# Final Year Dental Students' Self-Assessed Confidence in General Dentistry

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**Keywords:**

Self-assessed confidence, dental education, professional attributes, dental patient care, dental clinical knowledge

**Conflict of Interest Declaration**

All authors have no conflicts of interest to declare.

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**Final Year Dental Students' Self-Assessed Confidence in General Dentistry**

**Abstract**

**Background:** Self-assessment is an important introspective skill that dental professionals will utilise throughout their professional career. Its value lies in its ability to help individuals identify areas of strengths and weakness, and subsequently seek further development of professional skills where needed. The aim of this study was to investigate the correlation between self-assessed confidence and the assessment grade of final-year dental students based on the professional attributes and competencies of newly qualified dentists outlined by the Australian Dental Council (ADC).

**Methods:** Ethical approval was obtained prior to distribution of a questionnaire with 45 statements to final year dental students. The survey was created based on the learning outcomes of the ADC guidelines in the domains of 'scientific and clinical knowledge' and 'patient care'. Participants indicated their level of self-assessed confidence by marking 'X' on a visual analogue scale (VAS) from zero ('No Confidence') to 10 cm ('Very Confident'). The assessment grade was based on OSCE, viva voce, case report and written paper.

**Results:** A total of 58 (71.6%) dental students participated in the survey. The reported self-assessed confidence over two domains were, under 'patient care': clinical information

gathering 8.92±1.07cm (range=3.94–10.0cm: n=58; 100%), clinical diagnosis and management planning 8.26±1.34cm (range=0.50–9.95cm: n=55; 94.8%), clinical treatment and evaluation, 6.07±1.69cm (range=0–10.00cm: n=55; 94.8%), and 'scientific and clinical knowledge': 6.98±1.58cm (range=0–10.00cm: n=58; 100.0%). Within these categories, high confidence was reported for routine dental care (caries management and preventive care) while lower confidence was reported for the management of oral medicine and pathologies, dental emergencies, trauma, paediatric dentistry and prosthodontics. Correlation between the assessment grade and the overall score of self-assessed confidence is low positive (r=0.225) and not statistically significant (n=46; p=0.132, Spearman'sρ).

**Conclusions:** The final-year dental students appear to have good overall self-assessed confidence in core areas of general dentistry. However, confidence seems to be over-estimated when compared with summative assessment.

**Final Year Dental Students' Self-Assessed Confidence in General Dentistry**

**Introduction**

Self-confidence is defined by Oxford Dictionary as "a feeling of trust in one's abilities, qualities and judgement". Self-assessment is an important lifelong introspective skill that dental practitioners are trained to have and utilise continually throughout their professional career.[1] As with medical education,[2, 3] the ability to self-assess one's clinical skills and identify gaps in knowledge is an essential skill developed during dental training both at Bachelor and Specialist level training. In Australia, it is a legal requirement for qualified dental professionals to undergo continuing professional development (CPD) activities to develop the personal and professional qualities required throughout the dental practitioners' careers. The skills developed to accurately identify their learning needs (gaps in knowledge) during their professional training will assist dentists choose appropriate CPD courses to further develop their careers.

Training in self-assessment is incorporated into the dental curriculum during practice especially through reflection and maintenance of clinical logs. Gordon[4] has described self-assessment as learners being able to evaluate their own work according to set standards or criteria.[5] A systematic review of pre-doctoral dental and dental hygiene students, recommended training students to self-evaluate their work using the same form in pre-clinical and clinical environments, preferably throughout the curriculum.[6] Burrows[5] discussed the benefits and pitfalls of self-assessment in undergraduate dental education and concluded that teachers and students should receive training to develop skills in its use. Key feature of an adult learner is the ability to construct, perform, implement and self-assess his/her own learning.[7] Knowles theory of andragogy advocates six core principles in adult learning that accounts for learner's; i) need to know, ii) self-concept (self-directed), iii) prior experience, iv) readiness to learn, v) orientation to learn (problem based) and vi) motivation to learn (internal).[8] Dental education incorporate these adult learner attributes into the curriculum design.[9]

In dentistry, the dental regulatory body in each country sets accreditation standards (learning outcomes) for dental training to ensure a newly qualified dental graduate is capable of providing high quality dental care to patients. The Australian Dental Council (ADC) is designated by the Dental Board of Australia (DBA) as the accreditation authority for the

Australian dental profession and has produced professional attributes and competencies of the newly qualified dentist[10] that lists 6 domains: 'professionalism', 'communication and social skills', 'critical thinking', 'health promotion', 'scientific and clinical knowledge', and 'patient care'. To date, there are three studies available on Australian dental students on their work preparedness,[11] self-assessed confidence in managing cultural diverse patients[12] and five-year following post-graduation on their preparedness to practice.[11-13] These studies utilised questionnaires that were constructed based on each school's curriculum instead of registration guidelines set by ADC, hence assessed different aspects of clinical practice. None of these studies measured the self-assessed confidence with an objective external assessment. Self-assessment alone is not a reliable measure of true clinical competence[1, 14] and even when it is measured against external assessments,[4] the accuracy may differ due to the variability of study designs [15] and the cohort of students.[16]

Hence, the aim of this study was to investigate global self-assessed confidence of final year dental students in general dentistry, based on ADC competencies of the newly qualified dentist in two key domains: *scientific and clinical knowledge,* and *patient care,* and correlate to performance of basic clinical skills as assessed by summative assessment.

**Materials and Methods**

The sample population was the final year graduate students from the Doctor of Dental Surgery (DDS) program at the University of Melbourne. A questionnaire was developed containing 45 ADC-based learning outcome statements to assess students' perception of their level of self-confidence. The learning outcome statements from two domains were extracted in verbatim from the ADC guidelines (28). Two domains of interest were *Scientific and Clinical Knowledge* and *Patient Care*. *Patient Care* domain comprised of three subcategories: i) Clinical information gathering, ii) Clinical diagnosis and management planning and iii) Clinical treatment and evaluation. ADC domains and subcategory titles were excluded from the questionnaire to minimise bias in responses. The survey was conducted in the last week of the four-year DDS program.

A visual analog scale (VAS) was utilised to record responses with VAS score ≥ 5 indicated higher confidence while VAS scores < 5 indicated lacking confidence.[17, 18] An example was illustrated in Figure 1. The length of the VAS scale was measured from '0' to the mark 'X' by two researchers who used the same ruler to ensure standardisation.

The questionnaire, plain language statement (PLS) and consent forms were submitted to the ethics committee, Human Ethics Advisory Group (HEAG) for ethical approval (ID: 1545954). A pilot study was conducted prior to data collection. No significant issues were identified; minor modifications were made to clarify survey instructions.

The PLS was subsequently distributed by the researchers to participants a week prior to data collection. On the day of the survey, a third party was involved in obtaining consent, questionnaire administration, coding and collection to maintain anonymity of responses. Each survey was given a unique code which could later be used to link students' theoretical results. Only the third party had access to the coding as the researchers were blinded and provided with the anonymised questionnaires for data analysis. On completion of the data extraction, 10% of the samples were reassessed after a week to calculated inter-examiner reliability. Data was analysed using descriptive statistics via SPSS (v24.0).

The external assessment was the summative final year assessment which comprised of OSCE, treatment planning and case presentation assessment grades. These grades were used as a global representation of the basic clinical skills acquired (ADC domains chosen: *Scientific and Clinical Knowledge* and *Patient Care*). After the completion of the end of year exams, the third party provided anonymised theoretical grades to the researchers for analysis.

The global self-assessed confidence of students was correlated to their summative assessment to examine the accuracy of student's perception of their clinical competency. A standard procedure of correlation for effect size was used.[19, 20] To determine the direction of likely inaccuracy of confidence, the two means were compared.

**Results**

A total of 72% (n=58/81) of final year dental students responded to the survey. 54 participants fully completed surveys and 4 partially completed surveys were collected and analysed. Inter-examiner reliability between the two investigators was excellent (intra-class correlation coefficient=0.999), indicating near-identical measurements. The Cronbach α coefficient for the categories clinical information gathering, diagnosis and management planning, clinical treatment and evaluation, and scientific and clinical knowledge were reported to be 0.917, 0.815, 0.845 and 0.838 respectively, indicating excellent consistency.

The data distribution was skewed. Hence, median values for VAS were used in the analysis. The overall self-assessed confidence was determined by using the combined responses within each domain. The overall self-assessed confidence was positive, with median VAS values ranging between 6.07 and 8.92 cm for all four categories (Figure 2). This indicates that the cohort of dental students demonstrated a positive confidence (median VAS ≥ 5) in all assessed domains, attaining median VAS scores of 6.07 (±1.69) to 8.92 (±1.58) (Figure 2).

Students demonstrated the highest levels of confidence (median VAS=9.87cm) in 'Clinical information gathering' (Table 1). The analysis indicated that 100% of participants demonstrated confidence in recognising their limitations in treating patients and referring them appropriately (median VAS=8.84cm), maintaining an accurate, consistent and legible records (median VAS=8.50cm), and recognising the importance of identifying both the patient and the intended site for a procedure before undertaking treatment (median VAS=9.87cm). 98% of students (n=57) felt confident in their ability to obtain comprehensive medical history (median VAS=9.24cm) and to perform an appropriate physical examination, interpret findings and organise further investigations to arrive at an appropriate diagnosis (median VAS=8.92cm). 97% of students (n=56) were confident in selecting, understanding and interpreting appropriate diagnostic procedures and tests (median VAS=8.51cm).

In the 'Diagnosis and management planning' category, more than 83% of the participants showed confidence in 15 of 18 learning outcomes, with median VAS ranging from 5.60 to 9.38 in these domains as indicated in Table 2. However, only 69% of students were confident in diagnosing oral mucosal diseases (median VAS=5.60cm), which was the lowest score obtained in this category.

Students demonstrated the lowest confidence in the domain of 'Clinical treatment and evaluation'. In this category, less than 50% of dental students were confident that they were competent at managing common oral mucosal diseases, managing developmental or acquired dentoalveolar abnormalities of dentitions, managing conditions requiring minor surgical procedures of the hard and soft tissues, and applying appropriate pharmaceutical agents to support treatment (median VAS= 4.85 - 5.00) as indicated in Table 3. The highest confidence reported in the 'clinical treatment and evaluation' was carious and non-carious management (%n VAS >5 = 98%; n= 56; median VAS=8.82cm). Lower confidence was reported in managing patients with prosthetic needs or minor surgical interventions (%n VAS >5 = 53%; n=57; median VAS=5.00cm). Importantly, borderline confidence was reported in less commonly practiced procedures such as the management of emergency situations involving orofacial pain (%n VAS >5 = 54%; n=56; median VAS = 5.00cm).

For 'scientific and clinical knowledge', more than 71% of participants reported confidence in all the learning outcomes in this category as illustrated in Table 4. While 89% of students are confident in applying the scientific principles of sterilisation, disinfection and antisepsis, and cross infection control (median VAS=7.99cm), only 71% of final year students are confident in preventing, diagnosing and treating anomalies and diseases of the teeth, mouth, jaws and associated tissues (median VAS=5.96cm).

Correlation between global self-assessed confidence and external assessment was investigated. The theoretical grade (0-100%) was scaled to match the VAS range (1-10). Out of 80 students, 58 participated in this survey and 46 global self-assess confidence surveys were matched with their theoretical grades. Four returned questionnaires were partially completed which were excluded from the comparison. Eight final assessment grades were either incomplete or not available at the time of analysis. Therefore, the cases available for comparison were only 46. Because of the skewness of the two variables, rank order correlation (Spearman's ρ) was selected. Correlation between students' global self-assessed confidence and their summative assessment was low positive (r = 0.225, p=0.132) which indicates that dental students were able to self-assess their skills but at a level lower than typical according to the generally accepted effect size threshold.[16, 20] Self-assessed confidence appears to be over-estimated as the median global self-assessed confidence exceeds median summative assessment (Table 5).

## Discussion

The DDS program is a professional postgraduate degree of 4 years duration. The entry to the program requires a Bachelor degree in Science or Biomedical Science. The DDS program provides learning and teaching based on the best current evidence available by drawing upon clinical and academic expertise within the School, the wider University, and clinical affiliates from the profession. Students develop knowledge of basic sciences, plaque related diseases and preclinical dentistry skills during the first year. Students systematically develop clinical skills during 2nd and 3rd year of the program using an evidence-based approach to learning. Final (4th) year is mainly learning through clinical training, in preparation for independent clinical practice upon graduation. The curriculum of the final year is designed to align the Intended Learning Outcomes (ILOs), learning tasks and assessments. ILOs are matched to the ADC graduate attributes. During the final year students maintain a 'patient log' consisting of self-assessment and assessment from the clinical supervisor. Students also write a reflective report describing a patient management process. These are both formative assessments and students are provided with assessment criteria and rubrics.

The scaling method selected was an ordinal numerical estimation method to rate the students' perception of self-confidence.[21] VAS was selected over Likert scale, as student perception was subjective, the method was sensitive to small changes, easy to administer (researcher) and use (participant) especially with clear points representing 'no confidence', 'confident' and 'very confident', good reliability and validity,[21, 22] allowed comparison with other studies[17, 18, 23, 24] and use of numerical data for statistical analysis.[21, 22] The main disadvantages for psychosocial research was the subjective nature of the assessment.[21, 22] The final year students were selected for the global self-assessment of their clinical skills and the survey was administered on the last week of their 4-year-program. At this stage, students had completed their clinical training and were preparing for the exit examination which consisted of OSCE, treatment planning and case presentation. This timing of the survey was chosen to capture accurate self-assessment.

ADC's competencies[10] were formulated in consultation with dental experts, and as such a principal component analysis for the two examined domains in the questionnaire was not needed. The questionnaires were adopted from the ADC document, in verbatim, in relation to the learning outcomes of general dentistry. Although the questionnaire was pre-tested to

assess comprehension, clarity of the questions and obtain feedback to improve the questionnaire prior to distribution, however, some statements were quite general encompassing a wide range of practices/specialties within which student may have had differing confidence levels. This could create uncertainties when students may have been confident in one aspect but not in the others. For example, the statement "*How confident are you in managing patients with prosthodontic needs, including the provision of fixed, patient removable and implant prosthesis*?" which is broad and open to interpretation. Therefore, further investigations into specific areas would be beneficial in particular *Clinical treatment and evaluation* where lower self-assessed confidence was reported.

In the systematic review by Davis and colleagues[14] on correlation between self-assessed confidence and observed competency, 13 studies showed no, little or inverse association[25-36] while 7 were positive.[29, 31, 37-41] Gordon[4] reported correlation ranging from r=0.02-0.65 in the health profession. Blanch-Hartigan[16] presented a meta-analysis of studies that correlated student's self-assessment with external objective assessment. It was found that students were able to accurately self-assess their clinical performance in the later years (i.e. final year) and tend to reduce over-estimation of self-assessment when compared to objective external assessment. As a summary outcome, the meta-analysis reported mean correlation r = 0.21 indicating that students were able to self-assess with limited accuracy. This reported r value of 0.21 can be taken as a threshold for health sciences. The present study (n=46) reported a low positive correlation (r=0.225). However, it compares with the threshold of 0.21[16] indicating self-assessment with limited accuracy. There is a tendency for over-estimation of self-assessed confidence.

When analysing group data, some established limitations must be considered. Firstly, weaker students often lack the ability to self-assess and self-reflect accurately, tending to overestimate their ability,[4, 42] therefore, malalignment occurs between their perception with that of the educator. Weaker students lack the metacognitive skills to identify gaps in knowledge and incompetencies within themselves and others[43] leading to the poor ability to self-directed learning. To compound the problem further, the lack of metacognitive skills causes difficulties in accepting feedback which is essential for improvement. Some students may not either be aware or worse may not agree that gaps in knowledge exists.[43] Conversely, high achieving students tend to underestimate their self-assessed competencies[4, 42]. The two

differing groups of students (over- and underestimation) within group analysis, may lead to poor correlation between global self-assessment and external assessment.

In addition to gender, other factors that contribute to differences in individual self-assessment ability include insight and cultural differences while external factors that may affect ability to self-assess include purpose of the task and whether assessment is cognitive (theoretical) or skill based.[1] As the ability to self-assess is critical in a health professional, these skills will need to be developed by incorporating learning tasks into the dental curriculum. Learning tasks can be developed for specific clinical skills taught: i) video feedback and benchmarking ii) video and verbal feedback iii) instruction (printed, video and hand-on) iv) more clinical practice v) clinical skill stage (novice, advance beginner, competent, proficient, expert).[1]

In general, dental students have reported high self-assessed confidence in examination and diagnosis, preventative care (oral health education, fissure sealants, preventative resin restoration and scaling and polishing), caries diagnosis and management, restorative care in anterior and posterior teeth and periodontal diagnosis and management[17, 18, 44-46]. These are clinical procedures students have more exposure to in their training and able to acquire clinical competence which is reflected in their self-assessed confidence. The results of this study were in agreement with other researchers. The highest levels of self-assessed confidence in 'clinical information gathering' (median VAS=8.92cm), followed by 'diagnosis and management planning' (median VAS=8.26cm), 'scientific and clinical knowledge' (median VAS=6.98) and the lowest level was 'clinical treatment and evaluation' (median VAS=6.07). The early introduction of these oral diseases in the dental curriculum and continuous revisitation of these topics throughout the course through clinical and theoretical avenues may explain the relatively high level of confidence that students have in managing them. This is consistent with findings from Karaharju-Suvanto and colleagues,[47] where a large majority of students found that their dental course provided them with appropriate and even excessive education in cariology and periodontology. The heavy focus on these topics across dental schools may be attributed to the fact that dental caries and periodontal disease are within the most common health problems globally[48] and among the top five most prevalent health problems in Australia.[49]

Conversely, lower self-assessed confidence was observed in more complex treatment such as managing medical emergencies, oral medicine and pathology, minor oral surgery, prosthodontics, interceptive orthodontics, paediatric dentistry,[44-47] dental trauma,[17, 18, 46, 50]

vital tooth bleaching,[45] and molar endodontics[46]. This trend was also noted with the present study. It is important to note that the goal of the graduate dental curriculum is to provide basic training in all dental specialties (e.g. dento-alveolar trauma, dental emergency management, paediatrics, oral medicine and surgery, prosthodontics) via theoretical knowledge and some clinical exposure. A general dentist is expected to be competent in diagnosis and management of simple procedures in these areas. With increased clinical practice and mentorship, their general clinical skill will increase. However, dentists will need to decide whether a procedure is within their capabilities, otherwise timely referral to the appropriate specialty is needed. It is critical for general dentists to understand their clinical limitations and work within their scope of practice to ensure the highest quality of care is provided to the patient.

The management of emergency dental trauma are commonly treated in a general practice setting and require immediate and effective management by the dentist. Lack of self-assessed confidence in dental emergency management is problematic as mismanagement can lead to irreversible complications with long term effects to the patient and family. Expectedly, due to the acute nature of emergencies, dental students do not gain adequate experience in dental trauma management and are thus poorly equipped to manage such cases, even towards the end of their training as a dental student.[17, 18, 46, 50] Increased student observation in emergency clinics and the adoption of case-based learning or using virtual stimulated patients may be especially beneficial towards improving self-assessed confidence in this area due to the aforementioned unpredictable nature of presentation of such cases in real time.[17, 18, 50]

**Conclusion**

Within the limitations of this study, the final year dental students demonstrated reasonable confidence in clinical skills in general dentistry. Higher confidence levels were demonstrated for clinical information gathering, and diagnosis and management planning, followed by scientific knowledge, clinical treatment and evaluation. The correlation between global self-assessed confidence and their summative assessment was low positive (r = 0.225) and self-assessment was over-estimated.

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Table 1: Descriptive analysis of dental students' self-assessed confidence based on specific learning outcomes for clinical information gathering

| Clinical Information gathering | | | | | |
|---|---|---|---|---|---|
| **LEARNING OUTCOMES** | n | n (%) with VAS≥5cm | Median VAS ($\pm IQR$) cm | Mean VAS ($\pm SD$) cm | Range cm |
| Recording a patient's complete history on psychosocial, medical, oral and dental status | 58 | 57 (98%) | 9.24 (±1.59) | 8.74 (±1.48) | 5.00-10.00 |
| Performing appropriate physical examination, interpret findings and organise further investigations to arrive at an appropriate diagnosis | 58 | 57 (98%) | 8.92 (±1.42) | 8.58 (±1.40) | 4.97-10.00 |
| Recognise my own limitations. When diagnosis or treatment is beyond my skills or to confirm prescribed treatment, able to refer patients for appropriately | 58 | 58 (100%) | 8.84 (±1.43) | 8.49 (±1.41) | 5.00-10.00 |
| Able to select appropriate clinical laboratory and other diagnostic procedures and tests. Understand their diagnostic reliability and validity and interpret results | 58 | 56 (97%) | 8.51 (±2.34) | 7.96 (±1.63) | 3.94-10.00 |
| Maintain an accurate, consistent and legible record of patient management including referral, delegation or handover | 58 | 58 (100%) | 8.50 (±2.10) | 8.24 (±1.51) | 5.00-10.00 |
| Recognise the importance of identifying both patient and the intended site for a procedure before undertaking irreversible treatment | 58 | 58 (100%) | 9.87 (±0.96) | 9.33 (±1.02) | 5.00-10.00 |

VAS=visual analog scale, SD=standard deviation, IQR=interquartile range

Table 2: Descriptive analysis of dental students' self-assessed confidence based on specific learning outcomes for diagnosis and management planning

| Diagnosis and Management Planning | | | | | |
|---|---|---|---|---|---|
| LEARNING OUTCOMES | n | n (%) with VAS≥5cm | Median VAS ($\pm IQR$) cm | Mean VAS ($\pm SD$) cm | Range cm |
| Performing an extraoral and intraoral examination appropriate to the patient, including assessment of vital signs and the recording of those findings | 58 | 55 (97%) | 9.00 (±1.60) | 8.42 (±1.60) | 4.96-10.00 |
| Completing and recording a comprehensive examination of oral examination of oral hard and soft tissues | 58 | 54 (93%) | 8.97 (±1.90) | 8.53 (±1.68) | 2.64-10.00 |
| Formulating and recording a comprehensive diagnosis, management and/or referral plan which meets the needs of the patients | 58 | 56 (97%) | 8.58 (±1.93) | 8.14 (±1.69) | 3.53-10.00 |
| Proposing, discussing and agreeing treatment options that are sensitive to each patient's individual needs, goals and values, compatible with contemporary methods of treatment, and congruent with an appropriate oral health care philosophy | 58 | 55 (95%) | 8.61 (±1.59) | 8.25 (±1.58) | 4.04-10.00 |
| Recognising the causes and factors that lead to dental diseases or disorders | 57 | 54 (95%) | 8.65 (±1.80) | 8.18 (±1.55) | 4.91-10.00 |
| Recognising the clinical features of oral mucosal diseases and disorders | 58 | 40 (69%) | 5.60 (±2.98) | 5.89 (±2.11) | 1.54-9.91 |
| Examining the dentition for pathology and abnormalities including dental caries, attrition, wear, abrasion and erosion, and other damage to dental hard tissues | 58 | 54 (93%) | 9.07 (±2.05) | 8.40 (±1.66) | 4.48-10.00 |
| Identifying the location, extent, contributing factors and degree of activity of dental caries, tooth wear and other structural or traumatic anomalies | 58 | 56 (97%) | 8.48 (±1.65) | 8.22 (±1.56) | 3.86-10.00 |
| Taking radiographs of relevance to the diagnostic tests relevant to clinical practice | 58 | 55 (95%) | 8.95 (±1.92) | 8.59 (±1.42) | 4.94-10.00 |
| Interpreting radiographic and other diagnostic tests relevant to clinical practice | 58 | 55 (95%) | 8.63 (±2.18) | 8.18 (±1.69) | 3.96-10.00 |
| Recognising the presence of systemic disease and know how the disease and its treatment, including present medication, affect the delivery of dental care and vice versa | 58 | 42 (72%) | 6.72 (±3.24) | 6.51 (±2.05) | 0.50-10.00 |

| | | | | | |
|---|---|---|---|---|---|
| Diagnosing abnormalities in the dental or periodontal anatomical form that compromise periodontal health, function or aesthetics and identify conditions which require management | 58 | 48 (79%) | 7.97 (±4.01) | 7.27 (±2.12) | 2.39-10.00 |
| Distinguishing between periodontal health and periodontal disease and identifying and identify conditions that require management | 58 | 53 (91%) | 8.50 (±2.10) | 8.16 (±1.76) | 3.80-10.00 |
| Diagnosing, explaining and managing the deterioration and breakdown of existing restorations | 58 | 55 (95%) | 8.32 (±1.97) | 8.10 (±1.63) | 2.52-10.00 |
| Conducting, explaining and discussing the planning of restorative, periodontic and prosthetic dental treatment as part of comprehensive oral rehabilitation | 58 | 48 (83%) | 8.15 (±3.19) | 7.40 (±2.18) | 1.90-10.00 |
| Recognising the common impairment of function as a consequence of tooth loss | 56 | 53 (95%) | 8.20 (±2.89) | 7.79 (±1.83) | 2.48-10.00 |
| Recognising and communicating to patients the properties and risks and benefits of dental materials and related tissue responses | 56 | 49 (88%) | 7.79 (±2.84) | 7.46 (±1.88) | 2.16-10.00 |
| Recording informed consent for all forms of treatment | 56 | 54 (96%) | 9.38 (±1.88) | 9.76 (±1.66) | 1.89-10.00 |

VAS=visual analog scale, SD=standard deviation, IQR=interquartile range

Table 3: Descriptive analysis of dental students' self-assessed confidence based on specific learning outcomes for clinical treatment and evaluation

| Clinical Treatment and Evaluation | | | | | |
|---|---|---|---|---|---|
| **LEARNING OUTCOMES** | n | n (%) with VAS≥5cm | Median VAS ($\pm IQR$) cm | Mean VAS ($\pm SD$) cm | Range cm |
| Managing oro-facial pain, including TMJ disorders, discomfort and psychological distress | 56 | 30 (54%) | 5.00 (±2.81) | 5.12 (±2.38) | 0.05-10.00 |
| Managing periodontal disease | 56 | 47 (84%) | 7.79 (±3.06) | 7.44 (±2.17) | 1.70-10.00 |
| Managing caries and other hard tissue tooth loss | 56 | 55 (98%) | 8.82 (±1.91) | 8.52 (±1.39) | 4.95-10.00 |
| Managing pulp and peri-radicular disease and disorders | 58 | 49 (84%) | 7.46 (±3.68) | 7.03 (±2.11) | 2.08-10.00 |
| Restoring teeth and the dentition to acceptable form, function and aesthetics | 58 | 46 (79%) | 7.91 (±3.62) | 7.51 (±2.07) | 3.28-10.00 |
| Managing patients with prosthodontic needs, including the provision of fixed, removable and implant prostheses | 57 | 30 (53%) | 5.00 (±3.62) | 5.50 (±2.39) | 0.99-10.00 |
| Treating and managing conditions requiring minor surgical procedures of hard and soft tissues, and apply and/or prescribe appropriate pharmaceutical agents to support treatment | 57 | 28 (49%) | 5.00 (±4.06) | 5.44 (±2.61) | 0.72-10.00 |
| Managing common oral mucosal diseases and disorders | 58 | 26 (45%) | 4.87 (±3.20) | 5.20 (±2.47) | 0.79-10.00 |
| Managing minor developmental or acquired dentoalveolar, growth related and functional abnormalities of the primary, mixed and permanent dentition | 58 | 26 (45%) | 4.85 (±2.26) | 4.83 (±2.00) | 0.81-9.20 |
| Producing diagnostic casts, mounted with inter-occlusal records | 58 | 46 (79%) | 6.89 (±3.83) | 6.72 (±2.43) | 2.28-10.00 |
| Preventing and managing where necessary medical and dental emergency situations encountered in clinical dental practice, including oro-facial infections and trauma to the teeth, mouth and jaws | 57 | 36 (61%) | 5.00 (±3.59) | 5.53 (±2.27) | 0.00-10.00 |

| | | | | | |
|---|---|---|---|---|---|
| Evaluating systematically all treatment outcomes, including information on patients, their family/carer's satisfaction with treatment and providing and/or recommending additional action and planning for maintenance of oral heath | 58 | 45 (78%) | 6.53 (±3.28) | 6.68 (±1.75) | 3.76-10.00 |
| Managing and evaluating psychological and behavioural factors impacting and impacted by dental and oral conditions | 58 | 42 (72%) | 6.60 (±3.04) | 6.43 (±2.11) | 2.32-9.98 |

VAS=visual analog scale, SD=standard deviation, IQR=interquartile range

Table 4: Descriptive analysis of dental students' self-assessed confidence based on specific learning outcomes for scientific knowledge

| Scientific Knowledge | | | | | |
|---|---|---|---|---|---|
| LEARNING OUTCOMES | n | n (%) with VAS≥5cm | Median VAS ($\pm IQR$) cm | Mean VAS ($\pm SD$) cm | Range cm |
| Understanding and applying knowledge of the scientific basis of dentistry, including the relevant biomedical and psychosocial sciences, the mechanisms of knowledge acquisition, scientific method and evaluation of evidence | 58 | 44 (76%) | 6.09 (±2.84) | 6.23 (±2.16) | 0.69-10.00 |
| Applying knowledge and understanding of the basic biological, medical, technical and clinical sciences in order to recognise the difference between normal and pathological conditions relevant to clinical dental practice | 58 | 50 (86%) | 6.46 (±3.22) | 6.57 (±1.99) | 0.77-9.94 |
| Preventing, diagnosing and treating anomalies and diseases of the teeth, mouth, jaws and associated tissues | 58 | 41 (71%) | 5.96 (±2.81) | 6.21 (±2.04) | 2.33-10.00 |
| Selecting treatment options based on the best available information and the least invasive therapy necessary to achieve the appropriate and favourable outcome for the patient | 58 | 55 (95%) | 7.51 (±2.86) | 7.45 (±1.72) | 3.68-10.00 |
| Applying the scientific principles of sterilisation, disinfection and antisepsis, and cross infection control | 57 | 51 (89%) | 7.99 (±3.25) | 7.33 (±2.45) | 0.00-10.00 |
| Working safely with ionising radiations with consideration for their effects on biological tissues and understand and apply the regulations related to their use, including radiation protection and dose reduction | 58 | 349(84%) | 8.31 (±3.49) | 7.78 (±2.08) | 2.60-10.00 |
| Applying the principles of pharmacology in using therapeutics relevant to clinical dental practice | 58 | 44 (76%) | 6.37 (±3.31) | 6.58 (±2.09) | 1.40-10.00 |

| | | | | |
|---|---|---|---|---|
| Recognising medical conditions and medications which can impact on oral health or make provision of dental treatment unsafe | 58 | 46 (79%) | 7.20 (±3.39) | 6.78 (±2.08) | 1.34-10.00 |

VAS=visual analog scale, SD=standard deviation, IQR=interquartile range

Table 5. Comparing students' global self-assessed confidence with external summative assessment

| Variables | n | Mean (±SD) | Median (±IQR) | Skewness | r Spearman's ρ | p |
|---|---|---|---|---|---|---|
| Global self-assessed confidence | 46 | 7.49 (± 1.24) | 7.6 (± 1.80) | -0.563 | 0.225 | 0.132 |
| Summative assessment | 46 | 6.56 (± 0.60) | 6.6 (± 0.70) | -0.094 | | |

**Section 1: <u>How confident are you in...</u>**

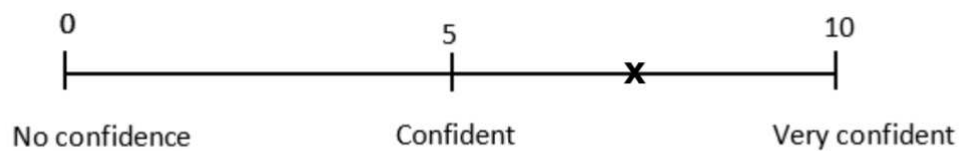1. **Recording a complete history of a patient's psychosocial, medical, oral and dental status**



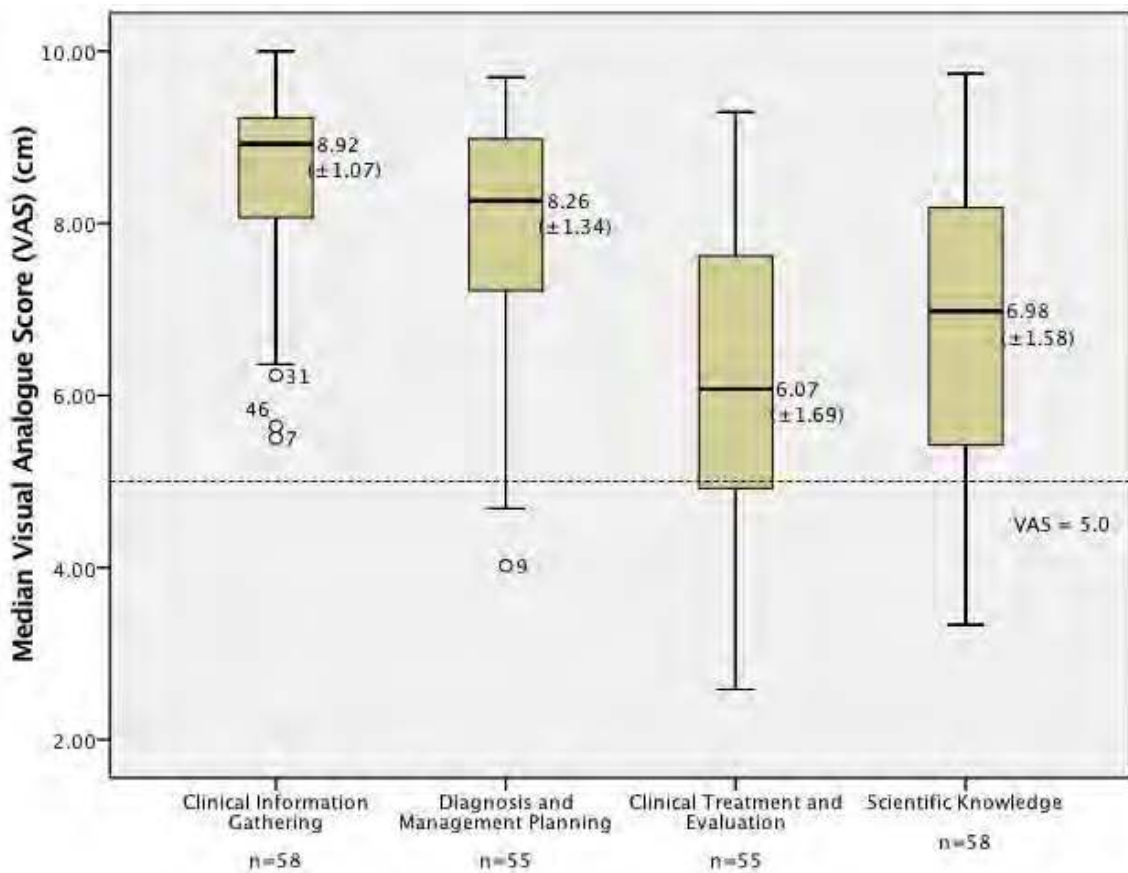Figure 1: The 10cm visual analogue scale (VAS) utilised for the questionnaire.

Figure 2: Boxplots showing overall self-assessed confidence in general dentistry for final year dental students. Median VAS ≥ 5cm indicate dental students were confident.