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## ORIGINAL ARTICLE

# Core clinical competencies for dental graduates in Taiwan: Considering local and cultural issues



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## KEYWORDS

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**Abstract** *Background/purpose:* Depending on the educational institute to which they are associated, professors of dentistry differ in their objectives and ideals. Thus, reaching a common consensus regarding the requirements that are essential in this field has proven exceedingly difficult. This study sought to provide a reference for the design of clinical courses and the assessment of educational outcomes in the field of dentistry.

*Materials and methods:* This study used the nominal group technique with 12 volunteers recruited from the School of Dentistry, National Taiwan University (Taipei, Taiwan) to identify the essential core competencies required by dental students before graduation.

*Results:* The participants classified the core competencies into two categories, namely, operational and nonoperational, and then prioritized them according to importance. The three most important of nonoperational capabilities were patient–dentist discourse (querying patients and responding to questions), treatment planning, and the ability to deal with medically compromised dental patients. The three most important operational capabilities were cavity filling, infection control, and proper handling of needles.

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**Conclusion:** Patient–dentist discourse was identified as the most important duty in dealing with patients on their first visit. Suitable discourse can help to identify the purpose of the current visit and obtain information related to a patient’s dental and medical history. It also gives the dental staff an indication of the patient’s personality traits and helps in the formulation of an initial treatment plan following the examination.

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## Introduction

The importance of education in the field of dentistry has recently gained attention.<sup>1</sup> However, professors of dentistry greatly differ in their objectives and ideals.<sup>2–9</sup> In 2011, the American Dental Education Association set up a clear set of core competencies required by graduates to practice independently.<sup>10</sup> Similar measures were taken by the Association for Dental Education in Europe in 2009,<sup>11</sup> the Australian Dental Council in 2010,<sup>12</sup> the Association of Canadian Faculties of Dentistry in 2007,<sup>13</sup> and the Dental Council of New Zealand in 2012.<sup>14</sup> Table 1 provides a comparison of the methods of editing and revision, common aims, and items of particular concern in each of these projects. These five publications came to similar conclusions in a number of areas regarding the core competencies of dentistry; however, they varied in other areas perhaps due to cultural differences.

Despite the homogeneous nature of Taiwanese culture, the goals of education display a notable lack of consistency. The purpose of this study was to establish a competency-based training program specifically for Taiwan, including a curriculum and tools for assessment.<sup>15,16</sup> It is hoped that a suitable training framework could help to develop the skills and instill the knowledge required to function independently in clinical practice.<sup>15,16</sup> In addition, existing programs and curricula could be assessed according to their effectiveness in meeting educational objectives.<sup>17</sup>

## Materials and methods

### Study object

This study recruited 12 participants (4 men and 8 women) between 24 and 45 years of age from the research unit of the School of Dentistry, National Taiwan University (Taipei, Taiwan). The participants included seven professors in various fields of dentistry (between 5 and 10 years of teaching experience), three resident dentists (2–3 years of experience), one professional in medical education, and one individual with no clinical experience. Basic background information related to the participants is listed in Table 2.

The participants had experience with dentistry procedures in Taiwan as well as of those in the United Kingdom, Japan, and the United States of America, which expanded the range of ideas proposed, and enabled a

comparison of similarities and differences between the approaches taken in domestic and foreign universities. Our aim was to integrate the core competencies adopted from various countries with domestic clinical teaching experience in accordance with global standards. This would provide a reference for use in the design of courses in clinical dentistry as well as a means to evaluate the effectiveness of existing courses.

### Steps

This study adopted the nominal group technique (NGT) as follows<sup>18,19</sup>:

1. An expert in medical education was assigned to be the moderator and describe the purpose of the meeting as well as the vision and goals of the project.<sup>20</sup>
2. Groups were assembled of sufficient size to enable each member a fair opportunity to speak and hopefully for the group to come to a consensus.<sup>21</sup>
3. Participants were given 5 minutes to compile a set of core competencies required by students of dentistry. All items were written down and divided into nonoperational (medical humanities education, attitudes, and literacy) and operational (practical technical skills) items.
4. In rotation, each member submitted his/her ideas to the group. A second cycle was also completed to ensure that every member had the opportunity to express himself/herself completely. Participants were encouraged to listen objectively to the other members and not to express any criticisms or other comments.
5. Each participant then assigned the proposed items either two points or one point to indicate the items they regarded as the most important and second most important, respectively. Scores were assigned separately for operational and nonoperational capabilities. Participants vote for items that they would like to include and the total results are tallied for all of the participants at the end.
6. The moderator combined ideas that appeared similar, before the compilation of results.

### Data analysis

After data collection, frequencies and percentages were used for analyses.

**Table 1** Comparison of dental clinical competencies among five nations.

|                   | 2011 ADEA   | 2009 ADEE   | 2010 ADC   | 2007 Canada (ACFD)   | 2012 DCNZ (New Zealand)  |
|-------------------|---|---|--|--|--|
| Content           | <ol style="list-style-type: none"> <li>1. Critical thinking</li> <li>2. Professionalism</li> <li>3. Communication and interpersonal skills</li> <li>4. Health promotion</li> <li>5. Practice management and informatics</li> <li>6. Patient care               <ol style="list-style-type: none"> <li>i. Assessment, diagnosis, and treatment planning</li> <li>ii. Establishment and maintenance of oral health</li> </ol> </li> </ol> | <ol style="list-style-type: none"> <li>1. Professionalism</li> <li>2. Interpersonal, communication and social skills</li> <li>3. Knowledge base, information and information literacy</li> <li>4. Clinical information gathering</li> <li>5. Diagnosis and treatment planning</li> <li>6. <i>Therapy</i>: establishing and maintaining oral health</li> <li>7. Prevention and health promotion</li> </ol> | <ol style="list-style-type: none"> <li>1. Professionalism</li> <li>2. Communication and social skills</li> <li>3. Critical thinking</li> <li>4. Health promotion</li> <li>5. Scientific and clinical knowledge</li> <li>6. Patient care               <ol style="list-style-type: none"> <li>i. Clinical information gathering</li> <li>ii. Diagnosis and management planning</li> <li>iii. Clinical treatment and evaluation</li> </ol> </li> </ol> | <p>A total of 47 competencies could be summarized in the following six domains:</p> <ol style="list-style-type: none"> <li>1. Health promotion</li> <li>2. Establishment and maintenance of a healthy oral environment</li> <li>3. Professionalism</li> <li>4. Practice organization</li> <li>5. Assessment of the patient and the oral environment</li> <li>6. Rehabilitation of form, function, and esthetics</li> </ol> | <ol style="list-style-type: none"> <li>1. Understand current scientific dental related knowledge</li> <li>2. Obtain patient information</li> <li>3. Analyze client or patient information and plan an oral health program</li> <li>4. Provide or make provision for oral health care</li> <li>5. Refer appropriately</li> <li>6. Assess the effectiveness of oral health strategies</li> <li>7. Communicate effectively</li> <li>8. Provide culturally safe practice</li> <li>9. Prevent cross-infection</li> <li>10. Maintain a safe work environment</li> <li>11. Understand scientific methodology</li> <li>12. Maintain competence</li> <li>13. Understand the legal requirements of practicing in an oral health workplace</li> </ol> |
| Edited method     | Members of Dental Education Association or Dental Council   |   |  | In 2003, edited by Scholars of NDEB, ACFD, CDAC, and CDA   | Members of Dental Education Association or Dental Council  |
| Revised method    | Literature review and updating to revise  | Reviewed once again in 5 y  |  | Literature review and updating to revise   | —  |
| The same idea     | <ol style="list-style-type: none"> <li>1. Professionalism</li> <li>2. Establishing and maintaining oral health</li> <li>3. Clinical knowledge and skill</li> </ol>  |   |  |  |  |
| Primary focus     | Critical thinking   | Professionalism   |  | Health promotion   | Understand current scientific dental-related knowledge   |
| Special attention | <ol style="list-style-type: none"> <li>1. Evidence-based medicine</li> <li>2. Crisis management</li> <li>3. Occupational safety</li> </ol>  | <ol style="list-style-type: none"> <li>1. Evidence-based treatment and lifelong learning</li> <li>2. Health care in the community</li> </ol>  | Scientific and clinical knowledge  | <ol style="list-style-type: none"> <li>Obtain informed consent including the patient's written acceptance of the treatment plan and any modifications</li> </ol>   | <ol style="list-style-type: none"> <li>1. Provide or make provision for oral health care</li> <li>2. Provide culturally safe practice</li> <li>3. Understand the legal requirements</li> </ol>   |

ACFD = Association of Canadian Faculties of Dentistry; ADC = Australian Dental Council; ADEA = American Dental Education Association; ADEE = Association for Dental Education in Europe; CDA = Canadian Dental Association; CDAC = Commission on Dental Accreditation of Canada; DCNZ = Dental Council of New Zealand; NDEB = National Dental Examining Board of Canada.

**Table 2** Basic demographic information of participants.

| Information        | No. | Percentage (%) |
|--------------------|-----|----------------|
| Age                |     |                |
| 40–45              | 2   | 16.7           |
| 30–39              | 6   | 50.0           |
| 24–29              | 4   | 33.3           |
| Sex                |     |                |
| Male               | 4   | 33.3           |
| Female             | 8   | 66.7           |
| Teaching seniority |     |                |
| >10 y              | 1   | 8.3            |
| 5–10 y             | 7   | 58.3           |
| <5 y               | 4   | 33.3           |
| Total              | 12  | 100            |

## Results

### Voting results

Voting results were described as follows:

#### 1. Nonoperational items of core competency for dental graduates (Table 3):

- i. Patient–dentist discourse (querying patients and responding to questions; 13 points)
- ii. Treatment planning (11 points)
- iii. Handling of medically compromised dental patients (7 points)
- iv. Communication skills (3 points)
- v. Patient care, oral education, and postoperative explanations (2 points)
- vi. Informing patients of diagnosis and how to avoid medical conflicts (2 points)
- vii. Dealing with difficulties immediately (1 points)
- viii. Declaration of medical expenses (1 point)
- ix. Medical ethics (0 points)

The dental mini-Clinical Evaluation Exercise assessment index<sup>22–25</sup> categorizes nonoperational items of core competency for dental graduates as follows:

- i. *Patient interviews*: inquiries, communication, avoiding medical conflicts, medical ethics

- ii. *Professionalism*: informing patient of diagnosis, avoiding medical conflicts, medical ethics
  - iii. *Clinical diagnosis*: dealing with medically compromised dental patients
  - iv. *Consultation*: teaching oral hygiene, postoperative explanations
  - v. *Organizational skills*: formulating treatment plans, and National Health Insurance claims
- #### 2. Operational items of core competency for dental graduates (Table 4):
- i. Procedures for cavity filling (11 points)
  - ii. Infection control (9 points)
  - iii. Safe handling of needles (7 points)
  - iv. Positioning patients (6 points)
  - v. Suturing (5 points)
  - vi. Deep scaling and root planning (4 points)
  - vii. Local anesthesia (3 points)
  - viii. Simple extraction (3 points)
  - ix. Root canal treatment (3 points)
  - x. Radiographic techniques (2 points)
  - xi. Fabrication of temporary and permanent fixed prostheses (2 points)
  - xii. Scaling (2 points)
  - xiii. Handling of instruments (2 points)
  - xiv. Fabrication of temporary and permanent removable prostheses (1 point)

## Discussion

This study used the NGT to identify the core competencies required by dental students at the time of graduation. The NGT provides a comfortable environment in which all participants may interact in a fair and equal manner.<sup>19</sup> Participants discuss the similarities and differences between various concepts at a cognitive level to facilitate the integration of similar ideas into representative concepts to facilitate classification. For this approach to be effective in the short time allotted, participants must actively participate in the generation of candidate items as well as in the ranking process. Efforts must also be made to ensure that the resulting items are concise and unambiguous.<sup>20</sup> The participants were able to reach a consensus regarding the core competencies required for dental students as well as the basic principles involved; however, regional differences still appeared.

**Table 3** Nonoperational items of core competency for dental graduates.

| Item  | 2 Points | 1 Point | Total | Ranking |
|---|----------|---------|-------|---------|
| Patient–dentist discourse (querying patients and responding to questions) | 2 × 3    | 1 × 7   | 13    | 1       |
| Handling of medically compromised dental patients                         | 2 × 2    | 1 × 3   | 7     | 3       |
| Patient care, oral education, and postoperative explanations              | 2 × 0    | 1 × 2   | 2     | 5       |
| Dealing with difficulties immediately                                     | 2 × 0    | 1 × 1   | 1     | 7       |
| Treatment planning  | 2 × 4    | 1 × 3   | 11    | 2       |
| Communication skills  | 2 × 1    | 1 × 1   | 3     | 4       |
| Informing patients of diagnosis and how to avoid medical conflicts        | 2 × 0    | 1 × 2   | 2     | 5       |
| Medical ethics  | 2 × 0    | 1 × 0   | 0     | 9       |
| Declaration of medical expenses   | 2 × 0    | 1 × 1   | 1     | 7       |

**Table 4** Operational items of core competency for dental graduates.

| Item   | 2 Points | 1 Point | Total | Ranking |
|--|----------|---------|-------|---------|
| Positioning of patient   | 2 × 3    | 1 × 0   | 6     | 4       |
| Infection control  | 2 × 2    | 1 × 5   | 9     | 2       |
| Local anesthesia   | 2 × 0    | 1 × 3   | 3     | 7       |
| Cavity filling   | 2 × 4    | 1 × 3   | 11    | 1       |
| Root canal therapy   | 2 × 0    | 1 × 3   | 3     | 7       |
| Deep scaling and root planing  | 2 × 1    | 1 × 2   | 4     | 6       |
| Radiographic techniques  | 2 × 0    | 1 × 2   | 2     | 10      |
| Simple extraction  | 2 × 1    | 1 × 1   | 3     | 7       |
| Fabrication of temporary fixed prosthesis                            | 2 × 0    | 1 × 2   | 2     | 10      |
| Fabrication of temporary removable prosthesis                        | 2 × 0    | 1 × 1   | 1     | 14      |
| Suturing   | 2 × 1    | 1 × 3   | 5     | 5       |
| Scaling  | 2 × 0    | 1 × 2   | 2     | 10      |
| Handling of instruments  | 2 × 1    | 1 × 0   | 2     | 10      |
| Handling of needles  | 2 × 3    | 1 × 1   | 7     | 3       |
| Basic disinfection procedures  | 2 × 0    | 1 × 0   | 0     | 15      |
| Preventing patients from swallowing dental instruments or prosthesis | 2 × 0    | 1 × 0   | 0     | 15      |

Among the nonoperational items of core competency for dental graduates, this group of experts identified patient–dentist discourse (querying patients and responding to questions) as the most important skill, particularly when dealing with new patients. This process can help to elucidate the patient’s previous medical and dental histories as well as their personality traits, all of which are essential to the establishment of a preliminary treatment plan. However, designating patient–dentist discourse as a skill for essential new dentists would require the development of specific courses for its instruction as well as methods of evaluating students with regard to their skills in this area. This will require further research and discussion. Among the nonoperational core competencies for dental graduates, clinical skills obtained the highest scores. For many years, dentistry has emphasized the training of technical skills; therefore, nonoperational skills are largely overlooked. In the training of dentists, clinical skills always receive more attention, and nonoperational skills tend to be underdeveloped. In the future, dentists will be tested with regard to their competencies in a range of dental fields. Skills in conversing with patients are easier to test; however, the skills and knowledge related to medical ethics are hard to test. This might be the reason why medical ethics received a lower score.

Among the operational items of core competency for dental graduates, the procedures of cavity filling were identified as the most important. The experts also emphasized safety issues related to the infection control and the proper handling of needles. Interestingly, medical ethics was not included among the issues of greatest importance, despite the general assumption that it is a fundamental issue in medicine. The limited resources available to universities often result in the relegation of medical ethics to secondary status. Fortunately, the health authority of Taiwan now insists that the education of medical ethics be a focus of the Teaching Hospital Evaluation Project. More and more teaching hospitals in Taiwan have established clinical ethics committees, which meet monthly to review the state of education related to medical ethics, develop

policies, and provide information in this area. We hope to raise the society’s awareness of medical ethics in the future.

The group of experts in this study included students as well as instructors, which enabled a balanced exploration of the difficulties involved in the study of dentistry from both perspectives. No other country in Asia has sought to establish a reference guide regarding the core competencies required for dental graduates. This study adopted an international perspective attempted to take into account regional issues and cultural differences specific to the context of students studying in Asia.

This study was subject to a number of limitations. The limited time available for discussion and the small number of participants may have affected the scope and quality of the final results. Nonetheless, this was the first qualitative assessment of education in dentistry in Taiwan and objectively reevaluating the clinical core competencies to determine the ones to eliminate or retain was proved to be a valuable exercise. The authors will expand this forum to include experts with a wider range of experience to obtain more perfect results and conclusions.

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