown preparation, provisional restoration and impression taking. None of them chose impression taking as their most difficult task.

When questioned regarding their level of competence and confidence to treat patients with PFM crown, 27.2% reported that they were competent and confident and 68.5% students claimed to be in so-so group but only 4.3% students had no confidence and competence doing this treatment procedure.

A total of 92.4% students thought that the lectures given were very good, while 7 of them said that the lectures were not thorough. Out of 92 students (73.9%) claimed that the video demonstrations were very clear. On the other hand, 26.1% students said that the demonstrations were unclear. With regards to the preclinical manual given to them before the session started, 85.9% students said that the manual was good and the rest of them claimed that the manual could be improved. As for assistance in the preclinical session, 84.8% of them said that the lecturers or tutors did assist them during the procedure (Table 6).

Table 6. Student's satisfaction on lectures and other teaching aids

Response	Lectures	Demonstration	Manual	Assistance
Yes	85 (92.4%)	68 (74.0%)	79 (85.6%)	78 (84.7%)
No	7 (7.6%)	24 (26%)	13 (14.4%)	14 (15.3%)
Total	92	92	92	92

## DISCUSSION

Understanding students' ability and perception in learning complex skills is of paramount importance for dental education in predicting performance. Our results showed there were differences in perceptions and experiences received by each student.

In preparing tooth for PFM crown, most of the students claimed they have successfully prepared the occlusal and axial surfaces. However, about 38% students damaged adjacent teeth even though it was only required direct vision. At the early stage of fixed prosthodontic, students are still struggling with their ability to fully utilised their manual dexterity as well as direct and indirect vision. Some of them did not realize that they damaged adjacent teeth. With regards to margin, most students prepared shoulder buccally and chamfer palatally at the correct locations. The structural durability, biologic width and aesthetics considerations are important features in preparing good and correct margin.

Almost all students said they produced successfully good impression of prepared tooth, adjacent tooth as well as soft tissue. Taking impression on real mouth in clinical setting will introduce the student to another different scenario as saliva and muscle movements will come in the picture. In simulation, the manikin mouth is dry and static as this eases the impression making procedure.

Margin seems to be the most difficult part of provisional restoration compared to contour, durability and occlusion. More than 50 percentages of students taught they had created opening at the margin. For diagnostic wax-up, marginal ridges appeared to be the most difficult area followed by central fossa and cusps.

The participants rated their level of satisfaction on tooth preparation, impression taking, provisional restoration and diagnostic wax-up slightly or very satisfrely. Weighing between four tasks, most participants claimed that diagnostic wax-up was the most difficult one. These students needed to cast the impressions then mounted them on articulator before they could finally proceed with diagnostic wax-up. If they failed to mount the casts correctly then remount should be necessary. These procedures can be complicated which may lead to frustration.

Only four participants felt that they had no competence and confidence in performing these tasks. This is consistence with our results where majority of the participants felt that they performed well in all four tasks. In this study, the students' perception of confidence and competence were measured to assess the effect of the simulation clinic. The fourth year class had experience in the simulation clinic for other disciplines such as operative but not for fixed prosthodontics, and it was anticipated that their confidence would be low at the beginning of the preclinical course. Perhaps a more accurate evaluation would have been obtained by measuring the students' perception after completion of preclinical course.

The total number of lecture hours for preclinical fixed prosthodontics in this faculty is 36 hours. Petropoulos et al. stated that fixed prosthodontics lecture hours (42) scored the highest lecture hours followed by complete denture (28) and removable partial denture (21) among US dental schools.<sup>4</sup> Here, we do have our lectures available online, therefore the students can spend more hours reviewing the lectures after traditional classroom lecture. Rashedi also reported that most US dental schools having live demonstrations of laboratory procedures as well as prerecorded video demonstrations for these procedures.<sup>5</sup> Unfortunately, we only have prerecorded video demonstration for clinical procedures and live demonstration for diagnostic wax-up. For the future, we may consider video or live demonstration for laboratory procedures. Students' involvements are not needed in every laboratory step, since most laboratory works are being delegated. This is the sole reason why we did not conduct any laboratory demonstration.

However, our teaching methods and aids were remarkably helped the participants in performing these tasks. Student's satisfaction for each task is essential since their feedbacks provide important information toward dental education especially in reviewing curriculum. Murphy et al. in stated that one of the most serious challenges that dental educators face today is improving the level of student satisfaction with the curriculum and learning environment.<sup>6</sup> Dental curriculums condensed the students with didactic, preclinical and clinical session within 4 to 5 years leaving them without opportunity to express their satisfaction toward the curriculum. Somehow, this can lead to student frustration and maybe the main reason of absenteeism. Murphy et al. also reported that most students prefer presentation using strong visual. The result also shows high response of preference toward lecturer who allow note taking during lectures. Dental educators should

be aware of these differences in order to explore opportunities for making the educational experience more productive and enjoyable.<sup>6</sup>

It can be concluded from this study that almost all fourth year dental undergraduates could perform good PFM preparation as well as its impression, provisional restoration and diagnostic wax up. Diagnostic wax up was rated as the most difficult task followed by PFM preparation and provisional restoration. Unfortunately, four students did not feel competence and confidence. Our teaching methods and aids were proven to help them in preparing these tasks.

## ACKNOWLEDGEMENT

The authors thank Simulation Laboratory staff who generously devoted their time and effort to ensure Preclinical Fixed Prosthodontics ran smoothly. Special thanks to Mrs. Siti Zubaidah Anuar for proofreading this report.

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