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Original Article

# Dental manpower and treated dental diseases in department of dentistry, Taipei Hospital (the predecessor of National Taiwan University Hospital) in 1923

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## KEYWORDS

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**Abstract** *Background/purpose:* In 1906, there was a dental treatment room established in the department of surgery of Taipei Hospital to introduce modern dental services to Taiwan. It is undoubtedly the earliest hospital dentistry in Taiwan. This study tried to assess the dental manpower and treated dental diseases in Taipei Hospital, and hence to explore the appearance of Taiwan's early hospital dentistry.

*Materials and methods:* This study utilized the secondary data analysis to evaluate the dental manpower and treated dental diseases of dental outpatients in the 27th Annual Report of Taipei Hospital (Taisho 12th year or 1923).

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**Results:** Our results found that there were 3 dentists and one dental technician in the dental department of Taipei Hospital in 1923. These 3 dentists totally treated 3 inpatients and 1759 outpatients with 4511 outpatient visits (1959 for male patients and 2552 for female patients) in that year. Dental caries and retained root were the two most common dental diseases in Japanese and Taiwanese dental outpatients, and followed in a descending order by missing tooth, pulp necrosis, and pulpitis for Japanese outpatients as well as pulpitis, suppurative periodontitis, and acute or chronic periodontitis for Taiwanese outpatients.

**Conclusion:** We conclude that the dentistry of Taipei Hospital in 1923 does have a modern form of dentistry with 3 dentists and one dental technician. Its dental patients are mainly Japanese and minorly Taiwanese. Moreover, the treated dental diseases are mainly tooth diseases for Japanese outpatients and both tooth and periodontal diseases for Taiwanese outpatients.

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## Introduction

Under Japanese colonial rule, the ceremonies for the inauguration of Japanese rule were held in Taiwan on June 17, 1895. This is the origin of June 17 known in Taiwan as “Dominion Day” during the 50-year colonial period. Then on the next day, June 18, Taiwan Hospital, the predecessor of the National Taiwan University Hospital (NTUH), was established in today’s Dadaocheng. At that time, there were two departments: internal medicine and surgery. In 1896, following the reorganization of the government, Taiwan Hospital was renamed as Taipei Hospital. In 1897, due to the revision of the official system, it was renamed as Taipei Hospital of Government of Taiwan, which was subordinate to the Taiwan Governor-general’s Office. In 1898, Taipei Hospital moved to its current location of NTUH.<sup>1</sup>

In 1906, there was a dental treatment room established in the department of surgery to introduce modern dental services to Taiwan. Although it is not the earliest dentistry in Taiwan, it is undoubtedly the earliest hospital dentistry in Taiwan. In 1910, the dentistry was separated from surgery, and the department of dentistry was established separately and became the first independent dental department of the hospital in Taiwan.<sup>2</sup>

In 1936, Taihoku (Taipei) Imperial University established its medical school. Then, in 1938, due to the revision of the official system, Taipei Hospital was renamed as the Affiliated Hospital of School of Medicine, Taihoku (Taipei) Imperial University. After World War II, Taiwan returned to the Republic of China in 1945. The hospital was renamed as the First Affiliated Hospital of School of Medicine, National Taiwan University. In 1950, it was renamed again as the Affiliated Hospital of School of Medicine, National Taiwan University, or NTUH for short.<sup>3</sup>

During Taipei Hospital period, the hospital published an annual report every year, and there were 40 annual reports in total. These 40 annual reports record hospital deeds from 1897 to 1936. In fact, each annual report contains detailed statistics on related deeds. They are precious historical materials for studying the development of NTUH and

Taiwan’s medical history.<sup>1</sup> Currently, Taipei Hospital annual reports can be found online in National Diet Library, Japan. There are a total of 10 reports. The 27th Annual Report of Taipei Hospital (Taisho 12th year) was published in 1924. It records the hospital deeds of the year of 1923. It contains detailed statistics of patients in various departments, also including dental patients. From the establishment of dental treatment room in 1906–1923, Taipei Hospital has 18-year experience in performing dental treatments. Due to the lack of research on Taiwan’s early dental history, we tried to explore the appearance of Taiwan’s early hospital dentistry by analyzing the dental manpower and treated dental diseases of dental outpatients in the 27th Annual Report of Taipei Hospital (Taisho 12th year).

## Materials and methods

This study used the method of secondary data analysis to collect the information about the dentistry of Taipei Hospital and the population in Taiwan in 1923. This information was open to access and could be collected from the related websites.

We downloaded the 27th Annual Report of Taipei Hospital (Taisho 12th year) stored in the National Diet Library online, and extracted information about dentistry, including the numbers of dentists and dental technicians, and the numbers of inpatients and outpatients in the dental department throughout the year of Taisho 12 (1923), as well as the list of treated diseases of dental patients. In addition, we also searched the Taiwan Database for Empirical Legal Studies for information related to the data on dentists and demographics in Taiwan in the 12th year of Taisho.

Based on the information and data collected by the methodologies that just mentioned above, these related data were stored in excel files and were put into analyses. The results in this study can help us to understand the appearance of Taiwan’s early hospital dentistry, and they may become important references for the research on Taiwan’s early dental history.

## Results

### The status of each department in Taipei Hospital in the year of Taisho 12 (1923).

In this study, a list of 44 practitioners in Taipei Hospital in 1923 was found. Of these 44 practitioners, one was the dean, 40 were physicians who were distributed in 9 medical departments, and 3 were dentists who worked in the dental department. At that time, Taipei Hospital had 10 medical service departments (Table 1). Because internal medicine contained 2 departments (First and Second Departments of Internal Medicine), there were 9 specialties in total. In the dental department, there were 3 dentists and one dental technician. In addition to the nurses in the nursing department and two assistants in the physical therapy department, only the dental department had paramedical staff (one dental technician). We also found a nurse training program in Taipei Hospital, which provided a dental nursing course as a compulsory course. However, from the annual report, there was no information to evaluate whether there were dental nurses or how many dental nurses in the dental department at that time. Furthermore, there were 3 inpatients and 1759 outpatients treated in the dental department in 1923. On average, every dentist had to take care of one inpatient and 586 outpatients in 1923 (Table 1). Based on the above data, the ratio of physician to dentist in Taipei Hospital was 13.67 (41/3) (Table 1).

### The frequencies of dental outpatient visits in different groups of dental patients in the dental department of Taipei Hospital in the year of Taisho 12 (1923)

The administrative region of the Japanese colonial period is different from that in the present day. The jurisdiction of Taipei City during the Taisho era probably includes the Wanhua, Datong, Zhongzheng, Zhongshan, and Da'an Districts of the present-day Taipei City. In addition, the

jurisdiction of Taipei Prefecture roughly includes the present-day Taipei City, New Taipei City, Keelung City, and Yilan County. Based on the number of dental outpatient visits in the dental department of Taipei Hospital in different groups of dental patients in 1923 as mentioned above, we could calculate the frequencies of dental outpatient visits per 10,000 people in Taipei City and Taipei Prefecture. In addition, the data of these populations of the year of Taisho 12 could be found in the Taiwan Database for Empirical Legal Studies. There were totally 186,768 people (98,352 males and 88,416 females) in Taipei City in 1923. Among them, there were 51,717 Japanese (27,736 males and 23,981 females), 122,922 Taiwanese (61,319 males and 61,603 females), and 12,129 foreigners (9297 males and 2832 females). Therefore, the frequency of dental outpatient visits per 10,000 people in Taipei City was 242 (199 for males and 289 for females) for overall dental outpatients (Table 2). The frequency of dental outpatient visits per 10,000 people in Taipei City was 754 (588 for males and 946 for females) for Japanese outpatients, 49 (53 for males and 45 for females) for Taiwanese outpatients, and 7.4 (1.1 for males and 28.2 for females) for foreigner outpatients. It is worth noting that in various ethnic dental outpatient groups, the female population of Japanese and foreigners were smaller than those of male population, but their female dental outpatient visits and frequencies were both higher than those of male population. On the contrary, the female population of Taiwanese were slightly higher than the male population, but their female dental outpatient visits and frequencies were both smaller than those of male population (Table 2).

We further expanded our scope to examine the similar data in Taipei Prefecture. There were totally 796,269 people (419,986 males and 376,283 females) in Taipei Prefecture in 1923. Among them, there were 79,190 Japanese (43,389 males and 35,801 females), 699,140 Taiwanese (362,599 males and 336,541 females), and 17,939 foreigners (13,998 males and 3941 females). Therefore, the frequency of dental outpatient visits per 10,000 people in Taipei Prefecture was 57 (47 for males and 68 for females) for overall dental outpatients (Table 2). The frequency of

**Table 1** The number of staff in each department and numbers of their inpatients and outpatients in Taipei Hospital in the year of Taisho 12 (1923).

	Practitioner	Employee	Number of inpatients	Number of outpatients	Total patients
First Department of Internal Medicine	5 (1) <sup>a</sup>	—	619	2374	2993
Second Department of Internal Medicine	5	—	688	2654	3342
Department of Surgery	6	—	753	3403	4156
Department of Obstetrics and Gynecology	7	—	10 <sup>a</sup> 7	2968	4025
Department of Ophthalmology	4 (1) <sup>a</sup>	—	136	3757	3893
Department of Pediatrics	4	—	712	2843	3555
Department of Dermatology and Venereology	4	—	159	3156	3315
Department of Otorhinolaryngology	3	—	238	3212	3450
Department of Dentistry	3 (dentists)	1 (dental technician)	3	1759	1762
Department of Physical Therapy	2	2 (assistants)	—	858	858
Total	43 <sup>b</sup>	3	4365	26,984	31,349

<sup>a</sup> One of them went abroad for studying.

<sup>b</sup> There were 44 practitioners in Taipei Hospital in 1923. Of these 44 practitioners, one was the dean, 40 were physicians, and three were dentists.

**Table 2** The number of dental outpatient visits in the dental department of Taipei Hospital and the frequencies of dental outpatient visits per 10,000 people in Taipei City and in Taipei Prefecture in the year of Taisho 12 (1923).

	Mainlanders (Japanese)			Native inhabitants (Taiwanese)			Foreigners (Republic of China or others)			Overall		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Number of dental outpatient visits	1631	2268	3899	327	276	603	1	8	9	1959	2552	4511
Population of Taipei City	27,736	23,981	51,717	61,319	61,603	122,922	9297	2832	12,129	98,352	88,416	186,768
Frequency of dental outpatient visits per 10,000 people in Taipei City	588	946	754	53	45	49	1.1	28.2	7.4	199	289	242
Population of Taipei Prefecture	43,389	35,801	79,190	362,599	336,541	699,140	13,998	3941	17,939	419,986	376,283	796,269
Frequency of dental outpatient visits per 10,000 people in Taipei Prefecture	376	634	492	9.0	8.2	8.6	0.7	20.3	5.0	47	68	57

outpatient visits per 10,000 people in Taipei Prefecture was 492 (376 for males and 634 for females) for Japanese outpatients, 8.6 (9.0 for males and 8.2 for females) for Taiwanese outpatients, and 5.0 (0.7 for males and 20.3 for females) for foreigner outpatients. It is worth noting that in various ethnic dental outpatient groups, the female population of Japanese and foreigners in Taipei Prefecture were still smaller than those of male population, but their female dental outpatient visits and frequencies were both higher than those of male population. On the contrary, the female population of Taiwanese as well as their female dental outpatient visits and frequencies were all smaller than those of male population (Table 2).

### The number of outpatients in the dental department and the most common treated dental diseases in the year of Taisho 12 (1923)

In the list of treated dental diseases of dental patients in the Taipei Hospital annual report, there were four variables: disease name (53 diseases), gender, nationality, and month, recording the number of diagnosed and treated dental diseases in dental outpatients of different genders and nationalities from January to December, 1923. According to this dental disease name list, we calculated and found that there were totally 4511 dental outpatient visits (1959 for male patients and 2552 for female patients) in the dental department in 1923 (Table 2). Among them, there were 3899 dental outpatient visits from Japanese (1631 males and 2268 females), 603 dental outpatient visits from Taiwanese (327 males and 276 females), and 9 dental outpatient visits from foreigners (from Republic of China or other countries, one male and 8 females), respectively (Table 2). This finding indicates that the dental outpatients in the dental department of Taipei Hospital are mainly Japanese, and there are more female (2268 patients) than male (1631 patients) Japanese outpatients. On the contrary, there were more male (327 patients) than female (276 patients) Taiwanese outpatients (Table 2). Besides, it

should be noted that Japanese and Taiwanese belonged to Japan, and the people from Republic of China were considered to be foreigners in that era. Moreover, in Taiwan at that time, the mainlanders meant Japanese, and the native inhabitants meant Taiwanese.

Regarding the treated dental diseases in dental patients, dental caries was the most common dental disease in Japanese and Taiwanese outpatients, which accounted for 43.9% and 41.3%, respectively. Moreover, retained root was the second most common dental disease in Japanese and Taiwanese outpatients, which accounted for 17.1% and 17.1%, respectively (Table 3). Besides, other relatively common dental diseases were missing tooth, pulp necrosis, and pulpitis in Japanese patients, as well as pulpitis, suppurative periodontitis, acute and chronic periodontitis in Taiwanese patients (Table 3). This finding indicates that dental hard tissue diseases were the main dental diseases, followed by periodontal diseases, while oral mucosal and soft tissue diseases were relatively rare.

### Discussion

Undeniably, based on the needs of colonial rule, the important thing for Japan to rule Taiwan was the establishment of Taiwan Hospital (the predecessor of NTUH) in 1895, and then the establishment of Taiwan's first medical school (the predecessor of National Taiwan University College of Medicine) in 1898. Therefore, the result was the introduction of modern medical technology, system, and education to Taiwan. Although Japan did not establish dental education for the training of dentists during the colonial period of Taiwan, it did also introduce modern dental technology and system to Taiwan during that period. For example, the Taiwan Physician Order and the Taiwan Dentist Order were announced at the same time in the year of Taisho 5 (1916), confirming that both physicians and dentists were practitioners with the legal status.<sup>4</sup>

In the present study, there were 3 dentists and one dental technician as well as 3 inpatients and 1759

**Table 3** The top five most common dental diseases of dental outpatients in the dental department of Taipei Hospital in the year of Taisho 12 (1923).

Ranking	Name of treated dental diseases	Number of dental outpatient visits in the mainlanders (Japanese)			Name of treated dental diseases	Number of dental outpatient visits in the native inhabitants (Taiwanese)		
		Male	Female	Total		Male	Female	Total
1	Dental caries or tooth decay	640 (39.2%)	1072 (47.3%)	1712 (43.9%)	Dental caries or tooth decay	137 (41.9%)	112 (40.6%)	249 (41.3%)
2	Retained root	341 (20.9%)	324 (14.3%)	665 (17.1%)	Retained root	62 (19.0%)	41 (14.9%)	103 (17.1%)
3	Missing tooth	57 (3.5%)	162 (7.1%)	219 (5.6%)	Pulpitis	11 (3.4%)	13 (4.7%)	24 (4.0%)
4	Pulp necrosis	55 (3.4%)	77 (3.4%)	132 (3.4%)	Suppurative periodontitis	16 (4.9%)	5 (1.8%)	21 (3.5%)
5	Pulpitis	45 (2.8%)	85 (3.7%)	130 (3.3%)	Acute periodontitis	8 (2.4%)	10 (3.6%)	18 (3.0%)
					Chronic periodontitis	13 (4.0%)	5 (1.8%)	18 (3.0%)
	Total	1631 (100%)	2268 (100%)	3899 (100%)		327 (100%)	276 (100%)	603 (100%)

outpatients in the dental department of Taipei Hospital in 1923. Although the dental department did not have its own wards at the time, and needed to borrow wards from other departments, the fact of having dental inpatients indicates that the dentists in Taipei Hospital at that time have the professional ability to treat inpatients who may have more serious dental diseases or medical compromised conditions. In addition, we also found that the nurse training program in Taipei Hospital had dental nursing course as a compulsory course. From the perspective of modern dentistry, Taipei Hospital had already played the roles in using paramedical personnel (such as dental technician and dental nurse or assistant) for dentistry at that time. This could be regarded as the earliest dental technician and dental nurse (or assistant) professionals in Taiwan.

Furthermore, the ratio of physician to dentist in Taipei Hospital was 13.67 (41/3). There were totally 4511 dental outpatient visits in the dental department in 1923 (Table 2). Therefore, the average number of visits to Taipei Hospital for each dental patient was 2–3 times ( $4511/1759 = 2.56$ ). In fact, this meets the type of the treatments for dental diseases which need more than one outpatient visit. In addition, we could estimate that each dentist in Taipei Hospital had an average annual outpatient number of 1504 ( $4511/3$ ) patients, and an average monthly outpatient number of 125 ( $1504/12$ ) patients. At that time, the number of vacation days per year was 72.<sup>5</sup> It was estimated that the number of working days of dentists in Taipei Hospital might be 293 ( $365-72$ ) days. Therefore, it could be estimated that the average daily outpatient number for each dentist was 5–6 ( $1504/293 = 5.13$ ) patients at that time.

Through the open information webpages of the Ministry of Health and Welfare, we also knew that there were 1464 physician, 143 dentists, and 2 dental technicians registered in NTUH in 2020. Thus, the ratio of physician to dentist was 10.24 ( $1464/143$ ). These data indicate that after a century of development, the number of physicians and dentists in NTUH has grown tremendously, and the growth rate of dentists is higher than that of physicians. On the other hand, the number of dental technicians has not been increased. The possible reason was that hospitals in Taiwan mainly used outside dental technician manpower to handle most of works of dental technology.<sup>6</sup>

According to the 2020 Annual Report of Department of Dentistry, NTUH,<sup>7</sup> there were totally 139,813 dental outpatient visits in the dental department in 2020. We could also estimate that each dentist in the dental department had an average annual dental outpatient number of 978 ( $139,813/143$ ) patients, and an average monthly dental outpatient number of 81.5 ( $978/12$ ) patients. In 2020, the number of working days was 251. Therefore, it could also be estimated that the average daily dental outpatient number for each dentist was 3–4 ( $978/251 = 3.90$ ) patients in 2020. The average number of dental outpatient visits per dentist in Taipei Hospital a century ago was higher than that in the current NTUH. To consider that the dental technology and dental assistant concepts of a century ago lag behind modern ones, the amount of the dental outpatient work of the dentists in Taipei Hospital a century ago might be much heavier than the current dentists in NTUH. However, now the Department of Dentistry, NTUH is responsible for many training tasks for dentists, such as clinical trainings for dental specialists, clinical or research trainings for postgraduate students in master or PhD programs, postgraduate year training program for dentists (PGYD), internship, and clerkship. The workload of these trainings cannot be reflected from the number of dental outpatients only.

In this study, there were totally 4511 dental outpatient visits in Taipei Hospital in 1923, of which 43.4% were for male patients and 56.6% were for female patients. Among them, there were 3899 dental outpatient visits (1631 for males and 2268 for females) for Japanese outpatients and 603 dental outpatient visits (327 for males and 276 for females) for Taiwanese outpatients. In addition, if we ignored the number of foreigner outpatients, Japanese outpatients accounted for 86.6% and Taiwanese outpatients accounted for 13.4% of all dental outpatients. Thus, there was only one Taiwanese outpatient for every 6–7 Japanese outpatients on average. Among Japanese outpatients, there were more women than men. On the contrary, among Taiwanese patients, there were more men than women. This difference might be affected by the social culture or economic status of that time and this result may need further in-depth studies. The Taipei City could be roughly divided into three urban districts during that period: the city, Dadaocheng, and Bangka. The city

was mainly inhabited by the mainlanders (Japanese), while Dadaocheng and Bangka were mainly inhabited by local people (Taiwanese).<sup>8</sup> Moreover, Taipei Hospital was located in the city, and its construction design was originally designed to meet the needs of Japanese sanitary living space.<sup>9</sup> Therefore, although the number of Japanese living in Taipei City or Taipei Prefecture was much smaller than that of Taiwanese, the number of their dental outpatient visits in Taipei Hospital was much higher than that of Taiwanese. In 2019, the number of dental outpatient visits paid by national health insurance was 35.13 million in Taiwan, of which 46.3% were for male patients and 53.7% were for female patients.<sup>10</sup> At least it could be confirmed that after a hundred years of history, the proportion of dental outpatient visits for Taiwanese female patients has increased.

Furthermore, we analyzed the dental diseases treated by the dentists in Taipei Hospital and found that dental caries was the most common dental disease in Taipei Hospital in 1923, which accounted for 43.9% of treated dental diseases for Japanese outpatients and 41.3% of treated dental diseases for Taiwanese outpatients. The retained root was the second most common dental disease, which accounted for 17.1% and 17.1% of treated dental diseases for Japanese and Taiwanese outpatients, respectively. Moreover, in Japanese, the third and fourth common dental diseases were missing tooth (5.6%) and pulp necrosis (3.4%), respectively. In Taiwanese, the corresponding dental diseases were pulpitis (4.0%) and suppurative periodontitis (3.5%), respectively. The total percentage of the top four treated dental diseases was 70.0% for Japanese dental outpatients and 65.8% for Taiwanese dental outpatients. Compared to the recent data based on the commonly treated dental diseases of dental outpatient visits paid by national health insurance, the top four treated dental diseases in a descending order are gingivitis and periodontal diseases (46.7%), dental caries (30.1%), pulp and periapical tissue diseases (8.7%), and stomatitis and related lesions (5.2%) in Taiwan in 2019. The total percentage of the top four treated dental diseases is 90.6% of all treated dental diseases.<sup>10</sup> It is important to note that there is no significant difference in commonly treated dental diseases between Taiwan a hundred years ago and modern Taiwan.

We conclude that the dentistry of Taipei Hospital in the year of Taisho 12 (1923) does have a modern form of dentistry, including the configuration of its dental paramedical staff, such as the position for a dental technician and the training courses for dental nurses, as well as the professional ability to treat dental inpatients. The average number of dental outpatient visits per working day managed by the dentists in Taipei Hospital in 1923 is not less than that managed by the dentists in the current NTUH in 2020. In Taipei Hospital in 1923, the dental patients were mainly Japanese, and the number of Japanese patients was more than 6 times that of Taiwanese patients. The diagnosed and treated dental diseases were mainly

dental hard tissue diseases, such as dental caries and retained root, which together accounted for more than 60% of all treated dental diseases. Moreover, the treated dental diseases were mainly tooth diseases for Japanese outpatients and both tooth and periodontal diseases for Taiwanese outpatients.

## Declaration of competing interest

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

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