

# Preparedness of Undergraduate Dental Students: A National Study

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## ABSTRACT

**Objectives:** To evaluate the self-perceived preparedness of final year undergraduate dental students in Malaysia and to compare the difference of preparedness level of final undergraduate student in public and private universities. **Material and Methods:** A cross-sectional questionnaire study was conducted using a validated questionnaire, Dental Undergraduates Preparedness Assessment Scale (DU-PAS) and no samplings were involved. The questionnaire was distributed via University representative of each university from MDSA in the form of online and written questionnaire. The data were analysed using SPSS version 23. **Results:** 239 students responded to this study. Responses revealed that student felt adequately prepared to carry out simple clinical procedures such as taking consent (88.3%), tooth-coloured fillings (87.4%), non-surgical periodontal treatment (86.6%), do proper history taking (85.8%), bitewing radiograph (84.1%) and communication skills (69.9%). However, low levels of scores were reported on ability to do an amalgam restoration (12.1%), endodontics treatment especially multi-rooted tooth (9.6%), crowns (9.2%), referral for suspected oral cancer (31.8%), research skills (15.1%) and raising concerns regarding inappropriate behaviour of colleagues (7.9%). There was significant difference between the level of preparedness of final undergraduate student in public and private universities. **Conclusions:** This is the first study of self-perceived preparedness of final year undergraduate students in Malaysia. The results showed that the self-perceived preparedness of final year student was satisfactory for a range of clinical and effective skills. However, several areas of weaknesses were identified which underscore the need for additional training and consolidation.

**Key words:** Self-perceived preparedness, Undergraduate students, Malaysia.

## INTRODUCTION

Learning and innovation in dentistry keep on developing at a fast pace, and due to scientific advances, Malaysian dental education has been faced with challenges to keep up with the quality inside the profession (Ministry of Higher Education, 2010). The number of dental students has been increasing in Malaysia. Malaysian Dental Council reported that the local dental undergraduates in Malaysia had a threefold increase in number throughout the years, from 186 graduates in 2009 to 660 graduates in 2017 (Malaysian Dental Council, 2017).



Dental training is a unique pedagogical experience with distinctive challenges. There are 13 dental universities in the nation, of which six are public universities. Therefore, to be qualified as a dental expert, an undergraduate must pass all the professional examinations and complete all minimum clinical requirements in an accredited educational environment of 5 years (Ministry of Higher Education, 2010). In dentistry, the clinical requirements include performing irreversible operative procedures on patients under the supervision of experienced clinicians.

Preparedness is defined by as the state of being prepared for a particular situation (McIntosh, 2013). Preparedness of undergraduate students may be influenced by a variety of factors including: curriculum design, teaching methods, educational environment and clinical training models, and assessment methods (Honey et al., 2011; Ali et al., 2018; Lynch et al., 2010; Divaris et al., 2008; Ali et al., 2017). A prepared graduate should have the ability to carry out patient assessment and treatment planning, perform routine and straightforward dental procedures safely, provide holistic care, communicate effectively, demonstrate professionalism and to have team-working skills as well as recognise the limits and know when to seek help (Ali et al., 2017). Therefore, dental students preparedness has a very close relationship with their skills and knowledge in delivering treatment to the patient.

Previous studies reported that there were two procedures that rated the highest in overall confidence by the students in School of Dentistry at Cardiff University which were carrying out a simple scaling and fissure sealant with the highest possible mean score of 5.00 (Gillmour et al., 2016). Yiu et al. also reported that 99% (n=157) had felt prepared in placing crowns yet 28% (n=44) felt poorly prepared for multi-rooted endodontics, which was due to lack of exposure and experience in handling endodontic treatment especially molar teeth (Hayes et al., 2001). The study concluded that practicing multiple times and encountering the same event would increase once confidence in that particular area. Similar conclusion was found in a previous report which stated that high proportion of students in Pakistan Institutions (81.5%) perceived themselves to be prepared in tooth extractions and this is because most dental institutions in Pakistan require each undergraduate student to perform approximately 100 extractions prior to graduation (Ali et al., 2018).

Dental education today must ensure that students are equipped to deal with the challenges of tomorrow, and in an increasingly globalized scenario, how skilful and well-prepared of our future dental officers will decide the future of oral health in our country. In Malaysia, limited data expressing a range of dental students clinical training, skills and preparedness are available..

Verification of the preparedness of dental undergraduate in Malaysia would be necessary to increased patient safety, reduction of dental errors, and the provision of high-quality healthcare services. The objective of this research was to report on the self-perceived preparedness of Year 5 dental undergraduate students in Malaysia toward dental practice upon graduation.

## **MATERIALS AND METHODS**

This study was a cross-sectional study using a validated questionnaire, Dental Undergraduate Preparedness Assessment Scale (DU-PAS) (Ali et al., 2017). The questionnaire was given to access the self-perceived preparedness of final year undergraduate dental students in Malaysia.

Prior to commencement of the study, ethical approval was granted by The Research Ethics Committee of Universiti Teknologi MARA, REC/88/19. A disclaimer was attached to the first page of the questionnaire to explain the purpose of the study and to ensure respondent confidentiality. Anyone who has inquiries pertaining to the survey has been invited to email the authors through the contact address provided in the questionnaire.

The questionnaire was divided into two sections, section A to investigate the preparedness in clinical procedure; and section B to investigate the preparedness in relation to cognition, communication, and professional skills. Section A involved 24 questions using the scale from 0 to 2, with 0 being no experience, 1 being with help of colleague and 2 being independently prepared. For section B, there were 26 questions to be answered. The questions were using the scale from 0 to 2, with 0 being no experience, 1 being mostly and 2 being always prepare.

Dental undergraduate students in their final year from all Malaysia Dental Schools were invited to participate in the study by online questionnaire or written questionnaire. A total of 239 students responded to this study, where the minimum sample size was 198 students. Epi Info Software was used for sample calculation. A convenient sampling was used to include all the students from various dental school in Malaysia.

The descriptive and quantitative data were analysed using Statistical Package for Social Sciences (SPSS) software 23 (IBM Corporation, Armonk, NY, USA). Further analysis was undertaken using the T-test to evaluate the overall preparedness level of final undergraduate students in public and private universities.

## RESULTS

In a total of 239 students responded to the questionnaires, 174 (72.8%) were respondents from public universities while 65 (27.2%) respondents were from private universities. All of the participants are from the range age group of 22-27 years old. Among all of the respondents, 182 (76.2%) were female respondents and 57 (23.8%) were male respondents.

Table 1 shows the levels of students' preparedness in performing clinical procedures. The data depict that the majority of students have high levels of preparedness in receiving valid consent from patient prior to performing any dental treatment as 88.3% (mean=1.88) of the students were able to obtain the consent by their own, however, some of them still felt that they need help from their colleagues or supervisors. Most of the students has higher than 60% level of preparedness on performing appropriate tooth-coloured restoration (87.4%, mean=1.87), obtaining patient's medical history (85.5%, mean=1.86), removing dental caries effectively (82.8%, mean=1.83) and taking periapical radiograph (79.9%, mean=1.80). Low levels of preparedness were associated with performing a proper amalgam restoration 12.1% (mean=1.62) as some of the students have never done any amalgam restoration before. There were also low levels of preparedness among the students in performing endodontic treatment on multi-rooted teeth. The statistical data of the study also showed that 9.5% (mean=1.35) of students had no experience in performing the endodontic treatment in multi-rooted teeth. Low levels of preparedness were also reported by the respondents in providing crowns using the principle of tooth preservation as 9.2% (mean=1.35) of students had no experience and the majority of them still need guidance and help from colleagues or supervisors.

**Table 1: The student's level of preparedness in performing clinical procedures**

Items	Questions	No experience (%)	With verbal or practical input from colleague (%)	On my own (%)
A18	I am able to restore teeth with amalgam fillings appropriately	12.1	29.3	58.6
A20	I am able to perform endodontic treatment on multi rooted teeth appropriately	9.6	59.8	30.5
A21	I am able to provide crowns using principles of tooth preservation	9.2	46.9	43.9
A19	I am able to perform endodontic treatment on single rooted teeth appropriately	2.5	33.1	64.4
A13	I am able to prescribe drugs to my patients appropriately	1.7	61.9	36.4
A7	I am able to assess the treatment needs of patients requiring orthodontics	1.3	54.0	44.8
A22	I am able to provide mechanically sound partial dentures	1.3	46.9	51.9
A5	I am able to undertake bitewing radiographs	0.8	15.1	84.1
A8	I am able to formulate a comprehensive treatment plan which addresses all treatment needs of my patients	0.4	35.6	64.0
A10	I am able to explain the merits and demerits of various treatment options to my patients	0.4	33.5	66.1
A15	I am able to perform non-surgical periodontal treatment using appropriate methods	0.4	13.0	86.6
A23	I am able to provide mechanically sound full dentures	0.4	38.1	61.5
A24	I am able to undertake non-surgical tooth extractions appropriately	0.4	28.9	70.7
A1	I am able to obtain a complete medical history from my patients.	0.0	14.2	85.8
A2	I am able to undertake a comprehensive, clinical oral examination	0.0	21.8	78.2
A3	I am able to prescribe appropriate dental radiographs	0.0	20.9	79.1
A4	I am able to undertake periapical radiographs	0.0	20.1	79.9
A6	I am able to interpret common findings on dental radiographs	0.0	31.0	69.0
A9	I am able to provide a range of treatment options to my patients based on their individual circumstances	0.0	29.3	70.7
A11	I am able to obtain a valid consent from my patients prior to undertaking any treatment.	0.0	11.7	88.3

A12	I am able to carry out patients' treatment sessions in an appropriate order	0.0	25.1	74.9
A14	I am able to administer inferior dental nerve blocks effectively	0.0	22.2	77.8
A16	I am able to remove dental caries effectively	0.0	17.2	82.8
A17	I am able to restore teeth with tooth coloured fillings appropriately	0.0	12.6	87.4

\*Items are ordered by the 'No experience' column in descending order.

Table 2 shows the levels of students preparedness in relation to cognitive, communication and professionalism skills. Overall the student had the highest level of confidence and preparedness to communicate appropriately with their colleagues as 69.9% (mean=1.59) of the students always felt confident when communicating with their colleagues. Students also had more than 50% level of confidence in seeking help from supervisors or colleagues (66.8%, mean=1.57), in providing opportunities for the patients to express their expectations from the dental treatment (64%, mean=1.54) and in case they recognize their own personal limitations in clinical practice (59.8%, mean=1.50). However, some of the students still had a low level of confidence on referring patients with suspected oral cancer as 31.8% (mean=1.00) of the students had no experience of encountering such type of patients. This study also revealed that 16.7% (mean=1.02) of the students had low levels of confidence to evaluate new dental materials and products using an evidence-based approach as well as 15.1% (mean=1.08) of the students were associated with low confidence levels to interpret the results of research which may influence their practice.

**Table 2: The student's level of preparedness regarding their cognitive, communication and professionalism skills**

Items	Questions	No experience (%)	Mostly (%)	Always (%)
B6	I feel confident referring patients with suspected oral cancer	31.8	36.4	31.8
B9	I am confident to evaluate new dental materials and products using an evidence-based approach	16.7	64.9	18.4
B10	I am confident to interpret the results of research which may influence my practice	15.1	61.5	23.4
B25	I feel able to raise concerns about inappropriate behaviour of my colleagues	7.9	54.8	37.2
B11	I use an evidence-informed approach in my clinical practice.	5.9	59.4	34.7
B17	I feel confident managing anxious patients with appropriate behavioural techniques	3.8	59.8	36.4
B8	I have sufficient knowledge of scientific principles which underpin my dental practice	2.1	72.0	25.9
B18	I am able to manage the behaviour of children to enable appropriate dental treatment	2.1	64.9	33.1
B14	I feel confident to address barriers to effective communication with patients appropriately	1.7	51.9	64.4

B5	I am able to refer patients with complex treatment needs appropriately	1.3	43.5	55.2
B20	I maintain accurate records of my clinical notes	1.3	50.2	48.5
B16	I feel confident to communicate appropriately with my colleagues	0.8	29.3	69.9
B22	I take responsibility for my continuing professional development	0.8	40.6	58.6
B7	I reflect on my clinical practice in order to address my learning needs	0.4	46.0	53.6
B12	I feel I can manage to communicate effectively with my patients	0.4	41.0	58.6
B15	I feel confident to communicate potential risks of operative procedures to patients	0.4	41.8	57.7
B19	I am able to fulfil my responsibilities as an effective member of the dental team	0.4	46.4	53.1
B23	I am aware of my legal responsibilities as a dental professional	0.4	33.5	66.1
B24	I restrict my relations with my patients to a professional level	0.4	35.6	64.0
B26	I take appropriate measures to protect patient confidentiality	0.4	42.3	57.3
B1	I feel I can manage peoples' expectations of their treatment	0.0	71.1	28.9
B2	I feel able to motivate my patients to encourage self-care for their dental needs	0.0	51.5	48.5
B3	I recognise my personal limitations in clinical practice	0.0	40.2	59.8
B4	I feel comfortable asking for help from supervisor or colleague if needed	0.0	33.2	66.8
B13	I provide opportunities for my patients to express their expectations from dental treatment	0.0	36.0	64.0
B21	I am able to work within the constraints of clinical appointment schedules	0.0	60.3	39.7

\*Items are ordered by the 'No experience' column in descending order.

For the overall levels of preparedness between the private and public universities, the study revealed that the final year students in public universities (mean=78.52) have higher levels of preparedness compared to private universities (mean=70.51), and the differences were significant ( $p = 0.001$ ). Table 3 shows the overall differences between both universities in terms of their level of preparedness.

**Table 3: Differences level of preparedness between students in private and public universities**

Variables	Public Universities Mean (SD)	Private Universities Mean (SD)	Mean difference (95% CI)	t statistic (df)	p value
Preparedness level	78.52 (11.44)	70.51 (11.91)	8.02 (4.70, 11.33)	4.767 (237)	0.001

## DISCUSSION

This is the first study done in Malaysia to investigate the overall level of preparedness of final year undergraduates' dental students. The study revealed large differences in the distribution of the samples between male and female correspondents is due to huge gap inequality in certain sectors of the Malaysian higher education. Women outnumber men in seven out of the eight fields of study, including areas in which women are traditionally underrepresented such as mathematics and science. Previous study reported that 13 out of 20 of Malaysian public universities fall under UNESCO's classification of 'far from gender parity', with a GPI higher than 1.5 which mean extreme fewer men enrolled. For the discipline of dentistry, which was included in the Health & Welfare field of study, women consist about 64% and even more pronounced in Malaysian public universities (71%) compare to men. As such, the resultant percentages in the current study are just reflecting the numbers of male and female on the ground of reality and hence lead to the large difference in the number between male and female respondents (Tienxhi, 2017). There was also an obvious difference in the number of respondents between public and private universities, this was probably due to the difficulty in distributing the written questionnaire to the private universities. It was also due to the private universities routine and geographical barriers as some of the private universities are in other states in Malaysia far from Selangor, which resulted in less number of respondents from private as compared to public universities.

Based on the survey, the current study found that a number of students were still perceived unprepared to perform certain clinical procedures independently. This is because some of them felt that they need a help/ guidance from their supervisors or colleges to perform the treatment without any problem. According to the survey, majority of the students were found to have a high level of confidence and preparedness in doing clinical procedures such as receiving valid consent from the patient prior to performing the dental treatment, performing the appropriate tooth-coloured restoration, obtaining patient's medical history, removing dental caries effectively and taking periapical radiographs. These findings are relatively compatible with previous studies done on dental students from European universities. According to the research done in the United Kingdom, it stated that students were found to be confident in performing basic assessments of patients such as obtaining a medical history, carrying out the clinical oral examination and undertaking intraoral radiographs (Ali et al., 2018) however, students were found to have low level of confidence in performing amalgam restoration, endodontic treatment on multi-rooted teeth and providing crowns using the principle of tooth preservation. According to a study done in Pakistan, most of the student had a low level of preparedness in undertaking bitewing radiograph, performing endodontic treatment on multirrooted teeth, providing partial dentures and providing crown to patients due to the lack of training and skill in treating these kinds of patients (Ali et al., 2018).

The current study findings highlighted the final year student's level of preparedness regarding their cognitive, communication and professionalism skills. Many students found that it was easy to communicate appropriately with their colleagues, providing opportunities for the patients to express their expectations from the dental treatment and recognizing their own personal limitations in clinical practice. The current study found that many students always seek help from their supervisors or colleagues. This in turn increased the confidence level of students as well as made them feel safer in providing treatment. Previous study stated that some students tend to rely on their supervisors and became anxious whenever they are working independently in certain occasions.

It also stated that the transition from supervised to unsupervised practice is difficult but also an important step because it is essential for an independent and confident practice in the future (Gilmour et al., 2016). Moreover, the current survey showed that a high number of students had agreed that they have a low level of confidence when referring patients with suspected oral cancer. These findings are similar to a previous study results of a dental institute in the United Kingdom. Based on the study, it was reported that the majority of students had a low level of confidence in the ability to refer suspected oral cancer due to their lack of knowledge and skills to detect and recognized oral cancer or potentially oral cancer cases (Ali et al., 2018). As such, the lack of knowledge and skills among dental students to recognize oral cancer must be rectified as it plays a crucial role in the sub-optimal prevention and referral for oral cancer management.

The majority of students felt unprepared with regard of using an evidence-based approach in evaluating new dental materials, in their clinical practices, and interpreting the results of the research. In previous studies, it was highlighted that undergraduate dental students lacked the confidence in their knowledge and skills in evidence-based dentistry (Nieminen et al., 2017; Straub-Morarend et al., 2016). Therefore, it is advisable that the dental education should emphasize on developing the skills of students to search and analyse evidence-based practice in the age of rapid technological advancement.

The current study found that there is a difference in the students' level of preparedness between public and private universities. It showed that public universities students has higher level of confidence and preparedness as compared to private universities. The differences may be influenced by many factors such as curriculum design, clinical training, and assessment methods . However, this study has some limitation as it did not include the components of the curriculum and percentage of teaching and clinical hours the student has undertaken. Although the Malaysian Qualifications Agency (MQA) is monitoring and accrediting the curriculum of the dental faculties in Malaysia based on certain requirements and legislations, there are a relative differences in the curriculum contents and clinical requirement between the public and private universities that may have consequences on the students clinical experience, attitude, behaviour and ultimately preparedness.

Although the Malaysian final year undergraduate students were satisfied about their level of preparedness in relation to certain clinical skills, however, several areas of weaknesses were also identified. The areas of skills that should be promoted, enhanced, updated and critically monitored include performing amalgam restoration, endodontic treatment on multi-rooted teeth, providing crowns and recognizing oral cancer. The results of the study would help the dental educators in Malaysia to recognise and avoid the expected shortcomings in the clinical training of their students and provide extra support, reassurance, and when necessary, a further clear training.

## **CONCLUSION**

The present study results showed that the self-perceived preparedness of final year students was satisfactory for a range of clinical and effective skills. However, several areas of weaknesses were identified which underscore the need for additional training and consolidation. Further detailed studies are required to be carried out to evaluate the reasons behind the students' level of preparedness; in order to reveal the collateral factors that influence the students' level of preparedness before entering the working environment. It is also recommended that future national studies on undergraduate students should involve a representative from each dental school to help to spread the information about prospective studies more widely with the aim to achieve a higher response rate. Few areas of dental students clinical training and skills need further attention from the lecturers/ supervisors to undertake their utmost experience in training their students.

## **CONFLICT OF INTEREST**

The authors would like to declare that there is no conflict of interest.



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