



Original Article

# Current practice patterns and training project of oral pathology specialists in Taiwan



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**Abstract** *Background/purpose:* There were 70 oral pathology specialists (OPs) in Taiwan till 2018. This study reported the current practice patterns and training project of OPs in Taiwan. *Materials and methods:* This study exploited the secondary data analysis and interview to survey the current practice patterns and training project of OPs in Taiwan. *Results:* Of the 70 OPs, 8 practiced both anatomical oral pathology (oral histopathological diagnosis) and clinical oral pathology (oral medicine), 8 practiced both general pathology (majorly) and anatomical oral pathology (minorly), 5 practiced oral medicine only, 30 practiced general dentistry or other dental divisions, 11 did teaching or researching, and 8 had retired. There were 9 OP training hospitals (8 medical centers and one regional hospital) that had 23 OPs and a training capacity of 11 dentists. Of the 9 OP training hospitals in Taiwan in

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2019, 5 were located in the northern, one in central, two in southern, and one in eastern region. Moreover, we found none of the dentists applying for the OPS training program and the number of OPSs did not increase along with the population and the number of the dentists in recent two years.

**Conclusion:** Only 8 OPSs practice both anatomical oral pathology and oral medicine in Taiwan and the manpower of the OPSs in Taiwan faces a severe problem of shortage. We suggest that the government should build a long-term budget to subsidize young OPSs and those dentists who enter the OPS training program to resolve this OPS shortage problem.

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## Introduction

The medical specialist system in Taiwan started from the announcement of the "Specialist Specialization and Examination Regulations" by the Department of Health (after 2013, Department of Health was renamed as the Ministry of Health and Welfare) in 1988. However, the regulations dealt with only medical specialist system, and none of the dental specialist system was mentioned. It was not until the year of 1999, the Department of Health announced the "Principles Regarding Screening and Review for the Specialist of Oral and Maxillofacial Surgery", and thus leading to the commencement of the first dental specialist system. The "Principles Regarding Screening and Review for the Specialist of Oral Pathology" began in 2001, followed by the "Principles Regarding Screening and Review for the Specialist of Orthodontics" in 2009. The Department of Health added these three existed dental specialist classifications into the Regulations in 2010, increased the number of dental specialists up to 10 classifications in 2017, and announced the "Dental Specialist Specialization and Examination Regulations" in 2018. Then, a complete dental specialist system was born in Taiwan. In 2019, the "Principles Regarding Screening and Review for the Specialist of Pediatric Dentistry" was also passed.

The contents of dental practices are prevention, diagnosis, and treatment of diseases in the oral and maxillofacial region with medical and dental knowledge. The dentists also provide the consultation for oral health. The oral pathology is highly professional, and the development of an experienced oral pathology specialist (OPS) takes a long time. The practice type of an OPS is quite different from that of a general dentist and is more like that of a general pathology specialist in the medical specialist system. The contents of the oral pathology practice can be divided into the anatomical oral pathology (oral histopathological diagnosis or histopathological diagnosis of specimens of oral and maxillofacial region) and the clinical oral pathology (oral medicine or the diagnosis and treatment of diseases of oral and maxillofacial region, mainly oral mucosal diseases).<sup>1</sup> According to the definition given by the American Academy of Oral and Maxillofacial Pathology (AAOMP), the oral and maxillofacial pathology is defined as follows: "*The oral and maxillofacial pathology is the specialty of dentistry and pathology which deals with the nature, identification, and management of diseases*

*affecting the oral and maxillofacial regions. It is a science that investigates the causes, processes, and effects of these diseases. The practice of oral and maxillofacial pathology includes research, diagnosis of diseases using clinical, radiographic, microscopic, biochemical or other examinations, and management of patients*". While the American Academy of Oral Medicine (AAOM) defines the oral medicine as follows: "*The oral medicine is the discipline of dentistry concerned with the oral health care of medically complex patients - including the diagnosis and management of medical conditions that affect the oral and maxillofacial region.*" It seems that in Taiwan the OPSs can deal with not only oral histopathological diagnosis but also diagnoses and treatment of patients with the diseases of oral and maxillofacial region.

Taiwan Academy of Oral Pathology (TAOP) was founded in 1989, and one of its goals was to perform the Screening and Review for the Specialist of Oral Pathology. Before the year of 2001, the OPS certificates were issued by the TAOP; at that time the OPSs were divided into two types: one dealt with the anatomical oral pathology and the other dealt with the clinical oral pathology (oral medicine). Since 2001, the Department of Health recognized the oral pathology as one of the classifications in the dental specialist system and then was responsible for the issue of the OPS certificates without the divisions of anatomical and clinical oral pathologies. The OPS certificates issued by the TAOP could be renewed by the Department of Health directly and the OPS examination was firstly performed in 2001. At that time, 57 qualified OPSs obtained the OPS certificates issued by the Department of Health. Currently, 47 of 57 OPSs still maintained their certificates.

By regulations, a dentist who wants to become an OPS has to finish the two-year training as a general dentist and the two-year training as an OPS first, and then he or she can apply for taking the OPS examination. After passing the OPS examination, he or she can acquire the OPS certificate. In average, the number of the dentists who are willing to accept the training for becoming OPSs ranged from 0 to 3 per year. Till the year of 2018, 70 OPS certificates were issued in Taiwan.<sup>2</sup>

Although the development of OPS in Taiwan has lasted for 30 years since the foundation of TAOP, oral pathology is one of the earliest officially recognized classifications of dental specialist. Only when a dentist has a great passion or interest for oral pathology, then he or she is willing to

devote himself or herself in the field of the oral pathology. Because of the lack of the studies in the human resources of OPS in Taiwan, the main purpose of this study was to survey the current practice patterns of OPSs and to explore the OPS shortage problem in Taiwan. Through this survey, we tried to give some helpful suggestions to the government to solve the OPS shortage problem in Taiwan. In addition, the geographical distribution, institution levels, and training capacity of OPS training hospitals in Taiwan were also assessed and reported.

## Material and methods

In this study, we adopted the methods of the secondary data analysis and the interview survey to collect the information about the practice patterns of 70 OPSs in Taiwan. There were several ways to collect information for the secondary data analysis, and all of them were open information that could be obtained from the governmental websites. These data were described as follows.

### Current practice patterns and working institutions of oral pathology specialists

From the homepage of TAOP, there were 70 board-certified OPSs in Taiwan up to the year of 2018. The information of their currently working locations and institutions could be obtained through the member list that was published by the Taiwan Dental Association in 2018. Besides, their institution levels, which were further divided into medical center, regional hospital, district hospital, and clinic by the time of October 2018, could be acquired from searching the open information webpages in the website of the Ministry of Health and Welfare. In addition, with the help of the institution and staff searching system of the Ministry of Health and Welfare, the information of the board-certified OPSs and practice registration classifications of every OPS could be obtained. Some of them were registered as the oral pathology, the general dentistry, or the other dental specialties.

### Oral pathology specialists working in hospitals from 2000 to 2018

We also used "*The current status of medical institutions and statistics on hospital medical services*" published by the Ministry of Health and Welfare to inquire the population, the number of OPSs working in the hospitals, and the number of the practicing dentists in Taiwan.<sup>3</sup> Since the investigation of the number of OPSs started from the year of 2000, the period of interest in this study was from 2000 to 2018. Based on what we got by this searching approach, we calculated the number of OPSs working in the hospitals per hundred thousand people, the number of the practicing dentists per hundred thousand people, and the corresponding rate (the number of OPS in the hospital/the number of practicing dentists) for the proceeding data.

### Current status of oral pathology specialist training hospitals and training capacity

From the homepage of the Ministry of Health and Welfare, we found that the OPS training hospitals that were appointed by the Ministry of Health and Welfare were 9 hospitals and the OPS training capacity were 11 dentists for the year of 2018. Meanwhile, through the open information webpages of the Ministry of Health and Welfare, we also knew that there were 19 hospitals that had the registered OPSs and the locations and institution levels of these 19 hospitals. In addition, through exploiting the institution and staff searching system of the Ministry of Health and Welfare, the numbers of the OPSs and dentists who were registered in the above-mentioned hospitals were recorded. Although 19 hospitals had the registered OPSs, only 9 hospitals that had two or more OPSs were subsequently qualified as the OPS training hospitals.

### Current status of dental specialties in hospitals of different levels

On the open information webpages of the Ministry of Health and Welfare, the numbers of hospitals of each institution level and those hospitals with dental departments, so-called hospital dentistry, could be obtained. Moreover, the developing status of the dental specialties including the oral pathology, oral and maxillofacial surgery, and orthodontics, in the hospitals of each level could also be understood. Then, we could compare the current status of these 3 dental specialties in hospital dentistry.

We also interviewed the former President of the TAOP, Dr. Chiang, Chun-Pin and the current secretary of TAOP Dr. Chang, Julia Yu-Fong. With their helps we confirmed the data for the number of OPSs, the number of OPS training hospitals, and the number of hospitals with OPSs in service. These data were collected via the secondary data analysis to further check and explore whether these board-certified OPSs actually carried out the practices of anatomical oral pathology and oral medicine. Based on the data and information collected from the methodologies that just mentioned above, these data were stored in excel files and then put into analyses. We hoped that the results of this study could help us to understand the current practice patterns of OPS in Taiwan. Moreover, these data could become an important reference for the development of OPS training program.

## Results

### Current practice patterns of oral pathology specialists

In this study, a list of 70 OPSs was collected. We searched each OPS for his or her practice pattern registered in the local dental associations, and also interviewed the former President and the current secretary of the TAOP to confirm the current practice patterns of these 70 OPSs.

**Table 1** Practice patterns for 70 oral pathology specialists (OPS) in 2018.

Practice pattern	Number of OPS (%)
Anatomical oral pathology and oral medicine	8 (11.43%)
General pathology and anatomical oral pathology	8 (11.4%)
Oral medicine only	5 (7.1%)
General dentistry or other dental divisions	30 (42.9%)
Teaching or researching	11 (15.7%)
Retired	8 (11.4%)
Total	70 (100%)

The practice patterns of the 70 OPSs (54 males and 16 females) in 2018 are described in [Table 1](#). Of the 70 OPSs, 8 practiced both anatomical oral pathology (oral histopathological diagnosis) and clinical oral pathology (oral medicine), another 8 practiced both general pathology (majorly) and anatomical oral pathology (minorly) ([Table 1](#)). The remaining 54 OPSs never performed oral histopathological diagnosis service. Of the remaining 54 OPSs, 5 practiced oral medicine only, 30 practiced general dentistry (including 11 practiced oral medicine minorly) or other dental divisions, 11 did teaching or researching, and 8 had retired ([Table 1](#)).

Based on the above data, for the 70 OPSs in Taiwan the practice rate of anatomical oral pathology was 22.9% (16/70), the practice rate of oral medicine was 34.3% (24/70), the practice rate for both anatomical oral pathology and oral medicine was 11.4% (8/70), and 42.9% (30/70) returned to work as dentists after acquiring the OPS certificates.

### The number of oral pathology specialists in the hospitals from 2000 to 2018

According to “*The current status of medical institutions and statistics on hospital medical services*” published by the Ministry of Health and Welfare,<sup>3</sup> the population, the number of OPSs in the hospitals, and the number of dentists in service in Taiwan from 2000 to 2018 can be obtained and shown in [Table 2](#). From 2000 to 2018, both the population and the practicing dentists in Taiwan increased year by year gradually. The population increased from approximately 22.28 to 23.59 million, and the number of practicing dentists increased from 8597 to 14,717 ([Table 2](#)). However, the number of OPSs fluctuated up and down. The number of OPSs was 12 in year 2000, and it reached 46 in year 2018. During the period from 2000 to 2018, the number of OPSs declined abruptly from 2006 to 2007 and from 2014 to 2015 ([Table 2](#)). The two significant declines indicate that many OPSs switch to work as dentists and at the same time not enough number of dentists participate in the OPS training program to make up the loss of OPSs from the oral pathology service market.

From 2000 to 2018, the number of practicing dentists per 100,000 people increased from 38.6 to 62.4, suggesting an increase of approximately 1.32 dentists per year ([Table 2](#)).

The number of OPSs per 100,000 people increased from 0.054 to 0.195 and the ratio of OPSs in the hospitals to dentists in service grew from 0.0014 to 0.0031. To consider the growth of the population, the people in Taiwan did not share more OPSs than before but did share more dentists than before.

### Current status of oral pathology specialist training hospitals and training capacity

The geographical distribution, institution levels, and training capacity of 9 OPS training hospitals in Taiwan till October 2019 are shown in [Table 3](#). In summary, these 9 OPS training hospitals (8 medical centers and one regional hospital) had 23 board-certified OPSs and an OPS training capacity of 11 dentists. Of the 9 OPS training hospitals in Taiwan till October 2019, 5 were located in the northern region, one in central region, two in southern region, and one in eastern region of Taiwan ([Table 3](#)). Regarding the OPS training capacity, of 9 OPS training hospitals, 7 hospitals each had the training capacity of one dentist and two hospitals (one at the central region and the other at the southern region of Taiwan) each had the training capacity of two dentists ([Table 3](#)). We also found none of the dentists applying for the OPS training program in recent two years (2018 and 2019). Moreover, of the 23 OPSs in the 9 OPS training hospitals, 11 worked in the hospitals in the northern region, 5 in the hospitals in the central region, 5 in the hospitals in the southern region, and 2 in one hospital in the eastern region of Taiwan ([Table 3](#)).

### Current status of dental specialties in hospitals of different levels

In Taiwan, there were 470 hospitals (excluding 4 children’s hospitals) of all levels, including 21 medical centers, 89 regional hospitals, and 360 district hospitals ([Table 4](#)). Of the 177 hospitals that had dental departments, 21 were medical centers, 77 regional hospitals, and 79 district hospitals. For 177 hospitals that had dental departments, we further surveyed whether they had the oral pathology, oral and maxillofacial surgery, and/or orthodontic specialists. We found that 19 hospitals had OPSs, including 14 medical centers, 4 regional hospitals, and one district hospital ([Table 4](#)). However, there were 66 hospitals that had the oral and maxillofacial surgery specialists and 40 hospitals that had orthodontic specialists ([Table 4](#)).

The above findings demonstrate that the development of the oral pathology in hospital dentistry is not as good as that of the oral and maxillofacial surgery or orthodontics. Besides, histopathological diagnoses of the specimens of the oral and maxillofacial region were usually carried out by general pathology specialists in hospitals. In only two university hospitals, National Taiwan University Hospital and Kaohsiung Medical University Chung-Ho Memorial Hospital, histopathological diagnoses of the specimens of the oral and maxillofacial region were carried out by the OPSs.



**Table 2** The population, the number of oral pathology specialists (OPS) working in the hospitals, and the number of dentists in Taiwan from 2000 to 2018.

Year	Population at the end of the year	Number of OPS in hospitals	Number of practicing dentists	Number of OPS in hospitals per 100,000 people	Number of practicing dentists per 100,000 people	Number of OPS in hospitals / number of practicing dentists
2000	22,276,672	12	8597	0.05386801	38.59194048	0.001395836
2001	22,405,568	15	8944	0.066947644	39.91864879	0.001677102
2002	22,520,776	22	9206	0.097687575	40.87780989	0.002389746
2003	22,604,550	21	9551	0.09290165	42.25255535	0.002198723
2004	22,689,122	27	9868	0.118999757	43.49220741	0.002736117
2005	22,770,383	59	10,140	0.25910851	44.53153028	0.00581854
2006	22,876,527	65	10,412	0.284134038	45.51390165	0.006242797
2007	22,958,360	38	10,740	0.165517049	46.78034494	0.003538175
2008	23,037,031	35	11,093	0.1519293	48.15290651	0.003155143
2009	23,119,772	31	11,351	0.134084367	49.09650493	0.002731037
2010	23,162,123	31	11,656	0.133839199	50.323539	0.002659574
2011	23,224,912	37	11,992	0.159311691	51.63421071	0.00308539
2012	23,315,822	46	12,391	0.197290921	53.14416965	0.003712372
2013	23,373,517	53	12,794	0.226752354	54.73716258	0.004142567
2014	23,433,753	51	13,178	0.217634794	56.23512376	0.003870087
2015	23,492,074	38	13,502	0.161756684	57.47470402	0.002814398
2016	23,539,816	38	13,912	0.161428619	59.09986722	0.002731455
2017	23,571,227	46	14,379	0.195153184	61.00233984	0.00319911
2018	23,588,932	46	14,717	0.195006709	62.38942908	0.003125637

**Table 3** Geographical distribution, institution levels, and training capacity of 9 oral pathology specialist (OPS) training hospitals in Taiwan till October 2019.

Geographical distribution in Taiwan	Institution levels		Training capacity	Number of OPSs in hospital
	Medical centers	Regional hospitals		
Northern	4 (44.4%)	1 (11.1%)	5 (45.4%)	11 (47.8%)
Central	1 (11.1%)	0	2 (18.2%)	5 (21.7%)
Southern	2 (22.2%)	0	3 (27.3%)	5 (21.7%)
Eastern	1 (11.1%)	0	1 (9.1%)	2 (8.7%)
Total	8 (88.9%)	1 (11.1%)	11 (100.0%)	23 (100.0%)

## Discussion

The oral pathology is a required course in the school of dentistry, which is both fundamental and clinical. Oral pathology is also one of the dental specialties and a branch of the general pathology. Because of its uniqueness, learning the oral pathology takes a lot of time to read and memorize. Moreover, we need not only the knowledge of oral pathology but also the related knowledge of systemic diseases to understand the oral diseases completely. Therefore, it is relatively hard to inspire students and dentists to devote themselves in the oral pathology field without having a high passion and interest. A recent survey of the dental postgraduate residents in the dental department of National Taiwan University Hospital showed that the reasons hindering the young dentists to choose the oral pathology as their careers are too academic, few job chances, low quality of life, high workload, and low wages.

It is obvious that this situation is not altered in a short period of time and is a long-lasting difficult problem to attract young dentists to engage in the field of oral pathology.<sup>1</sup>

This study firstly aimed to understand the current practice patterns of 70 OPSs. We discovered that of the 70 OPSs, 8 practiced both anatomical oral pathology (oral histopathological diagnosis) and clinical oral pathology (oral medicine), 8 practiced general pathology majorly and anatomical oral pathology minorly, 5 practiced oral medicine only, 30 practiced general dentistry or other divisions of dentistry, and the remaining 19 did not engage in the clinical services. These findings indicate that only 21 (30%) of the 70 OPSs persist to work for anatomical oral pathology, oral medicine, and general pathology and the rest of 49 (70%) OPSs switch to work as dentists with a higher monthly payment, engage themselves in teaching or researching, or choose to retire due to the age factor.

The possible reasons that made OPSs to become dentists were high workload, high work pressure, different life styles and work styles from peer dentists, lack of sense of accomplishment, low wages, and so on. Besides, when we compared the general pathology in the medical specialist system with the oral pathology in the dental specialist system, a low proportion of general pathology specialists would give up their career in the pathology after finishing the general pathology specialist training, because general pathology specialists still had many chances to further engage in the subsidiary pathology fields. Furthermore, if general pathology specialists decided to switch to other medical specialties, they had to spend a long time to retake the medical resident training. On the contrary, a high proportion of OPSs gave up their careers after OPS training,

**Table 4** Overview of numbers of hospitals with dental specialties in all levels of hospitals (October 2019)<sup>a</sup>.

	Medical centers	Regional hospitals	District hospitals	Total
Total number of hospitals	21	89	360	470
Hospitals with dental departments	21	77	79	177
Hospitals with oral pathology specialists	14	4	1	19
Hospitals with oral and maxillofacial surgery specialists	21	38	7	66
Hospitals with orthodontic specialists	21	18	1	40

<sup>a</sup> Excluding children's hospitals, currently there are 4 children's hospitals in Taiwan, all of which are medical centers, of which 3 have dental departments.

because the OPSs were already qualified dentists, they could switch back to work as dentists at any time.

In this study, we also discovered that there were several OPSs serving in the department of pathology of the medical centers, and some of them did have the general pathology specialist certificates. Due to the shortage of general pathologists about 50–60 years ago, the department of pathology also recruited dentists for training as a general pathologist when the medical specialist system had not been implemented in Taiwan. This made the general pathology become one of the early specialties that Taiwan dentists could apply.

The previously-mentioned "Specialist Specialization and Examination Regulations" announced by the Department of Health in 1988 only took the medical specialist system into account. Prior to the implementation of the medical specialist system, the Department of Health was not in charge of recognizing the general pathology specialist training hospitals. Thus, some general pathology specialist training hospitals recognized by the Taiwan Society of Pathology also recruited dentists to receive the general pathology specialist training. Those dentists who finished the general pathology specialist training and received the certificates of general pathology specialist issued by the Taiwan Society of Pathology before 1988 were allowed to apply for the Screening and Review for the General Pathology Specialist without the need to take the further specialist examination. In addition, those dentists who were qualified lecturers and attending physicians in the department of pathology of the medical centers were also allowed to apply for the Screening and Review for the General Pathology Specialist before 1991. These were the reasons why the dentists could become a general pathology specialist before 1991.

Some of the general pathology specialists with the dentist status also had OPS certificates; thus, they also carried out the anatomical oral pathology services. However, the majority of these dentists with double certificates were going to retire or had retired due to the age factor. Therefore, there would be a serious OPS shortage problem if no enough young dentists planned to enter the OPS training program to become the OPSs.

It is due to the fact that oral histopathological diagnosis service and treatment of patients with oral mucosal diseases need the supporting systems from the high-level hospitals, an OPS can work only in either a medical center or a regional hospital instead of a dental clinic which cannot provide the supporting systems (e.g. various blood examinations). This situation greatly constraints the career

choices by OPSs.<sup>1</sup> In the studies related to the human resource in dentistry and the dental post-graduate year (PGY) training programs, the findings indicate that all the human and training resources of dental specialists concentrate in the medical centers and in the northern part of Taiwan.<sup>4,5</sup> Our study also showed the similar results. We found that 5 (55.6%) of 9 OPS training hospitals were located in the northern part of Taiwan, especially in the Taipei City. In these 5 OPS training hospitals, 4 (80%) were qualified as medical centers. This could be due to the fact that a medical center can provide better training environment and abundant supporting systems for the OPSs.

This study showed that there was no proportionate growth of OPSs along with the increase of the population and the increase of the practicing dentists in Taiwan. The number of dentists per hundred thousand people in Taiwan grew year by year. This finding demonstrated that the quantity of the practicing dentists for Taiwanese people were elevated and became better. However, the number of OPSs per hundred thousand people did not increase, sometimes even showed a tendency to decline. This could lead to the problem of a vicious circle that the current number of OPSs cannot afford the oral pathology-related education works and clinical services, the enhanced workload for the OPSs reduced the quality of their educational and medical services, the overloaded OPSs retreated from their current works, and finally few OPSs remained in the current OPS service market.

Because the OPSs are responsible for providing the precise clinical and histopathological diagnoses of diseases in the oral and maxillofacial region, their work results are important references to guide the direction of treatment and to predict the prognosis of patients' diseases.<sup>6</sup> Thus, when the number of OPSs does not meet to the number of the dentists, the insufficient oral pathology services may subsequently result in poorer dental services. In addition, the lack of faculty members of oral pathology also influences on the oral pathology education in the dental schools.

According to "The dentist human development and supply and demand planning 2020" published in 2010 by the National Health Research Institutes, Taiwan, each OPS in USA has to service 901,550 people in average in 2006 estimated by the data from USA. Using the same proportion for calculation, the required number of OPSs for the population of Taiwan in 2006 is 25. From the data of the TAOP, the number of qualified OPSs in Taiwan was 65 in 2006 (Table 2). This datum gave us a wrong impression that the number of OPSs in Taiwan was quite enough.<sup>7</sup> However, the true

number of OPSs we concerned was the number of OPSs who were still active in anatomical and/or clinical oral pathology service, instead of the number of qualified OPSs. To take Taiwan's population of 23,588,932 people in 2018 as an example, the required number of OPSs was 26, but the actual number of OPSs who provided oral histopathological diagnosis and oral medicine services in 2018 was 8, only reaching approximately 31% of the American standard.

In Taiwan, many medical centers and regional hospitals did not have OPSs to deal with the oral histopathological diagnosis service for the oral and maxillofacial surgeons. This fact indicates that the development of OPS in the dental system has not yet kept up with the development of oral and maxillofacial surgery specialist. The need of OPSs has never been placed in a high priority. This could be due to the fact that the qualified general pathologists also have the right to carry out the oral histopathological diagnosis service. In Taiwan, only in two university hospitals, the National Taiwan University Hospital and the Kaohsiung Medical University Chung-Ho Memorial Hospital, the oral histopathological diagnosis service was carried out by OPSs, and in other hospitals the oral histopathological diagnosis service was carried out by qualified general pathologists. OPSs have to accept a two-year complete general dentistry training and a two-year OPS training, and thus they have sufficient basic and clinical oral pathology knowledge and experience. When compared with general pathology specialists, the OPSs were more capable of judging the oral lesions by clinicopathological correlations and thus they could provide a more precise and specific oral histopathological diagnoses of the oral lesions than the general pathology specialists.<sup>8–10</sup> Therefore, the OPS work results become a strong backup for treatment of diseases in the oral and maxillofacial region by the dental clinicians and further secures the oral health of the patients.<sup>1,6</sup>

Due to the long-term ignorance of the development of the oral pathology in the dental system, it leads to a severe deficiency of OPSs in Taiwan. The results of this study demonstrated that a majority of OPSs switched to do other high-payment dentist works. Moreover, some of the current OPSs in service were approaching the retirement age in the next 5–10 year. In addition, most dentists did not have passion to devote themselves in the field of oral pathology. It can be foreseen that there will be a great shortage of OPS manpower in the future 5–10 years.

In the dental PGY system started from 2010 to 2018, the number and proportion of optional training projects and programs of oral pathology are both few and low, respectively. To take the year of 2018 as an example, only 16 of 195 (8.2%) training projects provide oral pathology training program. Of 283 training dentists in the PGY system, only 13 take the optional oral pathology training program and 6 of them consider to choose oral pathology as their career.<sup>11</sup> In 2018, no dentists applied for the Screening and Review for Oral Pathology Specialist. Moreover, till the end of 2018, over 60% of the OPSs in service switched to work as dentists. From the separation point of the medical and dental specialist systems, the dentists who acquired general pathology specialist certificates in 1988 are going to retire gradually from their careers due to the age or other factors. There will be no more dentists with the general pathology

specialist certificates who can help the oral histopathological diagnosis service. In addition, the OPS system has lasted for nearly 20 years, most of the OPSs who got their certificates in the first year of the OPS system in 2002 also approached their retirement age (65 years old) and some of them did not persist to perform the oral pathology work. On the other hand, of the 23 dentists who completed the OPS training program and passed the OPS examination, only 6 (26.1%) of them carried out their careers in the field of oral pathology.

The facts we mentioned above indicate that it needs national policies to resolve the OPS manpower shortage problem. An OPS has the opportunity to switch to work as a dentist at any time he or she wants. Therefore, it needs a high passion or interest and even some sacrifice for those OPSs who continue their career in the field of oral pathology. The government should provide some benefits to the young dentists and encourage them to accept the OPS training. In addition, for those who pass the OPS examination and insist to work as the OPSs, the government should give them some reasonable rewards through any kinds of new policies.

According to the findings of this study, we may suggest that the hospital accreditation should include oral pathology. For instance, each medical center should install oral pathology department which needs at least one staff of OPS. In addition, the surgical specimens of the oral and maxillofacial region should be checked and signed out by OPSs. This policy may also create some new positions for board-certified OPSs. Meanwhile, for those dentists who enter the OPS training program and are willing to practice oral pathology as a career after getting the OPS certificates, the government, especially the Ministry of Health and Welfare, should build a regular and long-term budget to subsidize these devoted OPSs, to increase their monthly wage, and to secure their quality of life.<sup>2</sup> Besides, the government should allow the establishment of oral pathology center where the OPSs can provide oral histopathological diagnosis service for the specimens excised by the oral surgeons or dentists in the local dental clinics and in the regional or district hospitals that do not possess oral or general histopathological diagnosis service. We think that a perfect government policy can secure the manpower of OPSs who can not only help the oral pathology education work in the dental schools but also provide a more precise and specific oral histopathological diagnoses for oral diseases, which further guide the treatment toward the correct direction and lead to a better clinical outcome for the treated patients.

## Declaration of Competing Interest

None declared.

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