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Original Article

The performance of the two-year postgraduate year dentist training program in Taiwan

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Abstract *Background/purpose:* The postgraduate year dentist training program (PGYD) officially implemented in 2010. This study aimed to assess PGYD trainees' subjective satisfaction perception and objective competence performance according to different training institutions (either dental clinics or hospitals).
Materials and methods: A nationwide cross-sectional survey was conducted in 2018. Subjective satisfaction questionnaires from 222 PGYD trainees and 166 PGYD trainees' scores of objective structured clinical examinations (OSCEs) were collected for analysis. The *t*-test and logistic regression were used to compare differences between two groups.
Results: In subjective satisfaction, PGYD trainees in hospitals revealed less positive perceptions on teachers (odds ratios [ORs] range: 0.33–0.7) and on training plans and auxiliary facilities (ORs range: 0.23–0.69), but they had more opportunities to attend and present at professional meetings than those in clinics. In PGYD trainees' opinion, the optimal training period allocation was 25% in hospitals and 75% in clinics. Overall, trainees in hospitals had better OSCE scores than those in clinics (OR [95% confidence interval, CI]: 3.12 [1.68–5.79]), except for the item of "the relation between physical condition and dental treatment outcome" (0.3 [0.1–0.97]).
Conclusion: PGYD trainees in dental clinics have more positive perceptions on teachers and on training plans and auxiliary facilities, but PGYD trainees in hospitals have better OSCE scores. PGYD trainees prefer to be trained in clinics for a better connection with future careers, while

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hospitals can offer better training for PGYD trainees to become independent dentists because they have better training environment and more educational resources.

Introduction

Since July 2010, Taiwan's postgraduate year dentist training program (PGYD) has been designed to train postgraduate dentists to become independent practitioners. PGYD training is essential for new dental graduates to link up under-supervised practice in their school education with truly independent practice. PGYD has existed in the United States and Canada for decades. Institution-based training in the United States mainly has two forms: general practice residency and advanced education in general dentistry. General practice residency, a hospital-based general dentistry residency of 1—2 years, involves working as a member of the hospital staff. Advanced education in general dentistry is almost always a dental school-based residency. In Canada, hospital-based residencies are the only postgraduate programs available in dental specialties, and many dental specialties, especially those in hospital-based settings, require an additional year of postgraduate study.[1] Additionally, the PGYD system could be adapted according to territorial condition differences, such as the grouped-institution training manner in Japan.[2]

Owing to the 2003 outbreak of the severe acute respiratory syndrome (SARS) in Taiwan, the issue of initializing the two-year postgraduate year general medicine training system with more professional training was discussed. The PGYD was proposed after the SARS epidemic ceased and was officially implemented in 2010 after much discussion and maneuvering.[3] To facilitate the new training system initially and to accommodate different backgrounds of PGYD dentists, diversified training modes have been considered. There are optional elective courses for PGYD trainees. Certified dental clinics and hospitals with a department of dentistry are acceptable to become the training institutions. Single institution-based and grouped institution-based training are also allowed.

Although certified PGYD training institutions are all supervised and must be regularly accredited by the Joint Commission of Taiwan,[4] to date, no evidence has been reported on the difference in adequacy in the essential conditions of training programs and trainees' performance in dental competence between private dental clinics and hospitals. This study aimed to investigate the performance and its factors associated with PGYD based on a nationwide survey to provide evidence for future improvements in dental education.

Materials and methods

Study population and design

A nationwide cross-sectional survey in Taiwan was conducted from May to July 2018. A total of 24 hospitals and 14 private dental clinics participated in enrolling eligible PGYD trainees. PGYD trainees who had been trained continuously for at least 17 months up to December 2017 were eligible to be included. Those whose monthly records of 2017 training were incomplete or who finished PGYD in December 2017 were excluded.

A six-member expert panel was organized that consisted of four experienced dental educators in the schools of dentistry at four medical universities and two members from different PGYD committees that were responsible to formulate and evaluate the training program in two medical center hospitals. The expert panel drafted the study questionnaire based on literature review and peer communications, and finally settled a 20-item questionnaire to collect PGYD trainees' subjective perceptions of their training institutions on the essential factors of training adequacy. Meanwhile, we decided in consensus to use the trainees' scores in objective structured clinical examinations (OSCEs) as an objective training assessment on PGYD trainees' competence. A total of 166 PGYD trainees participated in the OSCEs, 196 PGYD trainees participated in the medical knowledge exam, and 222 PGYD trainees participated in the PGYD satisfaction and the system questionnaire.

Questionnaire

The subjective perception questionnaire inquired about respondents' perceptions on teachers (items 1—6), perceptions on training plans and auxiliary facilities (items 7—15), participation in professional meetings (items 16—19), and views on the composition of PGYD training institutions (item 20). Items 1—15 were rated on 5-point scales: from 4 to 0 (strongly agree, agree, acceptable, disagree, and strongly disagree). Items 16—19 had 6 options indicating the frequency of monthly participation in professional meetings (<1, 1—2, 3—4, 5—6, >6 times per month and irregular/unknown). The last item also had 6 order options. Respondents subjectively chose the optimal composition of training period allocated in hospital and in dental clinics (proportion of training period in dental clinics and in hospitals: 100%:0%, 75%:25%, 50%:50%, 25%:75%, 0%:100%, and uncertain). In the OSCEs, PGYD trainees had to complete a series of 5-min station tests where each station was made up of standardized patients and an examiner rated the participants' performance. After the 5-min station test was finished, a board of educators, usually the examination committee in the training institution, gave a comprehensive appraisal for every trainee. An assessment form comprising 14 items was used to summarize the trainees' competence, including 10 items for capability to care independently and adequately and another 4 items for patient communications. All 14 items were rated by 3 levels: not completed, partially completed, and fully completed.

Execution

Certified PGYD training institutions are announced annually by the Joint Commission of Taiwan, which responds to the accreditation of PGYD training institutions. An official phone call was made to the dean of each institution from April to June 2018, and an introduction to this study containing the background, goals, requirements for participation, and subjective questionnaire was mailed. Whenever a dean expressed willingness to participate, the dean was asked to designate a contact person.

The collection of PGYD trainees' OSCE scores depended on the dean's discretion. If the deans decided to participate in this part of the investigation, the study panel would then send data collection sheet materials to them, and the contact person would also complete the sheets and retrieve them for the study panel. To maintain the quality of OSCE appraisal results, the study panel scheduled and settled OSCEs at the participating PGYD training institutions after any dean indicated willingness to participate in the objective evaluation investigation. The actual devices could have slight differences among PGYD training institutions, but under the Joint Commission of Taiwan's supervision and devotion to facilitating inter-institution communication for at least 5 years, the difference in hardware among institutions was quite minor.

The subjective evaluation questionnaire was entirely anonymous. At institutions that participated in collecting OSCE scores, PGYD trainees filled out the subjective questionnaire and then took the OSCEs. The study panel collected the subjective questionnaire, the PGYD trainees' demographics, and their OSCE scores. No information could link the subjective questionnaire with other study data. In other nonparticipating institutions, only the subjective questionnaires were recycled by the designated contact person after the PGYD trainees completed them. This study was reviewed and approved by the Joint Institutional Review Board of TMU (No. 201802010) on April 18, 2018, and informed consent was obtained from each participant.

Statistical analysis

The difference in PGYD trainees' subjective evaluation between dental clinic and hospital was analyzed by *t*-test and chi-square test, where appropriate. The association of OSCE scores with PGYD trainees' characteristics was analyzed using the chi-square test. For the first 15 items of the subjective questionnaire, the responses were categorized as dichotomous outcomes: "agree," and "strongly agree" were recoded as 1 to indicate positive perception of the teachers, training plan, and auxiliary facilities, and "strongly disagree", "disagree", and "acceptable" were recoded as 0 to indicate a non-positive perception. An odds ratio (OR) with a 95% confidence interval (CI) between categories was reported. The analyzed PGYD trainees' characteristics were training institution categories (dental clinics vs. hospitals) and trainees' gender (male vs. female), age ($\leq$27 vs. $>$ 27 years of age), graduation year ($\geq$2015 vs. $<$ 2015), and practice experience before PGYD assessment (yes vs. no). The analysis was performed via SPSS version 19.0 (SPSS, Inc., Chicago, IL, USA) A *P*-value less than 0.05 indicated statistical significance.

Results

A total of 222 questionnaires were collected from PGYD training institutions: 178 (80.2%) from trainees trained in hospitals and 44 (19.8%) from those trained in private dental clinics. The mean scores (0–4 points) of PGYD trainee's responses to the subjective evaluation items were summarized according to different PGYD training institutions (either dental clinic or hospital) (Table 1). The ratings by PGYD trainees in clinics were higher than those by PGYD trainees in hospitals for the first 15 questions, while the *t*-test revealed no statistically significant differences between the two groups. In the analyses based on the dichotomized scores of items 1–15 ("agree" and "strongly agree" *vs.* "strongly disagree", "disagree", and "acceptable"), PGYD trainees enrolled in hospitals revealed less positive perceptions on teachers (the ORs ranged from 0.33 to 0.7) and on training plans and auxiliary facilities (the ORs ranged from 0.23 to 0.69) (Table 1).

Regarding PGYD trainees' opportunities to participate in professional meetings (Table 1, items 16–19), responses from trainees in clinics or those in hospitals revealed significant differences; i.e., trainees in hospitals had more opportunities to attend and present at professional meetings than those in clinics. Every month, opportunities to attend more than two journal meetings, case reports, and seminars were reported as 56.3%, 34.7%, and 33.3% by trainees in hospitals, respectively, while equivalent conditions were reported by only 2.3% of trainees in clinics. Moreover, the proportions of trainees in dental clinics who reported having such opportunities less than once per month ranged from 14% to 25.6%, much higher than those in hospitals (only 3.4–5.7%). Of trainees in hospitals, the proportion of those having the opportunity to present professionally at least once per month was 88.7%, while that of trainees in clinics was only 69.8%. In the trainees' opinion, the optimal allocation of the training period was 25% in hospitals and 75% in clinics (Table 1, item 20).

In the association analysis with respect to objective evaluation based on PGYD trainees' OSCE scores, a total of 166 trainees were included in the analysis (Tables 2 and 3). There were 125 (75.3%) trainees in hospitals and 41 in clinics. The proportions of females and males were 48.2% and 51.8%, respectively. Of the 165 trainees, 24.2% practiced before PGYD training, and 75.8% did not (Table 2). Overall, trainees in hospitals had better OSCE scores than those in clinics (OR [95% CI]: 3.12 [1.68–5.79]), except for the item of "the relation between physical condition and dental treatment outcome" (0.3 [0.1–0.97]) (Table 3). Female trainees had better OSCE scores than male trainees (1.27 [1.02–1.57]), especially in the items of "dental history", "oral hygiene habits", and "smoking/drinking/betel nut chewing" (Table 3). Trainees of older or earlier graduates seemed to perform worse (0.77 [0.62–0.97], 0.6 [0.43–0.85], respectively) in OSCEs on numerous items of capability to care. Those without practice experience before PGYD training performed better in both capability to care and patient communications (1.54 [1.15–2.08], 2.44 [1.62–3.68], respectively; Table 3).

Table 1 Postgraduate year dentist training program (PGYD) trainee's responses to the subjective evaluation items according to different PGYD training institutions (either dental clinic or hospital) (n = 222).

	Items by subscales	Training institution			OR (95% CI) for positive perception
		Clinic	Hospital		
	Trainees' perception on teachers	**Mean**	**Mean**		
1	The number of teachers is sufficient in this institution.	3.27	2.78		0.48 (0.35—0.66)***
2	Teaching skills provided to trainees are good in this institution.	3.36	2.8		0.46 (0.32—0.65)***
3	The teachers provide instruction about medical records.	3.2	2.7		0.33 (0.23—0.47)***
4	The teachers are good at providing feedback to trainees.	3.14	2.76		0.56 (0.27—1.18)
5	When trainees encounter difficulties in practice, teachers come to help immediately.	3.43	3.05		0.70 (0.29—1.68)
6	Overall, teachers provide adequate instruction.	3.34	2.89		0.37 (0.22—0.60)***
	Trainees' perception on training plan and auxiliary facilities	**Mean**	**Mean**		
7	The "50-h general oral medicine course" is provided for PGYD.	3.59	2.52		0.35 (0.26—0.46)***
8	Total patient care is provided.	3.2	2.6		0.23 (0.16—0.32)***
9	Community dentistry training is provided.	3.23	2.73		0.30 (0.21—0.43)***
10	Oral surgery and dental emergency training are provided.	3.02	2.71		0.43 (0.32—0.58)***
11	Electives are provided by your institution.	3.05	2.57		0.28 (0.13—0.61)**
12	Resources for teaching (e.g., textbooks, journals) for learning or training are provided.	2.95	2.71		0.69 (0.54—0.90)**
13	We use sufficient materials and equipment in the clinics.	3.18	2.59		0.25 (0.17—0.37)***
14	The training quality and progress management are good.	3.16	2.63		0.29 (0.21—0.41)***
15	Overall, the course is very helpful for my future career.	3.39	2.91		0.28 (0.15—0.51)***
	Trainees' participation to professional meetings				
16	How many times do you attend a journal meeting in a month?	***n* (%)**	***n* (%)**		
	<1 time	10 (23.26)	7 (3.98)	***	
	1—2 times	32 (74.42)	70 (39.77)		
	3—4 times	1 (2.33)	63 (35.8)		
	5—6 times	0 (0)	24 (13.64)		
	>6 times	0 (0)	12 (6.82)		
	Uncertain	1	2		
17	How many times do you attend a case report in a month?			***	
	<1 time	6 (13.95)	6 (3.41)		
	1—2 times	36 (83.72)	109 (61.93)		
	3—4 times	1 (2.33)	36 (20.45)		
	5—6 times	0 (0)	15 (8.52)		
	>6 times	0 (0)	10 (5.68)		
	Uncertain	1	2		
18	How many times do you attend a seminar in a month?			***	
	<1 time	11 (25.58)	10 (5.65)		
	1—2 times	31 (72.09)	108 (61.02)		
	3—4 times	1 (2.33)	37 (20.9)		
	5—6 times	0 (0)	12 (6.78)		
	>6 times	0 (0)	10 (5.65)		
	Uncertain	1	1		
19	How many times do you make a presentation in a month?			**	
	<1 time	13 (30.23)	20 (11.3)		
	1—2 times	28 (65.12)	129 (72.88)		
	3—4 times	2 (4.65)	26 (14.69)		
	5—6 times	0 (0)	2 (1.13)		
	>6 times	0 (0)	0 (0)		
	Uncertain	1	1		

Table 1 (*continued*)

	Items by subscales	Training institution			OR (95% CI) for positive perception
		Clinic	Hospital		
	Trainees' view on the composition of training institutions				
20	The ideal proportion of PGYD training by type of institution				
	100% in clinic	10 (23.26)	7 (3.98)	***	
	75% in clinic, 25% in hospital	32 (74.42)	70 (39.77)		
	50% in clinic, 50% in hospital	1 (2.33)	63 (35.8)		
	25% in clinic, 75% in hospital	0 (0)	24 (13.64)		
	100% in hospital	0 (0)	12 (6.82)		
	Uncertain	1	2		

Note: The PGYD training institution category "clinics" included private dental clinics, and "hospitals" included dental hospitals and dental departments in general hospitals. Items indicated with *, **, and *** had significant difference in trainees' responses with *P*-values < 0.05, <0.01, and <0.001, respectively. The tests were performed using *t*-tests for items 1–15 and chi-square tests for others. The column "perception tendency" showed the odds ratio (OR) and 95% confidence interval (CI) of a positive perception ("strongly agree" and "agree" vs. "disagree", "acceptable", and "strongly disagree") expressed by PGYD trainees trained in hospitals against those trained in clinics.

Discussion

This is the first nationwide assessment of PGYD adequacy and training efficiency according to different training institutions (either dental clinics or hospitals) in Taiwan. Some questionnaires have been used in dental education, such as the Dundee ready education environment measure (DREEM) and the dental clinical learning environment inventory (DECLEI).[5,6] The DREEM has been widely used to assess dental education.[7–10] As most training institutions do not have PGYD training experience, evaluating the effectiveness of these training institutions by a subjective questionnaire with essential features, including the adequacy of the training program and OSCE assessment scores, is necessary and important. The results of this study suggest that even though the trainees reported more positive perceptions on teachers from clinics than on teachers from hospitals, trainees in hospitals had better performance than those in clinics. Another interesting finding was that although the trainees in hospitals were less satisfied, they still preferred training in hospitals rather than in private dental clinics. This may indicate that trainees in hospitals have higher expectations for PGYD training than trainees in dental clinics.

Table 2 Demographics of postgraduate year dentist training program (PGYD) trainees participating in objective structured clinical examinations (OSCEs) (n = 166).

Institution	*n*
Hospital's department of dentistry	125 (75.3%)
Private dental clinics	41 (24.7%)
Gender	
Female	80 (48.2%)
Male	86 (51.8%)
Age (*n* = 164)	
mean	27.2 ± 2.47 year
≤27	110 (67.1%)
>27	54 (32.9%)
Graduation year (*n* = 162)	
After 2015	95 (58.6%)
Before 2015	67 (41.4%)
Practicing before PGYD training (*n* = 165)	
Yes	40 (24.2%)
No	125 (75.8%)

The use of an OSCE as an assessment tool to evaluate a student's clinical skill with the use of standardized patients in clinical simulation scenarios was described by Harden.[11] The OSCE has been used in medical education and other health sciences disciplines. The use of the OSCE in dental education was first reported in the late 1990s,[12] and soon the OSCE became an accepted tool for assessment of clinical skills in dental education.[13] Increasing evidence suggests that OSCEs can serve as reliability and validity assessments during the transition from preclinical to clinical education in the dental curriculum.[14] Overall, PGYD trainees in hospitals performed better, showed better capability to perform care, and exhibited better communications with patients than trainees in private dental clinics. The reasons for these findings may be due to that the hospitals have a larger scale of training, better training environment, and more educational resources than the private dental clinics. Training is also more rigorous in a hospital's department of dentistry than in a private dental clinic.

We also found significant gender differences in our results. Female trainees tended to perform better than male trainees overall. However, we found no significant differences in capability to care and in patient communications between male and female trainees. Further analyses showed that female trainees performed better with regard to documenting dental history, oral hygiene habits, and smoking/drinking/betel nut chewing habits; in self-introduction; and in patient identification. Female trainees were also better than male trainees in gathering patients' background information. Compared with previous OSCE research, we obtained similar results to those of medical OSCEs. Moreover, in Germany, female medical students also tend to perform significantly better than male medical students on the dimensions of empathy, structure, verbal expression, and nonverbal expression.[15]

Table 3 Analysis results of the association between postgraduate year dentist training program (PGYD) trainees' characteristics and objective structured clinical examination (OSCE) scores.

Subscales	Institutions	Gender	Ages	Graduation year	Practicing before PGYD
Items	Clinic / Hospital	Male / Female	≤27 y / > 27 y	≥2015 / < 2015	Yes / No
Overall situation	3.12 (1.68—5.79)***	1.27 (1.02—1.57)*	0.77 (0.62—0.97)*	0.60 (0.43—0.85)**	1.81 (1.42—2.30)***
Capability to care	2.16 (1.09—4.28)*	1.29 (0.99—1.68)	0.79 (0.60—1.04)	0.54 (0.37—0.78)**	1.54 (1.15—2.08)**
1 Chief complaint	10.1 (7.13—14.4)***	1.29 (0.98—1.70)	0.31 (0.23—0.42)***	1.23 (0.61—2.51)	2.14 (1.54—2.96)***
2 Family history	13.9 (4.65—41.5)***	1.11 (0.90—1.38)	0.98 (0.77—1.26)	0.75 (0.57—0.99)*	1.63 (1.17—2.27)**
3 Dental history	0.99 (0.76—1.30)	1.40 (1.15—1.71)**	0.93 (0.75—1.17)	0.41 (0.30—0.54)***	1.61 (1.23—2.10)***
4 Oral hygiene habits	3.03 (1.80—5.10)***	1.84 (1.43—2.39)***	1.03 (0.77—1.36)	0.25 (0.17—0.38)***	1.24 (0.86—1.77)
5 Smoking/drinking/ betel nut chewing	3.27 (1.94—5.49)***	2.07 (1.61—2.66)***	0.70 (0.52—0.94)*	0.27 (0.19—0.40)***	0.95 (0.68—1.31)
6 Medical history	6.36 (0.31—129)	1.88 (0.09—37.3)	0.24 (0.01—4.77)	(—)	1.58 (0.08—31.9)
7 Blood glucose monitoring habits	0.91 (0.36—2.27)	0.56 (0.28—1.11)	0.77 (0.38—1.548)	1.14 (0.47—2.78)	1.43 (0.66—3.12)
8 Blood pressure monitoring habits	1.15 (0.44—3.04)	0.76 (0.35—1.64)	0.85 (0.37—1.94)	1.28 (0.42—3.90)	1.87 (0.81—4.34)
9 Reasons for not extracting a tooth	0.93 (0.46—1.90)	1.37 (0.81—2.33)	0.89 (0.50—1.56)	0.61 (0.31—1.21)	1.35 (0.72—2.52)
10 Relation between physical condition and dental treatment outcome	0.30 (0.10—0.97)*	0.73 (0.47—1.15)	1.55 (0.86—2.77)	0.55 (0.33—0.93)*	2.35 (1.45—3.83)***
Patient communications	6.78 (2.54—18.1)***	1.21 (0.82—1.77)	0.75 (0.50—1.11)	0.82 (0.43—1.55)	2.44 (1.62—3.68)***
11 Self-introduction and patient identification	3.13 (2.34—4.19)***	1.61 (1.25—2.07)***	0.59 (0.45—0.77)***	1.44 (0.95—2.20)	1.78 (1.32—2.41)***
12 Attitude	14.6 (9.88—21.7)***	1.31 (0.98—1.75)	0.79 (0.58—1.07)	0.90 (0.41—1.98)	2.67 (1.92—3.70)***
13 Communication skill	12.1 (8.06—18.1)***	1.16 (0.85—1.59)	1.04 (0.73—1.48)	0.47 (0.19—1.1519)	2.86 (2.02—4.062)***
14 Confirm the conversation again	4.00 (2.71—5.90)***	0.76 (0.53—1.10)	0.69 (0.47—1.03)	0.50 (0.24—1.06)	2.78 (1.88—4.13)***

*P < 0.05; **P < 0.01; ***P < 0.001. Data in parentheses were 95% confidence intervals.

Regarding age-related factors, we found that in general PGYD trainees younger than 27 years of age performed better than those older than 27 years of age, and trainees who graduated in 2015 or later performed better than those who graduated before 2015. This finding may be related to gender because it is mandatory for a young man to enlist in the army for a year in Taiwan; thus, male trainees are usually older than female trainees.

We demonstrated significant differences between trainees who practiced before PGYD training and those who did not. The trainees who did not practice before PGYD training generally performed better, had better capability to care, and had better patient communications than the trainees who did. All sub-items of patient communications yielded significant differences. This might be because when trainees who did not practice before PGYD training, they usually had minimal clinical skills. Thus, they tended to focus more on patients' physical problems, worked more carefully, and paid more attention to patient communications.

There were several limitations in this study. First, long-term evaluation was lacking. Trainees in hospitals were found to have better performance at the starting point of being independent practitioners, while those who were trained in dental clinics and had more actual experience in direct contact with common people might catch up later, especially when operating a dental clinic independently. The pros and cons of training in hospitals and in dental

clinics left much for future studies. Second, the maneuvers of the survey were inevitably intermediated by the training institutions; nevertheless, we tried our best to avoid the interference of training institutions and the trainees' mentors. As a pilot study on the essential conditions of training institution adequacy, this study still provided valuable evidences for future research.

This first nationwide survey of PGYD adequacy and training effectiveness in Taiwan was conducted in different training institutions (clinics vs. hospitals). The major findings of this study were described as follows: (1) trainees tended to have more positive perceptions of clinical training conditions (teachers, plans, and auxiliary facilities), (2) trainees preferred to spend longer training spans in dental clinics than in hospital, (3) trainees in hospitals demonstrated better objective evaluations of dental competence, and (4) hospitals could provide more opportunities in academic training for trainees. Nevertheless, future longitudinal studies should be considered to clarify the persistent effect of PGYD on dentists' competence and career development.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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