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# Final year dental students in New Zealand: Self-reported confidence levels prior to BDS graduation

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## Abstract

**Background and objectives:** It is expected that the graduating dental student will have acquired the skills and knowledge to confidently treat most circumstances that they may encounter in private practice. The aims of this study were to evaluate final year dental students' self-reported levels of confidence in expected core skills just prior to graduation and to explore their career intentions both directly after graduating as well as in the longer term.

**Methods:** After ethical approval was obtained, a survey and participant information sheet was distributed to all final year undergraduate dental students in 2014. Statistical analysis was carried out using SPSS version 22.0 with the alpha value set at 0.05.

**Results:** The response rate was 69% (58/84). Most (44.8%) were going to be working in New Zealand private practices with 34.5% definitely considering specializing. The majority reported high self-confidence levels for sealant restorations (96.6%) and radiography (94.8%), while very few were confident in carrying out soft tissue biopsies (1.8%) or restoring dental implants and treating medical emergencies (10.5%). Some gender differences were found.

**Conclusions:** The general finding was that most NZ graduates perceived themselves to be confident in managing the most fundamental aspects of general practice. Similar to their counterparts around the world, they will benefit from further mentoring and additional exposure to the more complex clinical tasks such as the restoration of implants and soft tissue biopsies.

## Introduction

Graduating dental students have been trained in a range of core procedures to a level that allows them to register and practice as individual professionals, with the skills and knowledge to diagnose and treat most conditions that they may encounter in private practice. Final year dental students at the University of Otago in New Zealand (NZ) have completed most of their didactic teaching by the end of their fourth year of study. In their final year they carry out a minimum of 18 hours of clinical practice per week in the general dentistry scope of practice, as well as discipline-specific rotations in oral surgery, special needs

dentistry, emergency care, radiology and orthodontics. Seminars about CAD/CAM and dental implantology prepare them for clinical cases they may treat using these modalities, and a minimum of five weeks rotation and attachments outside of the Faculty of Dentistry broadens their cultural, educational and patient treatment experiences.

Competence is continually assessed, with all tasks graded and immediate feedback given to the students. These grades are based on their performance, patient management and work output. In addition, minimum clinical requirements need to be met, all to a satisfactory standard. Self-assessment with critical analysis is also required. It is expected that, upon graduation, they will demonstrate the competence standards required to practice as a general dental practitioner (GDP).

Until 5 years ago, students completed a given quota of clinical tasks during the year. In line with many other dental schools, more emphasis is now placed on a competency-based approach. While an expected quota of tasks is still recommended and encouraged, competency in carrying out tasks is the standard prerequisite instead of the mere completion of a certain number. The merits of repetition have been discussed in the literature, with educators questioning the rationale behind the traditional "requirements" system where a mandatory number of procedures is fixed. It has been found that the amount of practice, expressed as the number of procedures completed, is not predictive of test case performance, grade point average or performance on licensure examinations (Chambers, 2012). Although there are expectations regarding the number of procedures completed, students in NZ no longer have formalized requirements.

The aims of this study were to evaluate final year dental students' self-reported levels of confidence in expected core skills just prior to graduation and to explore their career intentions both directly after graduating as well as in the longer term.

## Method

The study population consisted of all 84 final year undergraduate dental students in 2014 and consisted of 50 females and 34 males. Ethical approval was obtained from the University of Otago Human Ethics Committee (D14/287), and Māori consultation sought

by the Ngāi Tahu Research Consultation Committee according to the University of Otago's Policy for Research Consultation with a Māori framework. Survey forms were distributed a few weeks prior to the students' final assessments via their pigeonholes or electronically for those away on attachments. A participant information sheet gave a brief description of the study and indicated that returning a completed questionnaire would imply consent. Participation was voluntary, with completed questionnaires returned to a designated area to maintain anonymity. Those who chose to participate were entered into a prize draw.

### Questionnaire

A questionnaire was developed and pretested for clarity and lack of ambiguity. The first 5 questions used tick boxes, and covered the participants' demographic details such as age, sex and prior education as well as their career intentions. The remaining questions used a 5-scale Likert-style and examined the participants' self-reported confidence levels in 53 procedures or skills. The level of confidence was classified as "very confident", "confident", "neutral", "little confidence" or "very little confidence". For the purpose of reporting, results were collapsed with "very confident" and "confident" both reported as the student feeling confident with respect to carrying out a procedure, and "little confidence" and "no confidence" combined to indicate a lack of confidence. Participants were also provided with space for additional comments if they wished to add any further information. The questionnaires were designed to be easy and quick to complete.

### Statistical analysis

Data were coded and entered into the IBM Statistical Package for the Social Sciences (SPSS Version 22.0, Chicago, IL, USA) for simple descriptive analysis. The Chi-square test and Fisher Exact test (for cell counts of less than 5) were used to test for significance of observed associations with an alpha level of 0.05.

### Results

Some 58 of the 84 final year students completed the questionnaire, a response rate of 69%. The mean age of the participants was 23.5 years with a minimum age of 21 years and a maximum of 30 years. There were more female (63.8%) participants than male (36.2%), a sex difference that was consistent with the gender differences of the total class where 59.5% were female. Nine (15.8%) had some prior tertiary education. This included 2 pharmacists and 2 with a Bachelors degree in Biomedical Science. The remainder had completed papers towards a degree prior to gaining entry into dentistry.

The majority were either going to be working as a GDP in NZ private practices (44.8%) or entering the workforce as dental house surgeons (37.9%). Seven were going overseas (12.1%) and 3 (5.2%) did not yet have employment plans at the time of the survey. For those going into private practice, the majority (24/26) were joining a group practice, two thirds (66.7%) were going to city practices, and the remaining third to rural practices

(33.3%). A little under half (44.8%) felt prepared for general practice with the remainder either unsure (39.7%) or feeling unprepared (15.5%). There was no gender difference regarding level of preparedness for practicing as a GDP once graduated.

Over one third (34.5%) would definitely consider specializing, 60.3% would possibly consider it, and 5.2% were not at all interested. The choices of specialty, for those who had not ruled out this possibility, were many and varied. Although respondents had been asked to only tick one box, it was obvious that the majority had not made any firm decisions, and most ticked several boxes with a few having ticked almost all eleven choices. Endodontics, prosthodontics and orthodontics appeared to be the specialties of choice while oral pathology, public health dentistry and special needs dentistry were the least popular.

The trichotomised self-reported confidence levels are reported in Table 1. Placement of a sealant restoration was the procedure where most students reported confidence (96.6%), followed by radiography (94.8%), history and examination, placement of dental dam, full mouth scale and simple extractions (93.1%). Crown preparation, a skill which is introduced at the 3<sup>rd</sup> year level in the Simulation Clinic and revisited in the 4<sup>th</sup> year prior to students carrying out this procedure in patient clinics, was also a task where high levels of confidence was reported (87.8%). Procedures where few students reported confidence were soft tissue biopsies (1.8%), the restoration of dental implants and treatment of medical emergencies (10.5%), surgical extractions (12.1%), paediatric pulp therapy (13.8%) and the recognition, reporting and follow-up of suspected abuse/neglect cases (14.1%). The treatment of physically and mentally disabled patients (17.5%), placement of paediatric stainless steel crowns (18.9%) and the identification and management of oral pathology (19.3%) were procedures in which less than a fifth of the participants reported feeling confident.

Although many procedures showed no gender differences, males reported statistically higher levels of confidence with regards to carrying out soft tissue biopsies ( $P=0.027$ ), the identification and management of oral pathology ( $P=0.021$ ) and managing local anaesthetic complications ( $P=0.008$ ). Females felt more confident when it came to managing pain ( $P=0.040$ ), designing metal partial dentures ( $P=0.021$ ), managing haemorrhage ( $P=0.023$ ), carrying out simple extractions ( $P=0.018$ ) and crown preparations ( $P=0.035$ ). Those students who intended going into private practice were more confident in carrying out vital bleaching ( $P=0.007$ ), while future house surgeons appeared to be more to be more confident when it came to treating physically and mentally disabled patients ( $P=0.001$ ).

### Discussion

This self-reported study examined the self-confidence levels of a cohort of final year dental students over a range of core skills, and explored their career intentions both directly after graduating as well as in the longer term. Private practice and dental house surgeon posts were the most common immediate career plans, with a

**Table 1.** Self-reported levels of confidence over a range of core general dentistry skills (brackets contain row percentages)

Procedure	Very confident/ Confident	Neutral	Little/No confidence
<b>Diagnosis and treatment planning</b>			
History and examination	54 (93.1)	4 (6.9)	0 (0.0)
Radiography	55 (94.8)	3 (5.2)	0 (0.0)
Diagnosis of caries	46 (79.3)	12 (20.7)	0 (0.0)
Treatment planning	40 (69.0)	18 (31.0)	0 (0.0)
Diagnosis of periodontal disease	46 (79.3)	11 (19.0)	1 (1.7)
Diagnosis of tooth wear	45 (77.6)	11 (19.0)	2 (3.4)
Orthodontic assessment	17 (29.8)	27 (47.4)	13 (22.8)
Identification and management of oral pathology <sup>a</sup>	11 (19.3)	27 (47.4)	19 (33.4)
<b>Preventive treatment</b>			
Oral hygiene instruction and dietary analysis	50 (86.2)	7 (12.1)	1 (1.7)
Preventive treatment (fissure sealants & fluoride application)	51 (87.9)	7 (12.1)	0 (0.0)
Smoking cessation intervention counselling	16 (27.5)	23 (39.7)	19 (32.7)
<b>Routine dental procedures</b>			
Administering local anaesthetic	51 (87.9)	6 (10.3)	1 (1.7)
Dental dam placement	54 (93.1)	4 (6.9)	0 (0.0)
Sealant restoration (Preventive resin restoration)	56 (96.6)	2 (3.4)	0 (0.0)
Anterior composite restoration	49 (84.5)	7 (12.1)	2 (3.4)
Posterior composite restoration	45 (77.6)	13 (22.4)	0 (0.0)
Complex amalgam restoration	43 (74.1)	11 (19.0)	4 (6.9)
Full mouth scale	54 (93.1)	4 (6.9)	0 (0.0)
Root planning	36 (62.1)	15 (25.9)	7 (12.1)
Simple extraction <sup>a</sup>	54 (93.1)	2 (3.4)	2 (3.4)
Surgical extraction	7 (12.1)	12 (20.7)	39 (67.3)
Veneer preparation	21 (36.8)	25 (43.9)	11 (19.3)
Crown preparation <sup>a</sup>	50 (87.8)	5 (8.8)	2 (3.6)
Post and core retained crowns	25 (43.9)	14 (24.6)	18 (31.6)
Conventional bridge preparation	27 (47.4)	21 (36.2)	9 (15.8)
Resin-bonded bridge preparation	19 (33.3)	22 (38.6)	16 (28.1)
Restoration of implants	6 (10.5)	14 (24.6)	37 (64.9)
<b>Endodontic treatment</b>			
Anterior RCT	52 (91.2)	5 (8.8)	0 (0.0)
Premolar RCT	52 (89.7)	5 (8.6)	1 (1.7)
Premolar RCT	24 (41.4)	22 (37.9)	12 (20.7)
Molar RCT	17 (29.3)	22 (37.9)	19 (32.8)
Vital tooth bleaching	14 (24.6)	22 (38.6)	21 (36.8)
Non-vital tooth bleaching			
<b>Removable prosthodontics</b>			
Designing metal partial dentures <sup>a</sup>	43 (75.4)	13 (22.8)	1 (1.8)
Acrylic partial denture construction	39 (68.4)	13 (22.8)	5 (8.8)
Full denture construction	34 (59.6)	16 (28.1)	7 (12.3)
<b>Paediatric dentistry</b>			
Stainless steel crown preparation and placement	11 (18.9)	19 (32.8)	28 (48.3)
Restoration of primary teeth	23 (39.7)	20 (34.5)	15 (25.8)
Paediatric pulpal therapy	8 (13.8)	17 (29.3)	33 (56.9)
Extraction of primary teeth	32 (55.2)	17 (29.3)	9 (15.5)
<b>Medical emergencies</b>			
Managing local anaesthetic complications <sup>a</sup>	18 (31.6)	26 (45.6)	13 (22.8)
Managing haemorrhage <sup>a</sup>	29 (50.0)	13 (22.4)	16 (27.6)
Treatment of dry socket	51 (88.0)	4 (6.9)	3 (5.2)
Management of pain <sup>a</sup>	34 (59.6)	21 (36.8)	2 (3.5)
Management of dental trauma	13 (22.8)	16 (28.1)	28 (49.1)
Management of medical emergencies	6 (10.5)	24 (42.1)	27 (47.4)
<b>Special needs</b>			
Treatment of anxious patients	33 (57.9)	19 (33.3)	5 (8.8)
Treatment of elderly patients	41 (71.9)	14 (24.6)	2 (3.5)
Treatment of medically compromised patients	17 (29.9)	26 (45.6)	14 (24.6)
Treatment of disabled patients	10 (17.5)	24 (42.1)	23 (40.3)
<b>Other</b>			
Prescribing drugs	19 (33.6)	26 (45.6)	12 (21.1)
Recognising and reporting suspected abuse/neglect	8 (14.1)	29 (50.9)	20 (35.1)
Soft tissue biopsy <sup>a</sup>	1 (1.8)	10 (17.5)	46 (80.7)
Evaluating dental literature	32 (56.1)	19 (33.3)	6 (10.5)

<sup>a</sup> Statistically significant gender difference ( $p < 0.05$ )**Note:** Percentages relating to numbers may differ as not all participants answered all questions

little over a third definitely considering specialisation. The students were most confident in the placement of sealant restorations, and least confident in more complex tasks such as soft tissue biopsies and the restoration of implants.

This study does have some weaknesses. It is unknown whether the confidence levels of non-responders differed from those who completed the survey. It is also unknown whether the data is generalizable to future cohorts. The 53 procedures listed in the questionnaire did not cover all clinical experiences but aimed to be representative of the core general dentistry skills expected at an undergraduate level. It had been felt by the authors that a longer list might result in either a lower response rate or inaccurate answers as students may become fatigued or bored with the questionnaire. Pretesting had confirmed that the questionnaires were easy and quick to complete. A further limitation is that this study assessed confidence rather than competence. While competence may be of greater relevance to the practice of dentistry, the role of confidence in achieving competence should not be underestimated (Honey et al., 2011).

The General Dental Council (UK) requires new graduates to not only be competent clinicians with the range of professional skills required to begin working as part of a dental team and be well prepared for independent practice, but also to be able to assess their own capabilities and limitations (General Dental Council, 2012). Although the concept of a "safe beginner" who acts within the boundaries of their own capabilities and limitations, and knows when to request support and advice, is described, it has been suggested that this definition lacks both precision and detail (Bateman et al., 2016).

Several UK studies have described self-reported confidence levels of either final year students or recent graduates. Similar to the NZ results presented here, they reported low confidence levels in orthodontics, molar root canal treatment (RCT), surgical extractions, complex bridge work, vital tooth bleaching and the management of dental trauma (Holmes et al., 1997; Murray et al., 1999; Bartlett et al., 2001; Patel et al., 2006; Honey et al., 2011; Walley et al., 2014). In the study by Murray et al. (1999), 37% of respondents stated that they had not received sufficient clinical experience to cope with the extraction of teeth and removal of roots where no major complications were anticipated. This is in contrast to the NZ students where 93% felt confident with this procedure. The University of Otago Faculty of Dentistry's Outplacement Programme, as well as the number of NZ students who participate in dental volunteer programmes during vacations, may partially explain this finding. Qualitative and quantitative data from 525 final year students in the UK have shown that outreach placements are seen as essential for students to gain satisfactory clinical experience (Walley et al., 2014). In addition to the experience gained, outreach work significantly increases students' confidence in providing everyday dental care for patients (Smith et al., 2006).

Another notable difference was in relation to paediatric dentistry. Murray et al. (1999) reported that over 90% of the UK graduates felt that they had received sufficient

experience in most aspects of paediatric dentistry clinical care, whereas the NZ students reported an overall lack in confidence in this discipline, except for the extraction of primary teeth where slightly over half reported feeling confident. The NZ oral health care system where children are treated predominantly by dental therapists may play a role in the number and types of paediatric patients seen and treated by the BDS students.

It has been suggested that many dental students find endodontics to be complex, difficult and stressful, and that they feel unprepared and lacking in confidence particularly with procedures such as molar RCT (Seijo et al., 2013). An earlier study of NZ final year students found that a little over a fifth (21.9%) felt confident carrying out non-vital bleaching, just over a quarter (26.6%) were confident when it came to managing dental trauma and over a third (36.0%) were confident in their ability to find all the canals in multi-rooted teeth (Murray & Chandler, 2014). These current figures are not markedly different, indicating consistency in either teaching methods, availability of patients or students' confidence levels regardless of cohort.

It was surprising that the placement of fissure sealants, one of the earliest tasks that NZ students are exposed to, was not one of the skills with the highest levels of self-reported confidence. This may be the result of combining fissure sealant placement and fluoride application in the survey under the heading of preventive treatment. A three-year survey conducted across three dental schools in the UK reported that almost 100% of students reported a high level of experience in this task, with preventive measures having the highest scores for perceived confidence (Walley et al. 2014). This is similar to the finding by Honey et al. (2011) which reported that students' scores showing high levels of confidence for fissure sealants were only slightly lower than those for 'scale and polish'.

Treatment planning is one of the most important clinical skills that underpins the preparedness of dental graduates (Ali et al., 2014). Over two-thirds of the NZ respondents were confident in their ability to treatment plan. It is, however, important to keep in mind that self-rated confidence does not necessarily indicate competence. The majority of respondents (94.8%) reported high levels of confidence in radiographic diagnosis as part of treatment planning. A previous NZ study which examined the radiographic recognition of approximal carious lesions found high inter-examiner agreement between final year students and experienced senior lecturers in the Faculty (Chandler et al., 2005).

In comparison to results from the University of Hong and Griffith University in Australia, fewer NZ students felt prepared for general practice. While 93% of the Hong Kong respondents (Yiu et al., 2011) and 85.7% of the graduating Australian students (Manakil & George, 2013) felt confident in their ability to smoothly integrate into general dental practice, only 44.8% of the NZ group felt prepared. While the respondents from the Hong Kong survey had had some work experience after graduation (which would likely have affected their answers), the Australian respondents had not yet graduated. Of interest



is that more than a quarter of the Hong Kong dentists felt that they were poorly prepared to evaluate the dental literature to inform their clinical practice. The authors of the paper commented that this was disappointing as it is an important skill for the lifetime practice of evidence-based dentistry. Fortunately, with the emphasis placed on this skill at the University of Otago Faculty of Dentistry, only 10.5% of the NZ students reported little or no confidence in this area.

Taking into account that smoking cessation interventions (SCIs) are as effective in the dental setting as in any other health care setting (Macgregor, 1996) and that the NZ Government has set the goal of a smoke-free country by 2025, it was disappointing that only a little over a quarter (27.5%) felt confident in providing SCI counselling. Although it has been shown that almost two-thirds of NZ dental students feel that smoking cessation interventions are important, and two-fifths feel it is their duty as a health professional, lack of knowledge (77.1%) and patient resistance (62.6%) were reported as the most common barriers to providing this service (Mistry et al, 2016).

It has been stated that insufficient clinical exposure during their undergraduate programme can limit the confidence levels of students in performing clinical tasks (Murray et al., 1999; Lynch et al, 2010). However, clinical exposure can be limited by a lack of appropriate patients, availability of physical space, available time and a lack

of suitably trained clinical staff (Lynch et al., 2010). While graduation signifies the end of a formal undergraduate curriculum of study, it is not the end of learning and development, as this continues throughout a dentist's career (Honey et al., 2011). One of the respondents alluded to this, commenting "I've been told that 90% of learning occurs in the first two years after graduating".

With regards to their longer-term career plans, the NZ students differed from their Nigerian counterparts where over 83.6% expressed their definite plans to specialise, with only 12.3% not wanting to specialise and 4.1% not sure (Oginni et al., 2014). A greater percentage of the NZ students were unsure (60.3%) and fewer (5.2%) were not at all interested. The most popular specialties for NZ graduating students were endodontics, prosthodontics and orthodontics, a finding similar to graduating students in India where conservative dentistry, endodontics, and orthodontics were the preferred specialties (Shetty et al., 2012).

In summary, this study has shown that although some differences exist, final year dental students in NZ have much in common with their counterparts in other parts of the world. Those heading to private practice and house surgeon positions will benefit from further mentoring, particularly for the more complex clinical tasks. For those clinical tasks where the majority of students were lacking in confidence, opportunities for further experience within the dental school setting might be helpful.

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## Book reviews

### *Clinical Success in Invisalign Orthodontic Treatment*

Richard Bouchez, 2011. Paris: Quintessence.  
ISBN: 978-2912550-67-5. Contains 126 pages.  
Price, US\$120.00.

Although now somewhat out of date (published in 2011), this book is a useful beginner's guide to Invisalign. It discusses the development of the Invisalign system, what aligners are, shows you how to take your impressions, and takes you through very well illustrated versions of the prescription form, step-by-step.

There are many examples of cases showing the Clincheck software (version 2.9), and although now outdated (c.f. the latest version, 3.1), most of the principles still apply in just the same way.

There are a large number of case examples throughout the book with ample photographs showing you what works and, sometimes, what doesn't. It illustrates the Invisalign system being used in combination with orthognathic surgery, intra-oral elastics, and miniscrews.

There is an assumption of diagnostic and treatment planning knowledge, and this book will not tell you how or when to treat. It does, however, give an indication of some of the limitations of Invisalign and offers good examples of cases to start on as a new user of the system.

There was not a lot of scientific literature cited within the text, but Damon was referenced several times with regard to application of force and the biomechanics of aligners and there was a significant bibliography at the end of the book which is useful for finding more information if interested.

Overall, this book is a very useful beginner's guide to Invisalign and would make a great initial reference for those who are new users of the system.

*Lydia Meredith (Dunedin)*

### *Principles of Design and Fabrication in Prosthodontics*

Arnold Hohmann and Werner Hielscher, 2016. Chicago: Quintessence. ISBN: 978-0-86715-612-6.  
Contains 408 pages. Price, US\$128.00.

This book covers a range of prosthodontic designs and fabrication from fixed restorations including crowns and bridges, removable partial and complete dentures, to dental implants. With great illustrations, the fundamentals of tooth preparation for crown restorations, material science, biomechanics of removable dentures and laboratory fabrication procedures are well presented. The chapter on telescopic anchoring and various attachment systems offers great technical insights to the reader. Not only did the author present the technical aspects of processing of different attachment fittings, but the practical aspects of the different copings are also explained. This book also presents the biomechanical concepts in the designs of fixed bridges, removable partial and complete dentures. Although dental implants have not been covered in great detail, this book provides a concise knowledge of the basic principles in prosthodontics. It is recommended supplementary reading for those who are interested in prosthodontics, including dental technicians, general dentists and prosthodontists.

*Adeline Chai (Dunedin)*

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