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## “Clinical Shadowing in Dental Education: Dentists Undercover” - An Observational Study Short Title: Clinical Shadowing in Dentistry

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### **Dr. Mohan Kumar P**

Associate Professor,  
Department of Periodontics,  
Vishnu Dental College,  
Bhimavaram,  
Andhrapradesh.  
Email: mosups@gmail.com

### **Dr. Ananda Babu B**

Associate Professor,  
Department of Oral Medicine and Radiology,  
Vishnu Dental College,  
Bhimavaram,  
Andhrapradesh.  
Email: anandbeeraboina@vdc.edu.in

### **Dr. M. Sita Rama Kumar**

Reader,  
Department of Conservative Dentistry and Endodontics,  
Vishnu Dental College,  
Bhimavaram,  
Andhrapradesh.  
Email: sitaramkumar.m@vdc.edu.in

### **Dr. Narasimha Rao G**

Readerr,  
Department of Prosthodontics,  
Vishnu Dental College,  
Bhimavaram,  
Andhrapradesh.  
Email: narasimhag@vdc.edu.in

### **Dr. Smita Shrishail Birajdar**

Associate Professor,  
Department of Oral Pathology and Microbiology,  
Vishnu Dental College,  
Bhimavaram,  
Andhrapradesh.  
Email: birajdarsmita@vdc.edu.in

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## Dr. Padmavathi K

Associate Professor and Head,  
Department of General Pathology,  
Vishnu Dental College,  
Bhimavaram,  
Andhrapradesh.  
Email: padmavathi.k@vdc.edu.in

## Keywords

Clinical shadowing, dental education, dental students, integration, workplace shadowing.

## Abstract

**Objectives:** Advances in educational developments changed institutions motto for providing a high level of education and clinical training required for earning a dental degree. The study investigates the importance and assessment of clinical shadowing's effect in improving clinical competencies among students at the institution level.

**Methods:** 100 dental students each of 1st and 2nd year BDS participated in clinical shadowing at the institution level. All the students were supplemented with a questionnaire comprising ten questions based on communication skills, education and motivation, and knowledge improvement in clinical dentistry.

**Results:** Improvement in communication skills, education, and motivation, the overall increase in clinical knowledge observed when they were assessed after entering into the clinical departments.

**Conclusion:** All the students demonstrated overall improvement in knowledge, communication skills, education, and motivation in dental departments. This practice also helped the students explore dental culture facets, knowing the dental professional standards and the ethical guidelines, which thus improve students' overall clinical skills in later years of the course.

## 1. INTRODUCTION

The constant change in learning mindsets across generations demands alteration in teaching methodologies, including individual student focus, updated industrial orientation, technology adoption, evidence-based training, and multitasking ability building. [1]

As all dental schools' academic standards are on par excellence, the institutes' motive changed to prepare dentists for the safe and effective practice of modern oral health care. That's the reason clinical shadowing came into existence in almost all dental schools in India.

Shadowing is an extracurricular activity in which a premedical/dental student follows a medical or dental professional for a designated period. Clinical shadowing or workplace shadowing, or the integration of basics sciences to Clinical sciences were frequently used in dental institutions. [1,2]

To introduce the dental health care system's culture and practice, most of the dental institutes started, including clinical shadowing to dental students at an early stage. Few universities

included shadowing practice in the dental curriculum.

The literature clearly shows evidence that the workplace is the only area where learning and teaching practices are constantly improving according to the needs. So, the workspace environment in both medical and dental professions plays an important role in improving students' learning skills and teaching styles or practices. [3,4]

By the clinical shadowing practices in dentistry, one can allow sufficient time for dental students to know how to apply the basic science theory into clinical aspects of dental specialties. The importance of clinical shadowing is clearly explained to the students by translating the theory part of the 1<sup>st</sup> and 2<sup>nd</sup> years BDS into clinical scenarios.

Thus, the study investigates the importance of shadowing and assessing improvement in basic knowledge of dental equipment and its function, communication skills of students in dental clinics, patient education and motivation regarding dental

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diseases, and interpretation of clinical parameters with different treatment modalities in dental clinics.

## 2. METHODS

The study was conducted among the students of 1<sup>st</sup> and 2<sup>nd</sup>BDS of Indian dental school in Andhra Pradesh state. Permissions from the institutional review board were obtained before starting the study.

All the 1<sup>st</sup> and 2<sup>nd</sup> BDS students who had taken admission during the academic years 2018 and 2017 were included in the study. The students other than 1<sup>st</sup> and 2<sup>nd</sup> BDS and those who had already entered into dental clinical departments were excluded from the study.

### *Clinical Integration Team formation at the institutional level*

The clinical shadowing team was selected by the academic dean of the dental institute. The team members should be aware of the guidelines and objectives of the clinical shadowing practices. Once the team was formed and approved by the head of the institute, they were asked to guide the 1<sup>st</sup> and 2<sup>nd</sup> BDS students to introduce and tell them the importance of their specialty first. Followed by discussing the importance or significance of basic sciences subjects, and how to apply basic sciences knowledge into clinical scenarios after entering clinical departments from the 3<sup>rd</sup> academic year onwards.

The integration team makes institutional guidelines that will help engage 1<sup>st</sup> and 2<sup>nd</sup> BDS students and apply the principles of the basic sciences into the clinical scenario through the clinical shadowing program. Thereby, it will improve confidence among the students in handling clinical cases. Following are the guidelines and objectives of the clinical shadowing program followed in our institution.

### **Guidelines to be followed for shadowing**

All the discussions/integration classes must orient the student in:

1. Clinical decision-making as well as critical thinking.
2. Should be able to appreciate the need and relevance/ significance of integrating the knowledge of basic sciences into clinical subjects.
3. Must know how to assess oral health status, medical risk assessment, and identify

the clinical findings of dental pain and its management.

4. Must know about the Dental chair and its operation well in advance of their clinical postings.
5. Must learn and know about the different sterilization techniques and the principles of instrumentation well in advance of their clinical postings.
6. Should be able to know the basic principles of various clinical procedures.

All the discussions in integration classes orient the student in clinical decision-making as well as critical thinking. It helps to know the need and significance of integrating the knowledge of Basic sciences into clinical, learning how to assess oral health status, medical risk, knowing the Dental chair and its operation, different sterilization techniques, and instrumentation principles in advance of their clinical postings.

Following are the objectives to be followed before the start of the clinical shadowing program. Every faculty in the integration team should know and follow the guidelines and they should stick to the objectives framed by the integration team.

### **Objectives to be followed by the integration team for clinical shadowing**

1. Understand the role of Basic and applied sciences when performing Dental treatment.
2. Understand the importance of oral health care.
3. Understand the barriers to treatment that the student may face to achieve case acceptance.
4. Understand and assess the interdependence of Basics and clinical sciences.
5. Understand and know how integration or clinical shadowing impacts the clinical practice.

Clinical shadowing is different from clinical postings, where students will do all treatments under clinical experts' supervision. In contrast, in clinical shadowing, students will observe the treatment protocols wherein they will get familiar with the dental equipment and its mechanisms and get familiar with dental diseases and treatments. [5] At the beginning of the clinical shadowing posting, students were given a tour of the department and introduce to the clinic environment of that specialty. In later days, once they acclimatize to the clinic environment, they will be given a framework

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of the worksheet, wherein the contents of the subject were handed over to the students.

Every week, in their rotation to the specialty, all the subject contents were discussed in detail by the subject experts, and an assessment was done at the end of each class.

The clinical shadowing was divided into four sessions as each group attends monthly postings specialty-wise. At the first visit to the department, students were enlightened in the following step-by-step guide once after finishing the department tour. [1,2]

1. Students were enlightened on the mechanism and parts of the dental chair. Once they get familiarized with the dental chair, they were shown all the basic dental instruments used by undergraduate students in clinical departments. At the end of the first session, all the students must know the sterilization techniques and biomedical waste disposal mechanisms followed in clinical departments.
2. The second session includes observing patient-dentist communication, followed by observing the patient's education and motivation regarding dental diseases and their treatment procedures. By the end of this session, all the students know how to communicate with patients, educate patients on the prevention of different dental diseases, and motivate them for treatment.
3. The third session helps the students direct observation of patients-doctor in case history recording and observing different dental treatments undergoing in the clinic. By the end of the third session, students know how to record case history and know about dental treatment procedures.
4. Students were given time to discuss any queries in the above three stages in the fourth and final sessions. All the students were asked to record a complete case history on their own in this final session and discussed it with the specialty experts.

Students were assessed at the end of each session by asking them to write about the discussion part done in that session in the worksheets provided to them. Finally, specialty experts will give the scores for their participation and performance in clinical shadowing. Special attention was given on the final day of posting by asking all the students to give their feedback on clinical shadowing experiences.

The discussion topics for 1<sup>st</sup> and 2<sup>nd</sup> BDS students are chosen in a way that they are useful for their theoretical examination purpose and to fulfill the clinical knowledge of the students attending the postings. Faculty from each specialty and the integration team of the institution framed and categorized few topics to be discussed when the 1<sup>st</sup> and 2<sup>nd</sup> BDS students come for the clinical shadowing program.

The following are the topics discussed step by step in 1<sup>st</sup> year and 2<sup>nd</sup>-year clinical shadowing program by the subject experts. During the 1<sup>st</sup> year of clinical shadowing, the following are the topics discussed, and assessment was done by the subject experts and given the grades: 1. There will be a brief introduction to all the dental branches, and then we go with an introduction and scope to each dental specialty, followed by a brief discussion on diseases affecting the oral cavity and treatment modalities. 2. Importance and significance of knowing general anatomy and its integration to dental surgeries- by the faculty from Anatomy, Oral and Maxillofacial Surgery and Periodontics. 3. Hematological Parameters in health and disease and its clinical significance during dental surgeries- by the faculty from Physiology, Oral and Maxillofacial Surgery, and Periodontics. 4. Biochemical Parameters in health and disease and its clinical significance during dental surgeries-by the faculty from Biochemistry, Oral and Maxillofacial Surgery, and Periodontics. 5. Role of dental anatomy and histology and its correlation to clinical subjects by the faculty from Oral and Maxillofacial Pathology. 6. Special emphasis on treating children- by the faculty from Pedodontics and preventive dentistry.

During the 2<sup>nd</sup> year of clinical shadowing, the following are the topics discussed and assessment done by the subject experts and given the grades:

1. Parts and Operating Mechanism of Dental chair- by the faculty from Oral and Maxillofacial Surgery department.
2. Standard Operating procedures of each specialty- Faculty from all the departments.
3. Identification and color-coding of LM instruments (Diagnostic and treatment instruments)-by the faculty from Oral medicine and Radiology department.
4. Sterilization techniques and about CSSD- Central sterile supply department)- by the faculty from Periodontics department.
5. Biological Waste management- by the faculty from the Periodontics Department.

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6. Medical Records Department and about patient's distribution to clinics-by the faculty from Oral medicine and Radiology department. 7. Patient-Doctor Communication and Patient education and motivation- by the faculty from the Public Health Dentistry department. 8. Observation of Treatment procedures in comprehensive clinics- by the faculty from all the departments. 9. Photography- by the faculty from the Orthodontics Department. 10. Demonstration of patient data uploads in Vaidhyo (Digital Patient Record system)-by the faculty from the Oral medicine and Radiology department.

Students analysis on clinical shadowing done by evaluating through questionnaires n = 10 items, Work shadowing reports by discussing the topics with subject experts and faculty allot a grade after discussion, Self-assessment of students before and post clinical shadowing program by providing feedback questionnaire, Overall assessment done by subject experts after clinical shadowing program in each specialty of dentistry.

Students were asked to give feedback for the questionnaire immediately after they finish their clinical shadowing program in each specialty. If there is any need to improve the shadowing program, the suggestions were taken from every student and modified accordingly.

### 3. STATISTICAL ANALYSIS

The statistical analysis of the assessment questionnaires of students attending for clinical shadowing program was analyzed descriptively and unstructured free reports were manually grouped according to the student's comments on the clinical shadowing program.

### 4. RESULTS

The data collection was carried out mainly by the following three evaluation methods: 1. Clinical shadowing worksheets and scoring 2. Work shadowing comprehensive report by every clinical subject expert. 3. Student feedback questionnaire on clinical shadowing.

Initially, at the beginning of the posting, students were given worksheets comprising the contents related to the clinical subject and discussed by the faculty. At the end of each discussion, students were asked to write all the important points related to the topic and asked to take the grading. All the students got scores good (12%) to very good (88%) on an average towards all the subjects during

shadowing. It showed the interest and acceptance towards the clinical departments at the earliest in the dental curriculum.

When asked about the general questions related to clinical shadowing: 1) whether these practices are important to be included at an early stage. 2) Whether they like this shadowing practice to get started right from 1<sup>st</sup> BDS. 3) whether clinical shadowing should be included in the dental education curriculum. One hundred percent of students said yes to the above questions when asked.

When asked about how far the clinical shadowing helped them after entering into clinical departments, 71 % of students rated excellent, 26% rated good, and 3% rated satisfactory. When asked about: to what extent the course objectives were fulfilled, 91% of students responded that objectives were fulfilled after the shadowing practices, and 9% of students said that objectives were fulfilled satisfactorily. Knowledge obtained through clinical shadowing was represented in the following graphs. (**Graph-1and, Graph-2**).

The clinical shadowing overall report was given at the end of each clinical posting. Here, students' attendance, topics discussed, students' responses towards each topic discussed, and satisfaction levels towards the subject expert after the clinical shadowing were obtained. Student's attendance, responses towards each topic, and student's satisfaction levels about the clinical subject experts were tabulated in **Table: 1**. Topics covered in each clinical subject and the significance of clinical shadowing, the skills obtained by shadowing were mentioned for each clinical subject.

Skills obtained by the student in each specialty through the clinical shadowing program and the student's satisfaction levels towards subject experts were excellent and the student's response at the end of the shadowing towards subject experts was also excellent.

When coming to specialty-wise, in the department of oral medicine and radiology, the students learned communication skills (27%), patient education and motivation (35%), and knowledge about identifying oral findings (6%). The percentage of students who had an overall idea of all the above skills or competencies after the shadowing program was about 32%.

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In the department of Periodontics and Implantology, the students learned sterilization techniques (34%), the importance of oral hygiene (26%), knowing the types of gingival and periodontal diseases (10%), and all the above skills by 30% of students.

In the department of conservative dentistry and endodontics, 10% of students appreciated the identification of instruments related to restorative dentistry, 12% of students had an idea about microorganisms causing dental caries, 10% of students said they were aware of different restorative materials used in dentistry after clinical shadowing. 68% of students said that they were satisfied in knowing all the above competencies after shadowing the program.

When coming to the department of prosthodontics, 23% of students said they learned steps in the complete denture, 10% of students said they got an idea of removable and fixed partial dentures indications, 12% of students came to know about implants in dentistry only through clinical shadowing.

Management of dental pain (27%), knowing about the emergency drugs (10%), biomedical waste management (33%) were the clinical competencies learned by the students after the clinical shadowing program in the department of oral and maxillofacial surgery.

Scope of orthodontics (35%), classifications of malocclusions about 9%, names of appliances used for orthodontic therapy about 6%, and overall above skills about 50% were learned by the students in clinical shadowing program in the department of orthodontics.

From the department of oral and maxillofacial pathology, the following are the skills obtained after the clinical shadowing program. They are about 26% in knowing the dental anatomy, 22% in knowing the basics in oral histology, 23% in knowing the basics in oral pathology and microbiology.

In the department of Pedodontics after the clinical shadowing program, the students aware of the chronology of deciduous dentition were 19%, students aware about the chronology of permanent dentition were 23%, students aware of the behavior modifications in children were 16% and finally, 42% of students said they were aware of oral hygiene measures in children after shadowing program.

Clinical shadowing in Public health dentistry helped the students in knowing about the importance of diet chart about 26%, the importance of dental health education about 23%, oral health surveys about 19%, and overall above skills about 32%.

## 5. DISCUSSION

Clinical shadowing in the dental profession is considered as one of the most effective ways of translating dental theory or basic science's importance into a clinical scenario or clinical practice. Clinical shadowing has its roots in the age-old 'apprenticeship model' in which the students take training under experienced physicians for their clinical training. This further helps in upgrading their skills in managing patient-related or any issues regarding the management of dental problems in practice when they own their clinic or hospital. [1]

This principle is followed traditionally at the postgraduate level, and if the same is used in undergraduate level students before their clinical postings in their academic 3<sup>rd</sup>-year program, then it is called clinical shadowing. For the clinical shadowing program to get success it has to clear few challenges that come during the program. Few among the challenges during dental clinical shadowing are unfavorable physical environment, lack of interest by clinical faculty and subject experts, and lack of student motivation. Additionally, time and priority for students already posted in dental clinics have to be compromised. [2]

Additionally, they need to learn the currently used educational methods such as student-centered teaching approach, competency-based assessment skills, professionalism, and ethics to be able to efficiently balance all their roles.

Dental clinics faculty or subject experts can help bridge this gap and improve students' learning through subject experts and collaboration by forming a team called basics-to-clinical sciences integration team. Here, the faculty should provide time and check the feasibility between the clinical shadowing program and usual daily clinical postings of dental students and try to give specific

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consideration for upcoming dentists or budding dentists.

Dental specialty clinics and comprehensive clinics provide an ideal platform for first and second dental undergraduate students for clinical shadowing programs. Once all these challenges are cleared by the subject experts and integration team, students will have an opportunity to apply their theoretical knowledge or basic sciences knowledge into clinical practice and develop competence. If properly planned, the dental integration team at the institutional level so can promote student motivation towards clinical practice.

In the area of dentistry, very few studies exist on clinical shadowing. Some of the studies showed a positive correlation in improving clinical knowledge among dental students. It also improves patient's conversation techniques and learning how to educate and motivate dental patients for treatment. [6,7]

According to Craddock's study group, dental students also showed acceptance towards clinical shadowing, and everyone liked to keep clinical shadowing practices in the dental curriculum. Students showed remarkably excellent satisfaction levels towards the clinical subject experts for their contribution in strengthening their clinical skills via work shadowing. [5,8]

Student's feedback responses revealed that there was a great improvement concerning clinical perspectives like improvement in knowledge regarding communication with patients and clinicians during clinical postings, education and motivation of patients towards dental treatment according to the need, identification of dental and oral findings, identification and use of proper dental instruments, sterilization techniques. Whereas other topics discussed during clinical shadowing also showed some importance towards the growth of student's knowledge. [9,10]

In particular, when students were given time to observe clinical cases and treatment procedures in various disciplines, they showed much interest in knowing the type of treatment procedures included in every clinical department. This further helps in choosing their Post graduation subject in advance

and helps in increasing passion and interest towards specialties in advance. [11,12]

Based on Miller's clinical skills learning pyramid, the gap between the classroom and clinics or transition from basic sciences to clinics can be filled by clinical cognitive skills and experience on clinical skills by observing through clinical shadowing. Observing the patient's communication skills and identifying and knowing different dental findings during clinical shadowing and managing various problems helped these students advance about the clinics. [13]

Lack of knowledge and confidence, lack of teaching and chairside support, and insufficient time in the patient and clinical environment were the primary causes for the gap between the pre-clinical and clinics in dentistry. This gap was filled with the help of clinical shadowing. These results followed C.M Serrano et al. in their report on challenges in the transition to clinical training in dentistry. [14]

At the end of the posting, when asked about the satisfaction levels towards their clinical expert in each department, most of the students said that they were delighted with the faculty chosen for clinical shadowing.

Students showed interest in clinical shadowing in their second-year dental course, and they have accepted this practice to include in the university curriculum. All the students were very enthusiastic about incorporating this practice even in the first-year course by introducing and explaining each dental subject's scope by allotting at least a week for each clinical subject.

Clinical shadowing improved active learning and patient-dentist relationship through their practical communication skills learner in clinical shadowing practices. Most of the students responded extraordinarily to this new clinical shadowing perspective as this practice helped them introduce themselves to all the specialty departments of dentistry. [15]

## Advantages of Clinical Shadowing

1. Shadowing a dentist helps a dental student to become acquainted with many aspects of the dental profession.

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2. Students will get the opportunity to see and observe all the different types of dental procedures and treatments performed by a dentist at the earliest academic stages only, that is in their 1<sup>st</sup> and 2<sup>nd</sup> year of dental education.
3. Students will come to know what are the common dental problems and what the patients come for treatment.
4. Clinical shadowing will help the students to know the technology-related issues at the earliest which thus helps the students not to have confusion in front of the patients when they start treatments in the practice of dentistry.
5. Watching and observing the senior dentist's interaction with the patients will help in the right way to communicate with the patients when they enter into dental clinics.
6. One another benefit of clinical shadowing is learning how to educate patients and deal with difficult situations when they come across in professional life.
7. It also allows knowing all the queries regarding the clinical procedures and protocol followed during treating the patients.
8. The students feel excited to visit dental clinics at their earliest academic years of dentistry and knowing about the different dental treatment procedures through the senior dentists and faculty. This will help them to inculcate interest in the dental profession.
9. Helps in getting acclimatized to the clinical environment.
10. Avoids unnecessary anxiety and fear of treating patients when they enter clinical departments. Shadowing will allow clinical exposure of dental students in a stepwise manner which thus takes off fear from the students related to treatment procedures.

## 6. CONCLUSION

Clinical shadowing practices at an early stage of dentistry helped improve knowledge in communication skills with patients and clinical

team, helpful in knowing the dental equipment mechanism at the earliest to clinical department's exposure. This practice also helped the students explore dental culture facets, knowing the dental professional standards and the ethical guidelines, which thus improve students' overall clinical skills in later years of the course.

## 7. RECOMMENDATIONS

The high degree of acceptance seen from both the students and dental faculty for conducting clinical shadowing program for 1<sup>st</sup> and 2<sup>nd</sup>-year students of dentistry. Students accepted that senior dentists and faculty served as role models for them which further helped to improve their communication skills towards patients and by setting up their practices or organizations in the dental profession.

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## Authors contributions:

Dr. MKP devised and designed the study, conducted research, provided research materials, and collected and organized data. Dr. ABB, analyzed and interpreted data. Dr. MSRK, wrote initial and final draft of article, and provided logistic support. Dr. NRG, Provided research materials, provided logistic support, collected the data and analyzed. Dr. SSB, Provided research materials, collected the data and the data was analyzed and interpreted. Dr. PK, Provided logistic support, collected the data. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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**Table: 1** Follow table describes the student's attendance, skills obtained in each competency, and satisfaction scores on clinical experts during the shadowing program in the dental institute.

Clinical Department	Attendance percentage	Skills Obtained	Percentage in Assessed Competencies	Satisfaction level towards Clinical Subject Expert
Oral medicine and Radiology	93%	Communication	27%	Excellent- 95%  Good- 05%
		Patient education and motivation	35%	
		Knowledge towards oral findings	6%	
		All the above competencies	32%	
Periodontics and Implantology	95%	Sterilization techniques	34%	Excellent- 96%
		Importance of oral hygiene	26%	

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		Types of gingival and periodontal diseases	10%	Good-04%
		All the above competencies	30%	
Conservative dentistry and Endodontics	93%	Identification of standard dental instruments	10%	Excellent- 95%  Good- 05%
		Caries microbiology	12%	
		Types of restorative materials	10%	
		All the above competencies	68%	
Prosthodontics	90%	Steps in construction of the complete denture	23%	Excellent- 92%  Good- 08%
		Indications for Removable and fixed partial denture	10%	
		Implants	12%	
		All the above competencies	55%	
Oral surgery	94%	Management of dental pain	27%	Excellent- 96%  Good- 04%
		Emergency Drugs	10%	
		Biomedical waste management	33%	
		All the above competencies		
Orthodontics	90%	Scope of orthodontics	35%	Excellent- 93%  Good- 07%
		Classification of malocclusions	9%	
		Names of appliances used in orthodontic treatment	6%	
		All the above competencies	50%	
Oral pathology	90%	Introduction to dental anatomy	26%	Excellent- 92%  Good- 08%
		Introduction to oral histology	22%	
		Introduction to oral pathology and microbiology	23%	
		All the above competencies	29%	
Pedodontics	90%	Chronology of Deciduous dentition	19%	Excellent- 94%  Good- 06%
		Chronology of Permanent dentition eruption dates	23%	
		Behavior modification in children	16%	
		Children oral hygiene measures	42%	
Public health dentistry	93%	Importance of diet chart	26%	Excellent- 90%  Good- 10%
		Importance of Dental health education	23%	
		Oral health surveys	19%	
		All the above competencies	32%	