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REVIEW ARTICLE

Strategies for oral health care for people with disabilities in Taiwan

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Oral health care for disabled patients is an important health issue in Taiwan. Disabled patients seeking dental care include those with mental retardation, cerebral palsy, epilepsy, Down syndrome, autism, xerostomia, AIDS, loss of function of major organs, and neurologic diseases. Current dental health care policies do not completely address this critical oral health issue. Most of these physically or mentally disabled patients cannot find suitable or qualified dental services in local dental clinics or even hospitals. Our current health care insurance system should provide greater benefits for dental practitioners who are willing to care for such disabled patients. The Department of Health (DOH) should legislate policies to provide greater financial support and equipment and encourage hospital dental clinics and dentists to join this special oral care program. Dental schools, hospitals, and the DOH can also provide curricula and special training programs for both dentists and undergraduate dental students so that they can learn about diseases and dental care of these patients. The government and DOH should cover the fees of lawsuits if dentists have medical legal problems while treating patients with disabilities. Questions on special care dentistry can possibly be included in the National Board Dental Examination. The government can establish some national oral health care centers to treat these disabled patients. Through the development of effective preventive and treatment strategies, the incidence of oral diseases in these patients can be reduced in the future.

Introduction

Special care dentistry is the field of dental practice that provides oral hygiene care and treatment needs for patients who have physical, mental or medical problems, or limitations. It encompasses preventive, diagnostic and treatment services. These patients often cannot adequately maintain

their oral health by themselves. Their dental care is neglected not only because of insufficient motivation and appreciation of oral health, but also a lack of appropriate dental care providers and health policies.

The regulations of the Social Security Disability Program of the US Department of Labor, which prohibit discrimination against persons with disabilities,

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define that an individual has a disability if he/she has a physical or mental impairment that substantially limits major life activities.¹ In the US, around 20% of the non-institutionalized population has some extent of disability.² One major difficulty in estimating the number of people who have a disability is how *disability* is defined. It is often defined from a broader perspective, which provides a more accurate picture of the number of people with disabling conditions in the US who could benefit from physical activity.³ Based on the 2007 data from the Ministry of the Interior (MOI), Taiwan, about 4.4% of the Taiwanese have some disabilities who fulfill the definition in the *Physically and Mentally Disabled Citizens Protection Law* (Table 1).⁴ The number of disabled patients is increasing in the world because of higher disease survival rates after adequate medical care. During the aging progress, the likelihood of obtaining a disability is therefore increased. According to information from the MOI, the physically and mentally disabled population older than 65 years comprised 36.4% of the total population in 2007, which was greatest among the different age groups.

People with disabilities are divided into two major groups, according to the onset of the disease conditions: those who are born with congenital defects and those who acquire a disorder or injury later in life.² The former includes mental retardation, congenital developmental defects, cerebral palsy, and genetic diseases such as Down syndrome. The latter includes disabilities acquired because of traumatic injury, systemic diseases, psychologic disorders, and life-threatening illnesses like cancer and AIDS.

In order to fulfill social welfare policies for the medical and dental care of disabled patients, the purposes of this review were to determine the general conditions, disadvantaged status, and needs of special dental care for patients with disabilities. Since oral health is an integral part of general health, suitable dental treatments to establish preventive dental programs and oral health care policies should be promoted in Taiwan.

Review of physically and mentally disabled populations

According to a report by the Department of Health, Executive Yuan, Taiwan, physically and mentally disabled conditions in Taiwan are divided into 16 major categories (Table 1).⁴ Limb disability (i.e., being reliant on crutches or a wheelchair for mobility) comprised 39.2% of the total disabled population in Taiwan and is frequently found in the general population. Their oral hygiene care is compromised

Table 1. Number and proportion of people who suffer from 16 major disabling conditions

Classification	<i>n</i>	%
Visual disabilities	54,615	5.3
Hearing disabilities	109,578	10.7
Balance disorders	2173	0.2
Limb disorders	401,826	39.2
Mental retardation	91,617	8.9
Multiple disabilities	99,563	9.7
Facial damage	4004	0.4
Voice or speech disabilities	12,986	1.3
Loss of functions of a primary organ	105,732	10.3
Chronic unconsciousness	4987	0.5
Senile dementia	24,852	2.4
Autism	7443	0.7
Chronic psychosis	97,738	9.5
Stubborn epilepsy	3279	0.3
Disability caused by infrequent diseases	1014	0.1
Others (chromosome defects, congenital defects, metabolic disorders, etc.)	3753	0.4

From statistics of the Ministry of Interior, Taiwan in 2008.⁴

by decreased hand dexterity. Their dental and medical problems were also neglected in the past, because it was not convenient for them to receive dental treatment. This is why the government should create a barrier-free environment for these patients with disabilities and provide more services for them and access to dental clinics. The population with disabling conditions also includes those with hearing disabilities (10.7%), loss of function of primary organs (10.3%), multiple disabilities (9.7%), chronic psychosis (9.5%), and mental retardation (8.9%) (Table 1).⁴ However, dental resources in different regions of Taiwan differ, and not every dental clinic or even every hospital dental department provides treatment for patients with disability (Table 2).⁵ General dentists should be aware of their special needs for oral care and learn more basic techniques for their treatment in dental practice. While hearing disabilities, reduced hand dexterity, and multiple disabilities affect some people, they do not critically influence oral health care and are not further reviewed in detail in this study. Some other common disabling conditions which affect dental treatment and their clinical characteristics are summarized below.

Mental retardation

According to a survey in 2008, there were 91,617 persons with mental retardation comprising about 9% of the total population of disabled persons in

Table 2. Number of dental facilities and disabled citizens in different cities and counties of Taiwan

Districts	Hospital dental departments, <i>n</i>	Local dental clinics, <i>n</i>	Citizens with a disability, <i>n</i>
Taipei City	35	2794	113,981
Kaohsiung City	52	1599	60,803
Taipei County	57	2651	122,444
Ilan County	11	292	32,650
Taoyuan County	31	1286	65,711
Hsinchu County	8	293	17,662
Miaoli County	16	345	28,331
Taichung County	35	1284	62,470
Changhua County	35	951	60,249
Nantou County	10	401	31,364
Yunlin County	17	486	54,428
Chiayi County	6	248	36,415
Tainan County	24	725	54,983
Kaohsiung County	32	889	52,094
Pingtung County	27	597	47,094
Taitung County	6	146	18,713
Hualien County	9	266	25,715
Penghu County	3	80	5,725
Keelung City	8	278	17,216
Hsinchu City	8	371	13,633
Taichung City	31	1636	35,071
Chiayi City	11	370	12,261
Tainan City	15	855	26,658
Lienchiang County	1	5	331
Kinmen County	1	29	4727

From the Ministry of Interior, Taiwan, 2008,⁴ and Bureau of National Health Insurance.⁵

Taiwan.⁴ The severity of mental retardation ranges from minor to severe. These patients usually have poor attention and cooperation, which may affect the efficacy of routine outpatient dental treatment. People with mental retardation usually have more untreated caries, and higher prevalences of gingivitis and other periodontal diseases than the general population.^{6,7} Keeping appointments short and postponing difficult procedures until the patient is familiar with the dentist and his/her staff are suggested.⁷ In Taiwan, Choi et al.⁸ examined oral conditions in 152 subjects with intellectual disabilities and found that dental caries and gingival inflammation were the most prevalent oral diseases. Kao and Chou⁹ also reported that children with mental retardation are generally smarter than children with Down syndrome and their periodontal health care differs. Hu et al.¹⁰ further showed that it is more difficult for mentally retarded children to find a dental clinic for oral health care. Therefore, a higher percentage of mentally retarded children never visited dental clinics in their survey. Interestingly, mentally retarded children and healthy children showed comparable decayed, missing, and filled primary teeth, and decayed, missing, and filled permanent teeth (DMFT) indices, but mentally

retarded children had a higher percentage of tooth decay compared with the healthy group. Similarly, Yang¹¹ reported the DMFT index to be 8 and the caries prevalence rate to be 92–94% in patients with mental retardation in eastern Taiwan. This study indicates that crucial oral health care issues exist for these patients in Taiwan.

To treat dental problems in patients with severe mental retardation, sedation or general anesthesia is usually required because they cannot understand or follow instructions. However, there are few dentists with specialist training in anesthesiology in Taiwan, which means that current management of these patients is difficult. Regular oral hygiene care by their caregivers is important to prevent caries and periodontal diseases.

Cerebral palsy

Cerebral palsy is the most common disease which causes childhood disabilities and is due to hypoxic or traumatic brain damage during birth.¹² Few well-organized studies regarding the oral health care of cerebral palsy patients in Taiwan have been published. Hurng¹³ examined the oral conditions of 632 adult cerebral palsy patients. Their mean DMFT

index was 7.8, and the prevalences of dental caries and gingivitis were 84% and 74–76%, respectively.

In these patients, motor activities are impaired and muscle tonicities are uncoordinated. They have problems in maintaining a proper position during dental treatment and have difficulty in daily oral hygiene maintenance. Some of them may have severe bruxism, which leads to excessive tooth wear.⁷ During dental treatment, some form of physical restriction, sedation or general anesthesia is needed to maintain a proper position and prevent their uncoordinated muscle activities. If they are being medicated with phenytoin, different extents of drug-induced gingival hyperplasia are commonly noted, and daily oral hygiene care becomes very important.

Stubborn epilepsy

Epileptic patients usually take medication to control seizures throughout their life. If they take phenytoin, gingival hyperplasia may occur and oral hygiene care becomes difficult because of pseudo-pocket formation. Without proper dental care, gingivitis and eventually periodontal destruction are major problems.⁷ Oral hygiene instruction for these patients and their caregivers should be emphasized and promoted. Regular dental examinations and maintenance prophylaxis to control periodontal health are also important.¹⁴ In cases of seizures occurring during dental treatment, it is important to prevent tooth and soft tissue injuries due to muscle contractions and teeth clenching as well as to maintain a patent airway. Dentists should avoid placing any substance or their fingers into the mouth of the patients to prevent aspiration pneumonia and biting injury to their fingers. In some cases, the dentist may consult a medical doctor to check whether other drugs can be used instead of phenytoin and whether the condition of a patient is stable and suitable for dental treatment.

Down syndrome

Down syndrome is a genetic disease (trisomy 21) due to nondisjunction of the 21st chromosome. Persons born with this defect usually have congenital heart disease, developmental defects of the facial skeleton, and variable levels of mental retardation. Physical and orofacial characteristics of the teeth, gingiva, tongue, palate, and occlusion in patients with Down syndrome may show some variations with those of healthy persons.¹⁵ Periodontal disease is a major oral health problem in people with Down syndrome. They may experience rapid, destructive periodontitis and lose their permanent

teeth before adulthood.^{15,16} The contributing factors include inadequate muscle (tongue) force, poor oral hygiene, malocclusion, and an abnormal host immune response.¹⁵ If a dentist has questions about a patient's medical history, he/she can contact the patient's general physician. To avoid the risk of bacterial endocarditis, antibiotic prophylaxis before dental treatment is usually required, because these patients often have congenital heart disease. Most of them are cooperative during dental treatment, and techniques used in treating pediatric patients like "tell, show and do" can be helpful. Dentists need only be kindhearted and understanding when taking care of such patients. However, when general anesthesia or sedation is necessary for dental treatment, dentists should inform the patient's family about the potential life-threatening risk of anesthesia according to classification of their physical status by the American Society of Anesthesiologist system.¹⁷ Sometimes, the dentist should refer a patient to a qualified medical facility with suitable equipment and anesthesiologists.

Autism

Autism is a complex disability that impairs the communication and social, behavioral and intellectual functioning of individuals.¹⁸ Clinical symptoms and severities of autism vary widely, and some people have concomitant disabilities such as mental retardation or epilepsy. People with autism are sensitive to changes in the environment. It is very difficult in terms of behavioral management, because they are usually uncooperative. Physical restriction, sedation, or general anesthesia may be necessary to facilitate dental treatment. However, promoting cooperation is the best choice. Using a tell, show and do approach can encourage some patients to become more cooperative. Immobilization techniques should only be used when absolutely necessary to protect the patient and staff during dental treatment but not as a convenience.⁷ Huang¹⁹ reported an 89% prevalence rate of dental caries in 91 autistic patients in Kaohsiung City. The reasons these patients visit dental clinics include dental caries, pain, and mucosal swelling. Regular oral examinations, oral hygiene instruction, and design of preventive strategies are necessary to promote the oral health of patients.

Xerostomia

Xerostomia, also known as dry mouth, affects many people in different situations. It may be caused by side effects of medicine, such as tricyclic antidepressants, or by Sjögren syndrome, head

and neck radiotherapy, and aging. A common cause of xerostomia in Taiwan is radiotherapy in patients with head and neck cancers (e.g., nasopharyngeal carcinoma, oral cancer).²⁰ It can cause many dental problems. Dry mouth can cause difficulties in eating, swallowing, and taste sensation.²¹ Without saliva lubrication, patients usually complain of a burning sensation in the mouth, and the risk of dental caries is increased.²² Oral preventive treatments like fluoride varnish and prophylaxis are indicated before, during and after radiotherapy to reduce dental caries.²³ The risk of osteoradionecrosis is high in patients who receive over 65 Gy of radiation to the head and neck region.²⁴ Artificial saliva may be prescribed to relieve the discomfort. Regular dental examinations for early diagnosis and treatment are useful for maintaining long-term oral health. Only a few studies evaluated the prevalence of xerostomia in Taiwan. Lin²⁵ evaluated the salivary flow in patients before and after radiation therapy for head and neck cancer, and obvious xerostomia was reported by patients 2 weeks after radiation leading to difficulty with swallowing food, and the condition worsened after 4–8 weeks of radiation. Further studies are needed to evaluate the oral health condition of populations with xerostomia, Sjögren syndrome, and head/neck radiation in Taiwan.

AIDS

Oral problems are very common in people with HIV because of their weakened immune function. They may have mucosal lesions like hairy leukoplakia, candidiasis, and herpetic stomatitis which can affect eating.^{26,27} Most of these problems can be treated or controlled. The extents of gingivitis and periodontitis are generally more severe than others,^{28,29} probably because of embarrassment about their condition, so they seek dental treatment only when they are in pain. The most challenging situation is that there are few dentists who are willing to provide dental services for them. The Taiwanese government should establish a sound medical system including providing specialized institutions and equipment to give them privacy during treatment, and financially support the advanced training of dental professionals for better dental services. Standardized operative procedures for infection control in general dental clinics are important to prevent cross-infection during dental treatment. Although dentists are familiar with most dental treatments, they are often not familiar with this disease. Continuing education programs for general dentists to understand the nature of this disease and precautions to prevent infection during dental procedures would

encourage more dentists to provide dental services for these patients.

Loss of functions of primary organs

Many patients suffer from dysfunction of a major organ due to diseases including cancer, autoimmune diseases, poisoning, and traumatic injury. While most of them survive these conditions, their general health is usually compromised. Impaired coagulating and immune functions may affect routine dental treatment.³⁰ In Taiwan, more than 100,000 citizens suffer from this problem (Table 2).⁵ Dentists should pay attention to the general status of these patients before treatment. For example, patients who undergo organ transplantation always take immunosuppressants for a long period and thus impair their immune function. The immune status of these patients should be checked before tooth extraction or other invasive procedures. If necessary, medical consultation should be done to evaluate the systemic condition of the patient.

Neurologic diseases

Neurologic degenerative diseases like Alzheimer disease and Parkinson disease usually occur in the elderly. As human life expectancy is prolonged because of advanced medical technologies, patients with these kinds of disorders are accordingly increasing.

Parkinson disease shows characteristics of muscular rigidity, tremors, and bradykinesia. It is a pathologic condition caused by dysfunction of the brain's dopamine neuronal systems.³¹ Patients may have problems with their oral hygiene care because of poor hand dexterity. Therefore, dental caries and periodontal disease can be severe if they cannot clean their mouth. Electric toothbrushes are helpful for patients with poor muscle control in their hands.

Persons with Alzheimer disease also have problems in maintaining good oral hygiene, because they forget what to do with the toothpaste or how to rinse and even where the toothbrush is. As the disease progresses, they may forget the importance of dental care and neglect taking care of their mouth.³² Providing oral hygiene instruction to their caregivers is important, and regular dental follow-up and prophylaxis (every 3 months) should be arranged to maintain their oral health.

Other infrequent disorders

Fibrodysplasia ossificans progressiva, myositis ossificans progressiva, mucopolysaccharidosis, tuberous sclerosis complex, multiple sclerosis, osteogenesis

imperfecta, phenylketonuria, hereditary epidermolysis bullosa are infrequent disorders, because their prevalence rates are <1 per 10,000.³³ Dental treatments for these patients do not differ from the general population unless the physical condition is not stable. Some medications might affect their health condition, and consultation with their physician before prescribing any medicine would be the best policy.³³

Oral health care strategies for persons with disabilities who need more oral health care

Recently, the Taiwanese government has dedicated itself to improving the social welfare of disabled people. These policies include daily allowances, employment policies, and medical insurance mitigation. However, the health care system should be further improved to become more accessible to patients with disabilities. According to the MOI's survey, 90% of disabled persons live at home.⁴ Community-based medical services should be provided, because patients with disability are not ambulant and are dependent on their caregivers.

The result of a survey performed by Kaohsiung Medical University in 2004 showed that the caries rate of permanent tooth in people with disabilities was >90%, and only 32% of the teeth were filled.³⁴ According to data from Taiwan Dental Association, only 54% of the special service program budget was utilized in 2006. By examining the global budget of the dental payment system, we found that the amount was <0.2% of the total expenditures of dental payments.³³

Disabled patients are grouped into four categories (minimal, mild, moderate, and severe) based on the severity of their disability in Taiwan.⁴ Accordingly, medical institutions should be graded to provide suitable services to different categories of patients as is done in Japan.³⁵ In order to make medical institutions community-based, general practitioners in local dental clinics should be able to treat patients with minor and median grades of disability. This kind of ability or skill should be taught or trained in dental schools as a required curriculum. Educational programs and associated training for dental students seem insufficient in this field of dental service.³⁶

Dental treatment for patients with severe disabilities or more complicated oral conditions should be handled in a specialized medical center with special equipment and in a multi-disciplinary approach. Thus, a dental specialist system for patients with disabilities should be established. Qualified institutions could provide postgraduate

clinical training programs for the dental health care of disabled patients.

In addition to the above strategies, the most important and effective method, however, is to prevent oral diseases from occurring in disabled people. Oral health education like tooth cleaning methods, diet consultations, and regular dental examinations should be designed and provided to patients with disabilities or their caregivers to decrease the incidences of dental caries and periodontal disease. Prophylactic measures like ultrasonic scaling and fluoridated mouth rinsing or professional topical fluoride application should be encouraged in these patients.

Conclusion

In Taiwan, there are seven dental schools and about 400 dental graduates each year. However, only Chung-Shan Medical University provides the curriculum, Dentistry for Patients with Disabilities, for undergraduate students. The other six dental schools include this only as one of the topics in pedodontics for undergraduates and put it into more advanced training in the postgraduate program. In addition, not every teaching hospital provides dental services for patients with disabilities, and only a few general dental clinics treat such patients (Tables 2 and 3).^{5,37}

In order to encourage more dentists to get involved in treating patients with disabilities, special training programs should be promoted for the dental care of these patients and educational courses should be designed in undergraduate schools. If dentists are more familiar with the physical and dental conditions of patients with disabilities, they will not be so reluctant to treat them.

The Department of Health should help establish sound and clear policies regarding various levels of suitable dental facilities for patients with different levels of severity of disabilities, provide more financial incentives for dentists willing to treat such patients, and pass regulations concerning those who refuse to treat or refer these patients to suitable facilities. Questions on special-care dentistry can possibly be included in the National Board Dental Examination. The government can also establish national oral health care centers for treating disabled patients in different regions of Taiwan and provide support for potential legal problems which may be confusing to dentists. It is not too late to emphasize this issue and begin to establish a sound health care system. Further development of effective preventive and treatment strategies, oral hygiene care, special dental management, and even multidisciplinary approaches for these disabled

Table 3. Dental facilities which offer special-care services in Taiwan in 2009

District	Service, <i>n</i>		
	Primary	Advanced	Total
Keelung City	2	9	11
Taipei City	37	91	128
Taipei County	41	32	73
Taoyuan City	1	0	1
Taoyuan County	14	113	127
Hsinchu City	19	4	23
Hsinchu County	4	0	4
Miaoli City	1	0	1
Nantou County	4	1	5
Taichung City	24	45	69
Taichung County	34	8	42
Changhua City	2	0	2
Changhua County	56	4	60
Yunlin County	20	1	21
Chiayi City	2	0	2
Chiayi County	5	6	11
Tainan City	18	9	27
Tainan County	21	0	21
Kaohsiung City	6	6	12
Kaohsiung County	4	6	10
Pingtung City	2	0	2
Pingtung County	18	0	18
Ilan County	21	0	21
Hualien County	14	4	18
Taitung County	4	2	6
Total	374	341	715

From the Bureau of National Health Insurance.⁵

patients would help meet their needs both in quality and quantity.

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