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Current Status of Ophthalmology in Taiwan

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Introduction

Taiwan is a medium-sized island, located south-east of the Chinese mainland; the land area is about 30,006 square kilometers. In 2014, Taiwan has a population of 23,390,000 and a population density of 646 people per square kilometer. People over the age of 65 years old account for 11.7 percent of the total population, which exceeds the World Health Organization criteria for an "aging society". In 2013, the average life expectancy in Taiwan is about 79.84 years old (Male 76.72 years, female 83.20 years). Birth rate is 8.54 per thousand, the mortality rate is 6.59 per thousand, and the infant mortality rate is 4.49 per thousand. Taiwan residents are 98% Han Chinese and 2% aboriginal.

Taiwan's government in 1995 began implementing the National Health Insurance; by the end of 2013, it covered 23.3 million Taiwanese citizens (99.7% of the population) [1]. In 2013, the total insurance expenditure of the National Health Insurance was 500 billions NT dollars (15.8 billions USD), which was 6.1% of the GDP in Taiwan [1].

We report the current status of ophthalmology in Taiwan through a review of the current literature and other relevant data sources from publications of the NHIB (National Health Insurance Bureau) of Taiwan Government, [1] the Taiwan Medical Association (TMA) [2], and the Ophthalmological Society of Taiwan (OST) [3].

Development of Ophthalmology in Taiwan

The development of ophthalmology in Taiwan may be divided into three periods. The first was the "Catholic medicine" period, during which ophthalmic services were provided primarily by Catholic physicians. The early contributors to ophthalmology are well-known physicians, Dr. Mayako (James Laidlaw Maxwell, 1836-1921), Dr. Mackay (Rev. George Leslie Mackay, 1844-1901), and Dr. Lang (David Landsborough , 1870-1957).

The second period was the "Japanese-occupation" period, which lasted from 1895 to 1945. During this period, the Japanese government emphasized that eye divisions and clinics were essential in most hospitals [4]. The "modern ophthalmology" period began in 1945, during which the Taiwanese government's continued support of ophthalmology divisions and clinics has ensured a high standard of clinical services to ophthalmology patients [4].

For the past 60 years, Taiwan has benefited due to the implementation of democracy, universal education, good law and order, improved economic conditions. Taiwan has become a free and open society with large numbers of medical manpower to provide rich resources and excellent medical care.

Manpower of Ophthalmologists

In 1960, eighty ophthalmologists practiced in Taiwan. Since then, the number of ophthalmologists has steadily increased at a rate of 40 to 60 per year, with the most rapid increases occurring after 1980. In 2014, 58% of the 1,728 practicing ophthalmologists provided outpatient services, and the remaining 42% provided hospital-based care [3]. With 7.38 ophthalmologists per 100,000 people (one ophthalmologist for every 13,540 inhabitants in 2014), the ophthalmology manpower in Taiwan is adequate, relative to that of many other countries (13.6 ophthalmologists per 100,000 people in Cuba, 11.0 in Japan, 10.6 in Finland, 8.2 in USA, 8.1 in Germany, 5.2 in UK, 4.0 in Australia, 3.3 in Hong Kong, 2.6 in Singapore, 2.1 in China, 0.9 in India) [5]. However, an inequitable distribution of ophthalmologists exists between the urban and rural areas in Taiwan.

As of today (2015), there are 1540 registered ophthalmologist and 210 residents in Taiwan. There are 40-44 new residents each year. The manpower is relatively superfluous.

Ophthalmic Education and Training

Twelve medical schools exist in Taiwan, and enroll approximately 1,300 new medical students per year. After completing a 5-year undergraduate education program, a 1-year clerkship, and a 1-year internship, medical students obtain an M.D. degree (Medical Doctor). Ophthalmology residency programs are offered by 30 qualified training hospitals that accept 40 to 44 new residents each year.

After completing a 4-year residency program, physicians must pass both a written and oral board examinations in ophthalmology before receiving their board-certification in ophthalmology. The written examination is given every year, and involves taking a 200 multiple choice question examination, Examinee must answer 60% of the questions to pass. The pass rate for the written exam is 85%, and participants that fail the written exam can retake the exam next year. The oral exam is given after participants pass the written exam. The oral exam consists of 6 senior examiners and each part consists of 10 minutes, and participants must obtain a 60% to pass the oral exam. The board certification is given to about 95% of the residents in the program.

Ophthalmologists may continue subspecialty training in any of the following categories, which are provided at most teaching hospitals in Taiwan: refraction, cataract, cornea, oculoplastic and orbital surgery, refractive surgery, glaucoma, vitreo-retina, pediatric ophthalmology, neuro-ophthalmology, strabismus, uveitis. Approximately 30% pursue fellowship training in the United States and Europe.

To renew their board certification, ophthalmologists must obtain 200 credit hours of continuing education courses every 6 years of

practice (including 18 credit hours in medical ethics) that are received through various hospital-based activities, such as case conferences, journal meetings, laboratory meetings, local annual meetings, and international conferences. Continuing education courses are also provided by various ophthalmological societies [3].

Ophthalmic Services

In Taiwan, approximately 96 institutions provide 560 beds for ophthalmic patients. From 2005 to 2014, the average cataract surgery rate (CSR) was 6,120 per million people per year, with an average of 126,500 cases (range 118,000-152,000) of cataract extraction with IOL implantation per year (95% with phaco-emulsification), [1] and approximately 760 keratoplasty surgeries, 1,800 retinal-detachment surgeries (sclera buckling and/or pars plana vitrectomy), and 32,000 refractive surgeries (LASIK, PRK, and LASEK) were performed annually [1,3].

The Taiwanese government offers national health insurance for the Taiwanese people. Rural areas in Taiwan are staffed with government-supported physicians that provide ophthalmic services and ocular surgeries in rural areas. There are no special programs for staffing rural areas. Currently, Taiwanese ophthalmologists have also provided medical charity services in underdeveloped countries, such as in Honduras and El Salvador, through ORBIS international programs [6]. They have also provided eye health care in Haiti, Swaziland, São Tomé and Príncipe, Palau, Republic of the Marshall Islands, Republic of Kiribati, India, Sri Lanka, some rural areas of mainland China, and other countries or areas through various international non-governmental organizations.

Publications and Biomedical Research

Ophthalmic researchers in Taiwan have principally focused on ophthalmic epidemiology, angle-closure glaucoma, cornea diseases, vitreo-retinal diseases, and stem-cell studies. From 1974 to 2014, Taiwan ophthalmologists have published 18 monographs (for ophthalmic personnel), 36 books (for layman), 32 ophthalmology-related textbooks, including four in Chinese and 28 that were translated from English to Chinese. From 1990 to 2014, Taiwan ophthalmologists have published approximately 3,500 scientific articles, including approximately 1,400 in Scientific Citation Index (SCI) journals and approximately 2,100 in non-SCI journals. Nine research articles have received high citation rate, (cited more than 100 times) including articles regarding the use of mitomycin-C in refractory glaucoma; [7] corneal limbal epithelial-cell transplantation; [8] ex vivo corneal-endothelium transplantation; [9] the epidemiology of childhood refraction; [10,11] the prevalence and causes of visual impairment; [12] dry eye in the elderly Chinese population;[13] Cancer stem cell study; [14] and DCR (dacryo-cysto-rhinostomy) surgery [15].

Ophthalmology-Related Societies

There are six ophthalmology-related societies in Taiwan [16]. They are: (1) The Ophthalmological Society of Taiwan (founded in 1960); (2) Taiwan Agency of Prevention of Blindness (founded in 2002); (3) Taiwan Academy of Ophthalmology (founded in 2005); (4) Taiwan Society of Cataract and Refractive Surgery (founded in 2005); (5) Taiwan Retina Society (founded in 2012); and (6) Taiwan Society of Ophthalmic Plastic and Reconstructive Surgery (founded in 2013).

The Ophthalmological Society of Taiwan (OST), founded on May 15, 1960 is the largest and oldest professional society of ophthalmologists in Taiwan [3,16]. The society's membership has grown from 107 at its inception to 1,728 in 2014. Similar to other such societies, the OST has a rich tradition of education and leadership in the ophthalmic profession. The society provides continuing education courses for practicing ophthalmologists, and serves as a coordinator between ophthalmologists and the Bureau of National Health Insurance (BNHI).

The OST began publishing its official quarterly journal Acta Soc Ophthalmol Sinicae in 1961, which was renamed as the Taiwan Journal of Ophthalmology in 2011. A total of 55 annual national and 50 regional conferences have been held by the OST from 1960 to 2014, as well as the following international conferences: (1) the 18th Congress of the Asia-Pacific Academy of Ophthalmology (APAO, 2001); (2) the Second Global Chinese Ophthalmic Conference (2002); (3) the Seventh International Symposium on Myopia (1998); (4) the Fifth Conference of the Asia Society of Neuro-Ophthalmology (2008); (5) the Fourth Congress of the Asia-Pacific Vitreo-Retinal Society (2009); (6) the first Asia-Pacific Joint Glaucoma Congress (2010); (7) International uveitis Combined meeting (2013); (8) 4th Asia Cornea Society meeting (2014); (9) 4th Asia ortho-K symposium (2014); (10) the 1st-17th Taipei International Symposium on Current Ophthalmology (1997-2014); (11) six Taiwan-Japan Joint Meetings on Ophthalmology (between 1994 and 2014); and (12) the forthcoming 31st APAO congress (2016) [16].

Taiwanese ophthalmologists have attended meetings of the International Council of Ophthalmology (ICO) since 1966 and APAO meetings since the first APAO Congress in 1960 [3,16].

Future Aims

In the future, ophthalmologists in Taiwan plan to increase their efforts in preventive ophthalmology, such as their Vision 2020 program, education and action for preventing the progression of myopia in school-aged children. In addition, they will expand their basic researches in visual science, establish a national eye-disease registry, and support the Taiwan Journal of Ophthalmology in becoming an internationally recognized SCI journal [17].

Summary

We describe the current status of ophthalmology in Taiwan. There are 1,728 ophthalmologists in Taiwan (year of 2014) with an average of 7.38 eye specialists per 100,000 people. Taiwan is adequate in both basic and continuing education. The ophthalmology residency is a 4-year program in Taiwan, and there are 40 to 44 new residents each year. The Ophthalmological Society of Taiwan and many other professional ophthalmological organizations, and 30 teaching hospitals provide continuing education for practicing ophthalmologists and hospital staffs. Ophthalmic services are adequately available, with an average Cataract Surgery Rate of 6,120 per million people per year (2005 to 2014). Taiwan has held many international congresses. The major areas of biomedical research in ophthalmology in Taiwan are ophthalmic epidemiology, glaucoma, vitreo-retinal diseases, cornea, and stem cells.

From 1990 to 2014, Taiwan ophthalmologists have published approximately 3,500 scientific articles, 1,400 in Scientific Citation Index (SCI) journals and 2,100 in non-SCI journals. Nine research articles have received high citation rate (cited more than 100 times).

The future objectives of Taiwanese ophthalmologists are to promote preventive ophthalmology, to expand efforts in basic research, to establish a national eye-diseases registry, and to support the Taiwan Journal of Ophthalmology in becoming a scientific citation index journal.

The development of Taiwan ophthalmology has gone on for over a hundred years. Currently, Taiwan ophthalmology has reached its "peak era". In Taiwan, abundant medical manpower, highest levels of clinical treatment are available.

With the cooperation between ophthalmologists, nursing staffs, technical personnel and industry, the future of ophthalmology is bright for Taiwan.

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