

Education of dentists in China

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China is geographically located in the east of Asia and its population exceeds 1.3 billion. An understanding of dental education in China is thus of interest. However, as there is little published information on this topic, this paper provides information about China regarding its dental history, dental school system including curriculum and dental licensure. High school graduates take a nationwide entrance examination to apply for dental school, of which there are more than 50 in China. A five year dental education leads to the BDS degree. Dental school graduates must then pass the nationwide licensure examination to practise dentistry. Currently, there are not adequate numbers of dentists to provide the necessary oral health care for people living outside metropolitan areas.

Key words: Dental education, dental school curriculum, dental licence, dental practice, culture, China

China is geographically located in the east of Asia. The country covers an area of 9.6 million km², which is slightly smaller than the USA, although the population exceeds 1.3 billion¹. China's economic development and increase in international relations has resulted in increases in demand for oral health care^{2,3}. International relationships in dentistry have grown stronger through journals, books, academies, seminars, and researcher exchange programmes⁴. Global dental education and health promotion are also being developed⁵. Dental students play a significant role in public life, eventually becoming the future leaders in dentistry⁶. An understanding of dental education in China is thus critical. However, there is little published information on this topic.

This review of dental education in China addresses the following topics: the history of dentistry and dental education, the structure of dental education and entrance examinations, the dental school curriculum, and

dental licensure and practice. This review excludes the Hong Kong Special Administrative Region, the Macau Special Administrative Region, and Taiwan.

History of dentistry and dental education

China boasts the world's oldest continuous civilisation, with more than 4,000 years of recorded history. Some of the most important cultural achievements in history, such as papermaking, the compass, gunpowder, and movable type printing, were first produced in China⁷.

The first use of a toothbrush and of amalgam for restoring teeth can also be traced back to China. Amalgam was first mentioned as silver dough in the *Materia Medica* of Su Kung, 659 A.D. during the T'ang Dynasty. Thus, we can assume that amalgam has been used as a filling material for carious teeth in China since the 7th century⁸.

Before the founding of the People's Republic of China in 1949, there were few dental schools, which were mainly private and run by foreign missionaries. The first dental school in China was part of the private West China Union University in Chengdu and was founded in 1910. The second was the Aurora University Dental School in Shanghai which was established in 1933 by the French Mission. The Dental School of the Medical College of the National Central University started in 1935 and the Dental School of the Medical College of Beijing University was founded in 1943. It was estimated that not more than 500 qualified dentists existed in China before 1949⁹. Dental education was taught in English in China up until 1949. All dental equipment and materials were imported from foreign countries. The first dental textbook in Chinese that was not a translation, was written in the 1950s. Dental education in China is now taught in Chinese. Only a few dental schools still teach in Chinese and English.

In 1950, the Beijing Medical College School of Dentistry, Sichuan Medical College School of Dentistry, Shanghai Second Medical College School of Dentistry, and the Fourth Army Medical University School of Dentistry were established. The total number of dental students admitted to these four schools was 50. During the six-year period from 1966 to 1972, none of the schools enrolled any new students due to the Cultural Revolution in China. Since then, many new dental schools have opened, especially in the 1980s and 1990s.

Currently, there are more than 50 dental schools in China¹⁰ all run by central or local government. There are no private dental schools. Three types of dental schools exist; a college of stomatology attached to a medical university, a faculty of stomatology attached to a medical college, and a specific training school of stomatology¹¹. The definition of these three classifications is confusing and the discrepancy in number of dental schools is evident in both the Japanese and Chinese literature. In addition, the number of dental schools is changing in line with the reform of health care education at Chinese universities and institutions. Therefore, the number of dental schools in China estimated here is based on reliable information collected by the authors.

Dental school systems and entrance examinations

The Ministry of Public Health in the People's Republic of China, which is the premier governing body of dental education, instituted a uniform teaching programme for dental education in 1954. Since then, the Ministry and the Chinese Stomatological Association, which is a regular member of the *Fédération Dentaire Internationale* (FDI), have been working together to promote scientifically-based dental education. In addition, the Chinese government is placing more importance on the oral health of its citizens. As a consequence, the Stoma-

tology Branch of the Chinese Medical Association was converted into the independent Chinese Stomatological Association in 1996¹¹.

Dental personnel in China comprise; dentists, middle-level dentists (denturists), dental nurses, and dental technicians¹². In this review, we will only focus on the dentists' curriculum.

The duration of the dental school programme is five years, of which four are devoted to didactics and laboratory course work, and one year to compulsory internship rotations. Dental school graduates in China are awarded a bachelor of dental surgery degree (BDS). About 10 dental schools provide a seven year programme which combines a five year BDS degree and a two year master degree. PhD programmes are also available¹³. Class size varies from 30 to 100. The total number of freshman dental students is about 2,500 per year.

Beginning in 1977, applicants have been required to take a nationwide entrance examination. Eligible applicants must have graduated from high school and no undergraduate pre-dental study is needed prior to entry into dental school. The dental school programme starts each September. The entrance examination is provided once annually and is held only a few months before the programme starts. Dental schools must make rapid admission decisions based solely on the academic score achieved by the applicants. The two-day nationwide entrance examination consists of multiple-choice questions, short answers, and essays covering six or more subjects, including mathematics, English, Chinese, physics, chemistry, and social studies. It is similar to the American SAT system. Because only a small portion of high school graduates can pursue higher education in China, the admission process is extremely competitive. Applicants are required to undergo a medical examination to satisfy health requirements⁷. Until recently tuition was free, however now some students must pay part of the tuition and fee, which is approximately US\$1,000 per year.

Dental school curriculum

The five year dental school curriculum in China consists of four years of didactic and laboratory courses, and one year of compulsory dental clinical internship rotation, which is supervised by faculty members. The term stomatology, instead of dentistry, is widely used and indicates the traditional philosophy in China that dentistry is a sub-specialty of medicine. The integration between medical and dental education is thus seamless and Chinese dental students study basic sciences together with medical students during the first and second years of the curriculum¹⁴. The third year curriculum includes lectures and grand round rotations in a medical hospital. Fourth year students further engage in dental didactic and laboratory coursework, and students begin making contact with patients. Fifth year dental students

participate exclusively in patient care and prepare for the nationwide dental licensure examination. An example of a typical curriculum is included in *Table 1*.

The collective experience of the authors indicates that the curriculum content is generally similar in the U.S., Japan, Korea, and China. However, there are some differences. For example, implant and laser dentistry are taught in many dental schools in the USA, Japan, and Korea, but only a few dental schools in China. Precious metals for casting are very expensive, and thus were not commonly used in China until about 10 years ago. Other equipment and materials were also in short supply in the past, largely due to the socioeconomic conditions in China. Current Chinese leaders are focusing on market-oriented economic developments and modernisation. In recent years, dental schools in China have also been modernising, and most are now equipped with many of the same dental materials and devices used in other industrialised countries.

The academic calendar of Chinese dental schools runs from September to July. The first term is from September to January. There is a 3-4 week break during the Chinese New Year Holidays (Spring Festival) between the first and second terms. The second term is from February to July. Chinese dental schools have final exams at the end of each term, conducted by a course director such as a department chair or professor. Examinations are important because passing them is a requirement for graduation. The examination guidelines for theory stipulate a written examination, oral examination, and an internal assessment. The written examination consists of multiple-choice questions, essay questions, and short answers. The oral examination is a 15-30 minute, one-on-one interview between one to three examiners and the student.

All dental students in China use the same textbooks. The Ministry of Public Health organises the production and revision of the medical and dental textbooks. Having a uniform dental curriculum and textbooks throughout the country helps to ensure consistency between graduates from different schools. Pre-clinical courses include mathematics, chemistry, physics, biology, anatomy, histology, physiology, biochemistry, pathology, microbiology, immunology, pharmacology, and dental materials. Clinical subjects include operative dentistry, endodontics, periodontics, preventive dentistry, prosthodontics, orthodontics, oral surgery, paedodontics, anaesthesiology, and oral radiology.

The integration of traditional Chinese medicine and western medicine is unique to Chinese dental education¹³, for example, in the treatment of patients with malignant tumours. Oral maxillofacial surgery will often utilise acupuncture to control pain and some herbal compounds are used in toothpaste for the treatment of mucous membrane pathology¹⁵.

Table 1 Typical academic hours for each subject of study in China.

Year	Subjects	Hours of lectures & practices
1	Politics	74
	English	133
	Physics	95
	Physical Education	74
	Advanced Mathematics	60
	Inorganic Chemistry	114
	Organic Chemistry	105
	Biology	36
	Human Anatomy	162
	Histology & Embryology	95
2	Philosophy	72
	English	88
	Genetics	18
	Physical Education	72
	Physiology	160
	Biochemistry	144
	Microbiology	108
	Pathology	108
	Pathophysiology	36
	Pharmacology	108
3	Political Economy	72
	Physical Diagnostics	135
	Surgery	103
	Laboratory Diagnostics	52
	Radiodiagnostics	54
	General Surgery	44
	Traditional Chinese Medicine	70
	Internal Medicine	121
	Ophthalmology	25
	Otolaryngology	50
	Gynecology & Obstetrics	25
	Pediatrics	25
	Dermatology	25
4	Latin	24
	Oral Histopathology	80
	Dental Anatomy & Occlusion	40
	Regional Anatomy	60
	Orthodontics	93
	Oral Surgery	268
	Prosthodontics	268
	Oral Internal Medicine*	332
5	Clinical Training†	1840

*Includes Restorative Dentistry, Endodontics, Periodontics, Paedodontics, Preventive Dentistry.

†Includes Oral Internal Medicine (15 weeks), Prosthodontics (15 weeks), Oral Surgery (16 weeks). One Clinical Training week consists of 40 practical hours.

Dental licence and practice

China did not employ a uniform, nationwide dental licensure examination until 1999. Prior to that time, all students in Chinese dental schools received both a BDS diploma and dental licensure at the time of graduation.

The Chinese nationwide dental licensure examination has been run annually since 1999⁵. The Ministry of Public Health conducts the examination and appointed experts prepare its content annually. It is the only examination that candidates for dental licensure in China must take and they are eligible to sit it one year after the BDS diploma has been conferred. It was originally only written but now includes an additional clinical part which is patient-based and requires candidates to make a diagnosis and treatment plan but no actual treatment is undertaken. Those who pass the clinical part are then eligible to take the written part, which examines the knowledge and techniques required for the practice of dentistry in China.

The exam results are reported on a pass/fail basis and a minimum score of 60% is required to pass. The pass rate for the first examination, which was held in November 1999, was approximately 70%. The Chinese systems differs from that of the USA in that eligibility for licensure in China is based on a single test, while licensure in the USA is based on multiple examinations such as the National Board Dental Examination Parts I and II and state or regional board clinical examinations⁴.

After passing this exam, a dentist will be assigned to work wherever the Ministry of Health sends them, but dentist preferences are also taken into account. More than 90% of new graduates are assigned to work at dental schools or hospitals, which give fixed monthly salaries under the social welfare system. The dentists practise as general dentists or in specialty fields, even though they have not completed specialty training and receive mentorship and training while they work as an employee.

Further training

In Chinese dental schools it usually takes five years following graduation to be appointed to an instructor position. Promotion from instructor to associate professor takes another five years with an additional five years required to be promoted from associate professor to full professor. Instructors, associate professors and professors can all give lectures to undergraduates. Associate and full professors are qualified to be advisors for Masters and PhD degree programme students.

Some graduates pursue their educational endeavours through postgraduate dental study programmes in Hong Kong, or other countries. Master or PhD degree programmes in China take three and six years, respectively and are administered by individual dental schools,

where the examinations include English and the dental specialty area which the applicant wishes to pursue. The master degree programme is clinically oriented, whereas the PhD degree is research oriented.

Some of the new graduates go to work in private sector dental clinics, which although not yet as common in China as in many other countries, are an increasing trend in line with China's 'open door policy'.

Access to dental care in hospitals is better in big cities than in small cities. People working in big cities usually have dental insurance if they are employed by the government, enabling them to visit dentists in state-owned hospitals. Recent health care reforms in China have seen a rise in private dental insurance, with the premium being paid by the individual or the employer, and this trend will probably grow.

The number of dentists in China has increased rapidly along with the increased number of dental school since 1990. According to the FDI data in 1990, the number of dentists was 11,044 and the number of middle-level dentists (denturists) was 400. The ratio of dentists to the total population was approximately 1:100,000⁷. According to a later report by Zhang *et al.*¹⁶ in 1993, there were approximately 1.5 university-trained dentists per 100,000 population. In addition, there were about 1,000 middle-level dentists. Thus, they calculated the overall dentist to population ratio to be about 1: 33,000. Today there are 56,528 dentists in China, yielding a ratio of 1 dentist for every 25,000 people. However, the geographic distribution of dentists is very uneven; being many more in the major cities than in the small towns, and very few in the rural areas¹⁶. The shortage and unequal distribution of dentists and the lack of facilities severely limit access to oral health services by many Chinese. There is also a need for community dental health care, and oral health prevention and promotion to be prioritised in the dental school curriculum^{6,10,17}.

Discussion and conclusion

Our previous reports of dental education in Japan, Korea, and India were conducted in capitalist countries, however China has a different system^{4,6,18}. Acquiring the information that is reported in this paper was more difficult than anticipated since there are few publications and references on dental education in China. The shortage of recent references was partially resolved by using the collective knowledge and experiences of the authors. Therefore, some of the comments are the opinions of the authors based on their personal information. China's move towards a political and economic 'open door policy' during the last 10 to 15 years has reverberated into the educational area as well⁵. China's economy is growing rapidly; however, the high cost of imported dental materials and equipment still limits dental education and dental services.

In conclusion, this paper reports on dental education in the People's Republic of China and contributes to a better understanding of international dental education. In China, a standard curriculum is followed, and some similarities and differences with overseas courses have been discussed. It is expected that academic interchange will continue to occur between Chinese and foreign educators and researchers to the benefit of both groups.

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References

1. United Nations Statistics Division- National Accounts Main Aggregates Database. The Economic Statistics Branch of the United Nations Statistics Division, Available at <http://unstats.un.org/unsd/snaama/SelectionCountry.asp>. Accessed on March 25, 2005.
2. Lin HC, Schwarz E. Oral health and dental care in modern-day China. *Community Dent Oral Epidemiol* 2001 **29**: 319-328.
3. Wang HY, Petersen PE, Bian JY *et al*. The second national survey of oral health status of children and adults in China. *Int Dent J* 2002 **52**: 283-290.
4. Heo S-M, Kim K-J, Kawamura M *et al*. Comparison of the dental education systems in Korea and Japan. *Int Dent J* 2004 **54**: 70-72.
5. Corbet E. Oriental and occidental cultural differences - their possible influences on global dental education and learning. *Eur J Dent Educ* 1999 **3 (suppl 1)**: 39-43.
6. Komabayashi T, Kwan SYL, Hu DY *et al*. A comparative study of oral health attitudes and behaviour using the Hiroshima University - Dental Behavioural Inventory (HU-DBI) between dental students in Britain and China. *J Oral Sci* 2005 **47**: 1-7.
7. FDI World Dental Federation. *FDI Basic Facts 1990, Dentistry around the world*. pp 39. London: FDI World Dental Press Ltd, 1990.
8. Hoffmann-Axthelm W. *History of Dentistry*. pp 42-44. Chicago: Quintessence Publishing Co, Inc, 1981.
9. Chu HT. A brief introduction of the dental education in the People's Republic of China. *J Tenn Dent Assoc* 1986 **66**:14-16.
10. Practical information of Chinese stomatology 2005. Beijing: People's military surgeon publisher 2005 (in Chinese).
11. Niu Z-Y. The present status of pre- and post-graduate clinical training education and social insurance systems of conservative therapy in P.R. China. *Jpn J Cons Dent* 1999 **42**: 807-809.
12. Bai TX, Zhang QH. A survey of fundamental condition of secondary stomatological education and a forecast of the requirement for higher, secondary and elementary stomatological education in China. *Chin J Health Stat* 1990 **7**: 23-27 (in Chinese).
13. Qiu WL, Zhang XZ. Oral and maxillofacial surgery in China. *J Tenn Dent Assoc* 1986 **66**: 17-19.
14. Xiao Z. The advancement of periodontics in China. *J Tenn Dent Assoc* 1986 **66**: 20-22.
15. Yeweng SJ, Huang SF, Ren LJ. Orthodontics in China. *J Orth* 2002 **29**: 62-65.
16. Zhang SN, Ou Y, Cheng SX, *et al*. Present oral care situation and prediction of need for manpower by year 2000 in Guangdong Province. *J Dent Prev Treatment* 1993 **1**: 5 (in Chinese).
17. Leung WK, Chu CH. Dental caries and periodontal status of 12-year-old school children in rural Qinghai, China. *Int Dent J* 2003 **53**:73-78.
18. Komabayashi T, Raghuraman K, Raghuraman R, *et al*. Dental education in India and Japan: implications for U.S. Dental programs for foreign-trained dentists. *J Dent Edu* **69**:461-469.

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