Commercial opportunities in the dental care market in China

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Contents

Executive summary **5**
1. Analysis of the dental care market in China **8**
1.1 Dental care services 9
1.1.1 Demand and supply 9
1.1.2 Providers 11
1.1.3 Workforce 12
1.1.4 Payers 13
1.1.5 Regulators 13
1.1.6 Market size and growth potential 13
1.1.7 Competitor analysis 14
1.1.8 Opportunities 15
1.2 Dental equipment 15
1.2.1 Demand and supply 15
1.2.2 Providers 16
1.2.3 Regulators 17
1.2.4 Market size and growth potential 17
1.2.5 Competitor analysis 17
1.2.6 Opportunities 18
1.3 Dental education 18
1.3.1 Demand and supply 18
1.3.2 Types of education and major providers 19
1.3.3 Providers 20
1.3.4 Payers 22
1.3.5 Regulators 22
1.3.6 Market size and growth potential 22
1.3.7 Competitor analysis 22
1.3.8 Opportunities 23
1.4 Mobile health 23
1.4.1 Demand and supply 23
1.4.2 Key Stakeholders and competitor analysis 24
1.4.3 Opportunities 25
1.5 Infrastructure services 25
1.5.1 Demand and supply 25
1.5.2 Key stakeholders 25
1.5.3 Opportunities 25
2. The dental market in Guangdong **26**
2.1 Dental care service 26
2.1.1 Market overview 26

2.1.2 Demand and supply 26
2.1.3 Workforce 29
2.1.4 Regulators 29
2.2 Dental education 30
2.2.1 Demand and supply 30
2.2.2 Market size and growth potential 30
2.2.3 Conclusion 30
2.3 Dental equipment 31
3. Analysis of commercial opportunities in the mainland China dental market 32
3.1 Summary of the commercial opportunities identified 32
3.2 Assessment of identified opportunities with UK's capabilities 33
3.3 Comparison of identified opportunities with market size and growth potential 35
3.4 Assessment of regulation and competition issues around identified opportunities 37
4. Go-to-market strategy 38
4.1 Develop dental care service delivery organisations in China 38
4.2 Export 3D dental printers from the UK to China 39
4.3 Provide credit-based lectures to registered dentists in China within private sector 40
4.4 Provide management courses/degree programmes to dental administrators 40
4.5 Provide international certificate programmes to registered dentists 41
5. Key success factors 42
5.1 Develop dental care service delivery organisations in China 42
5.2 Export 3D dental printers from the UK to China 42
5.3 Provide credit-based lectures to registered dentists in China within private sector 43
5.4 Provide management courses/degree programmes to dental administrators 43
5.5 Provide international certificate programmes to registered dentists 43
6. Challenges, barriers and risks 44
7. Future roadmaps 45
7.1 Develop dental care service delivery organisations (Guangdong for instance) 45
7.2 Export 3D dental printers from the UK to China 46
7.3 Provide credit-based lectures to registered dentists in China within private sector 46
7.4 Provide management courses/degree programmes to dental administrators 47
7.5 Provide international certificate programmes to registered dentists 47

List of Figures

Figure 1 Evaluation matrix for identified opportunities in the dental care market in China 7
Figure 2 Eco-system of the dental care market in China 8
Figure 3 Total number of dental care delivery organisations in China 10
Figure 4 Total patient volume and service revenue generated by dental care delivery organisations in China 10
Figure 5 Number of dental care delivery organisations in China, by types 11
Figure 6 Patient volume (in million) in each type of dental care delivery organisations in China 11
Figure 7 Number of dentists per 1,000 population in various countries compared, 2013 12
Figure 8 Number of registered dentists in China, 2010-2013 12
Figure 9 Number of dental school graduates in 2014, 2015 and 2020 predicted in China 18
Figure 10 Distribution of highest degrees received of the registered dentists in China, 2012 19
Figure 11 Number of dental chairs per 10,000 population in cities of Guangdong Province in China 27
Figure 12 Number of stand-alone dental clinics in Guangzhou & Shenzhen, compared with other benchmarking cities in China 28
Figure 13 Prevalence of dental caries among different age groups in Guangdong, compared with National average 28
Figure 14 Assessment of identified opportunities in dental care market in China, using 3*3 evaluation matrix 36

List of Tables

Table 1 List of leading teaching dental hospitals in China ... 14
Table 2 List of leading private dental chain clinics in China ... 14
Table 3 List of key providers of the various dental device sub-categories in China ... 16
Table 4 List of key providers of various dental instrument sub-categories in China ... 16
Table 5 List of leading dental schools in China ... 21
Table 6 Introduction to the international dentist certificate programmes provided by Case Western University, USA ... 21
Table 7 List of key players within various sub-categories of dental m-health in China ... 24
Table 8 Key providers of dental clinic designing services ... 25
Table 9 Number of dental care delivery organisations in Guangdong province in China ... 27
Table 10 Number of workforce in Guangdong compared to China ... 29
Table 11 List of major regulators for dental services in Guangdong ... 29
Table 12 Assessment of identified opportunities with UK's capability ... 34
Table 13 Assessment of identified opportunities with current market size and future growth potentials ... 35
Table 14 Assessment of regulation and competition issues around identified opportunities ... 37
Table 15 Go-to-market strategy for establishing chain clinics in China ... 38
Table 16 Go-to-market strategy for exporting 3D dental printers to China ... 39
Table 17 Go-to-market strategy for providing lectures (with credits) to registered dentists in China ... 40
Table 18 Go-to-market strategy for providing management courses and degree programmes to dental administrators and practice owners in China ... 41
Table 19 Go-to-market strategy for providing international clinical certificate/degree programmes to dentists in China ... 41
Table 20 Challenges, barriers and risks for the identified opportunities ... 44
Table 21 Future roadmap for establishing chain clinics in China (Guangdong for instance) ... 45
Table 22 Future roadmap for exporting 3D dental printers to China (Guangdong for instance) ... 46
Table 23 Future roadmap for providing lectures (with credits) to registered dentists in China (Guangdong for instance) ... 46
Table 24 Future roadmap for providing management courses and degree programmes to dental administrators and practice owners in China (Guangdong for instance) ... 47
Table 25 Future roadmap for providing international clinical certificate or degree programmes to dentists in China (Guangdong for instance) ... 47

Executive summary

Dental care has remained a relatively independent and distinct segment of the mainland China healthcare system. Unlike other specialties, dental care services in China are provided by both hospitals and stand-alone clinics. The majority of tertiary and secondary general hospitals provide dental services through their stomatology departments, while each major city is also equipped with a dental hospital, usually affiliated to a local dental school. Leading dental schools have developed strong stomatology hospitals in their regions, providing complex and comprehensive treatments. However, similar to many other countries, private sector dental clinics started to boom and have now earned a significant market share.

The private dental sector in China began developing around 20 years ago, when setting up private or socially-funded healthcare organisations was first permitted. The number of private clinics has increased dramatically, especially in areas where the private sector is more encouraged by the government and accepted by the public.

One reason for the rapid growth is that a significant proportion of costs incurred by accessing dental treatment is not included in the social insurance scheme; coverage only extends to basic treatments. Additional treatments such as dental hygiene, cosmetic dentistry, dental crowns with more advanced materials, orthodontics and dental implants are not covered. The advantages of private clinics include short or no waiting times, better facilities and patient experience, and greater flexibility in appointments. All these factors encourage patients to choose private clinics when they have to pay themselves.

From the political perspective, the Chinese government is not specifically trying to promote the growth of the private dental sector. With the introduction of Guidance on promoting socially-funded healthcare organisations in China in 2013, the government stated that privately owned healthcare organisations should be encouraged to improve the quality and quantity of medical services. However, the development of dental care organisations has not been clearly mentioned in any of the national plans and political guidance. This is partly because the government believes there are sufficient private dental care organisations at the moment; it is up to the market whether the number will increase.

Regardless of the political background, demand for dental services is expected to grow strongly. The prevalence of oral disease is relatively high compared with developed countries, but the treatment rate is very low. According to the most recent National Surveillance Studies of the Population Dental Health, conducted in 2005, the prevalence of caries was 66% among children aged 5, 28.9% among children aged 12, 88.1% among adults aged 35-44, and 98.4% among population aged 65-74. Though disease rates were severe, the treatment rate was extremely low: 3% among children aged 5, 11% among children aged 12, and 8.3-21.1% among adults aged 35-74. Similar to dental caries, the prevalence of illnesses such as periodontic diseases were also high, with low treatment rates. It indicates that demand for dental care treatments is a current issue which will continue to grow.

The number of people receiving treatments such as orthodontics and dental implants has been growing strongly throughout the past decade. Studies revealed that orthodontics, previously seen as a treatment for teenagers, is now much more common among adults. As the economy grows, people are more likely to care about oral health and aesthetics, so again, demand for dental treatments, including both preventive and cosmetic care, are expected to grow significantly.

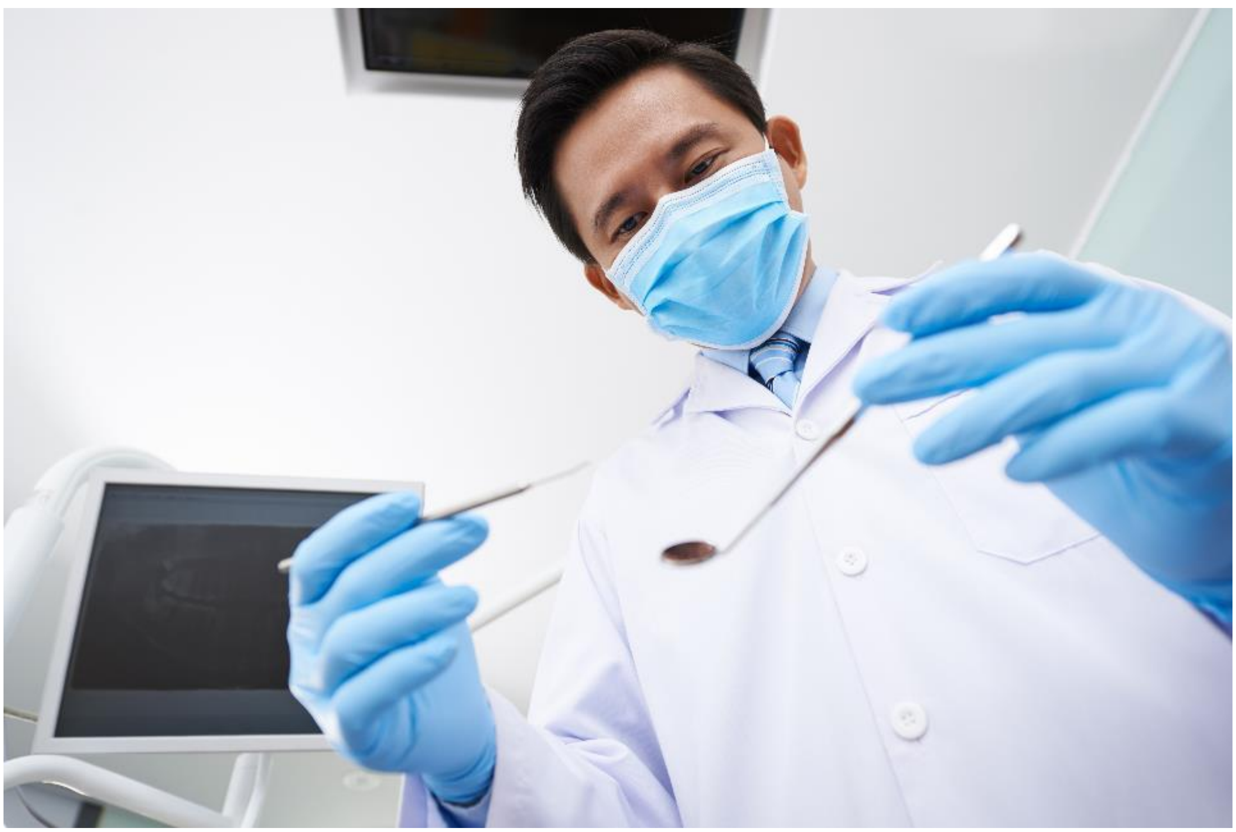
In addition to the low treatment rate and lack of awareness of oral health among the Chinese population, there is a shortage of dentists. It is more severe in the private sector compared with public hospitals; dentists are more reluctant to work in private facilities because there are fewer patients and it is regarded as less prestigious.

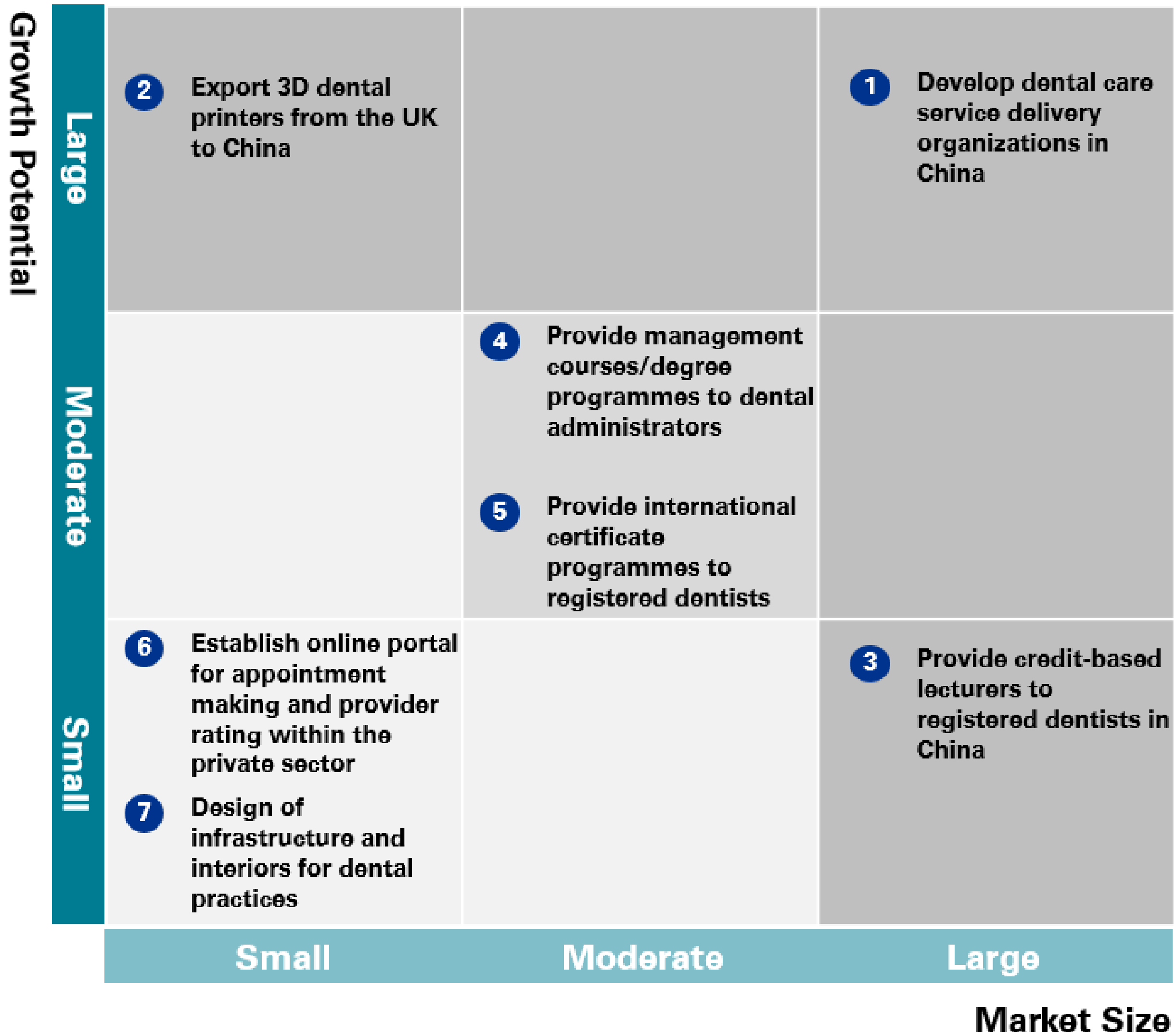
The quality of dental education varies significantly across the country. Dentists may register and practice with various types of degrees ranging from associates (three years) to PhDs (eight years). Dentists with higher education qualifications (masters and above) usually work in public hospitals, which tends to lead to lower quality care in private organisations. However, now it is becoming more common for dentists to work at more than one clinic, and therefore becoming easier for the private sector to attract and retain the better qualified staff.

Despite the challenges, the Chinese dental care market is expected to grow significantly, especially the private sector. Private clinics need to keep improving their services, workforce quality and management in order to establish themselves as leading players in this fiercely competitive market.

Part 1 of this report provides a detailed analysis of the dental care market in China. The strongest commercial opportunities for UK organisations are likely to be:

- Develop dental care service delivery organisations in China
- Exporting 3D dental printers from the UK to China
- Providing credit-based lectures to registered dentists in China
- Providing management courses/degree programmes to dental administrators
- Providing international certificate programmes to registered dentists





Market Size	Growth Potential
Large: over £50 million	Large: over 15% CAGR
Moderate: £1-50 million	Moderate: 5-15% CAGR
Small: less than £1 million	Small: less than 5% CAGR

Figure 1 Evaluation matrix for identified opportunities in the dental care market in China

Part 2 looks at the example of the key province of Guangdong. Part 3 analyses the commercial opportunities, while the remaining parts provide a go-to-market strategy, identify key success factors, analyse the challenges, barriers and risks, and lays out roadmaps for commercial development.

1.Analysis of the dental care market in China

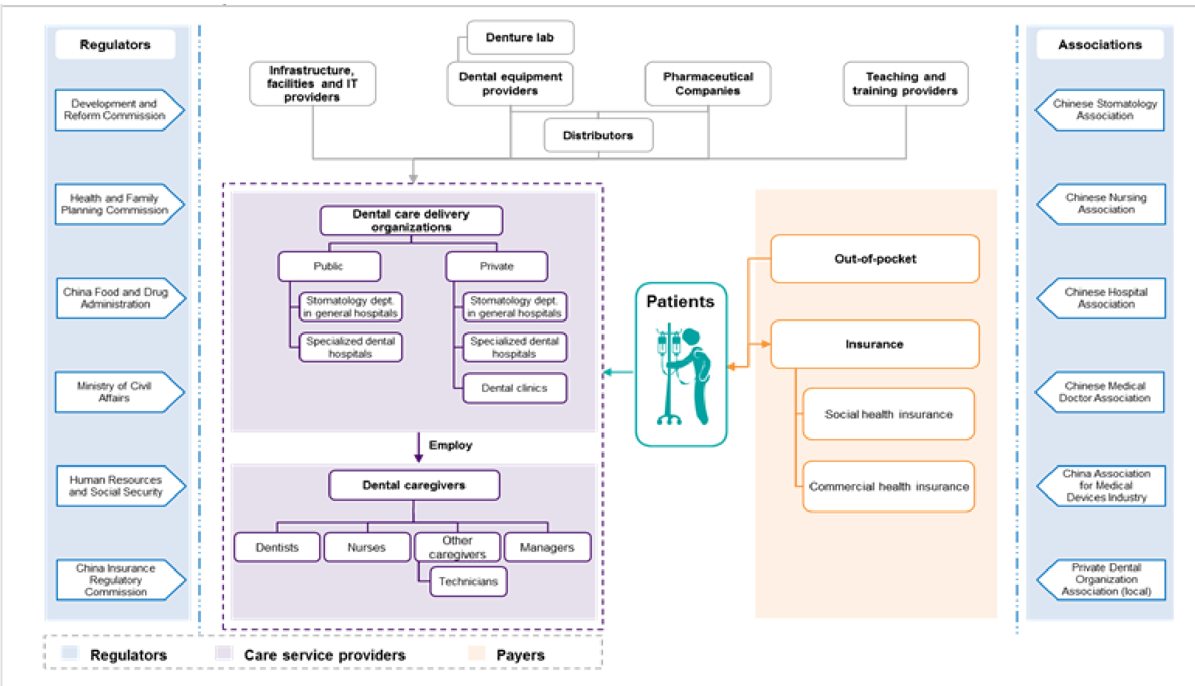


Figure 2 Eco-system of the dental care market in China

Key sectors in the dental care market in China include:

- Dental care services
  Both dental care delivery organisations and the workforce are included in the dental care services sector. The workforce includes dentists, nurses, other care staff (such as dental technicians) and managers, while care delivery organisations are divided into two categories:
  - Public dental care facilities: stomatology departments in general hospitals, as well as specialised dental hospitals
  - Private dental care facilities: stomatology departments in general hospitals, specialised dental hospitals, and stand-alone dental clinics.

- Dental equipment and pharmaceuticals:
  In terms of product categories:
  - Dental device: diagnostic devices, treatment devices and auxiliary devices
  - Dental instrument: intraoral instruments, surgical/implant instruments, orthodontic instruments and prosthetic instruments
  - Dental pharmaceuticals.

  In terms of organisation categories:
  - Manufacturers
  - Vendors
  - Denture providers/laboratories.

- Dental Education:
  - Dental schools: associate (three to four years), bachelor (four years), masters (seven years), PhD (8 years)
  - Nursing schools: associate, bachelor
  - Continuing education: online education, on-site education, forum and lectures.

- Mobile health (M-health):
  - Caregiver toolkits
  - Diagnostic/consultation platform
  - Patient disease management
  - Health IT
  - Online store/distribution platform
  - Media

1.1 Dental care services

1.1.1 Demand and supply

Major dental services include general dentistry, endodontics, periodontics, orthodontics, prosthetic dentistry, dental implants and cosmetic dentistry. Although specialities such as orthodontics and dental implants are relatively new and more expensive for many Chinese people (as they are not covered by social medical insurance), the market has been growing dramatically over the last few years, especially in urban and more developed regions where people have more money and are more willing to pay for these services. For example, orthodontics – previously perceived as being for teenagers – has been growing in popularity among adults in more developed regions in mainland China. A study showed that over the past decade the percentage of adults with improper bites and crooked teeth who have received orthodontic treatments has reached 30%, compared with 10-20% a decade ago. In some of the more developed regions treatment levels are as high as 40-50%. Studies have also shown that the dental implant market, although still in its early phase, has shown dramatic growth over the past few years. Experts believe the dental implant market will become a leading force in the Chinese dental industry in the coming decades.

However, there is still a significant proportion of the population suffering from oral disease who have not received any treatment. As previously discussed, the most recent national survey, conducted in 2005, showed the treatment rate for dental caries and periodontics diseases is as low as 3% while the prevalence was more than 60%. Although education about oral health has improved over the past decade, many people are still not seeking treatment. But it is expected that better education will gradually increase demand for services.

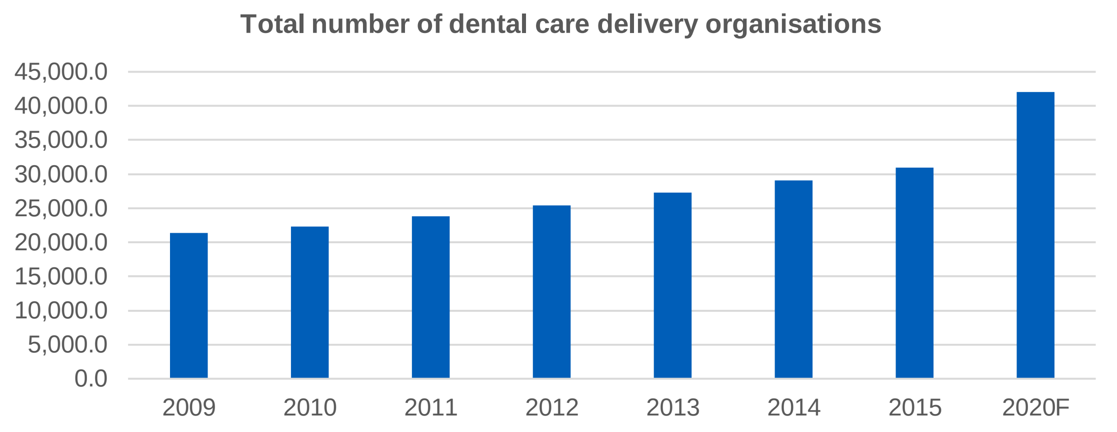


Figure 3 Total number of dental care delivery organisations in China

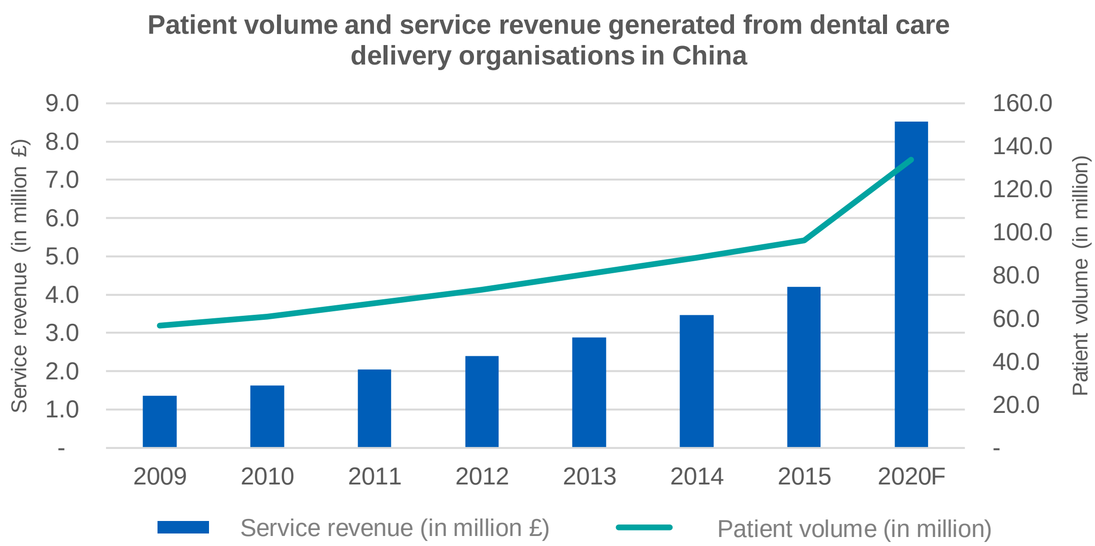


Figure 4 Total patient volume and service revenue generated by dental care delivery organisations in China

Source: *China Health Statistics Yearbook 2015*; KPMG China Analysis

1.1.2 Providers

Providers of dental care services include stomatology departments in general hospitals, specialised stomatology hospitals and stand-alone dental clinics. These hospitals and clinics are publicly or privately owned. Typically, each municipality and most cities have a specialised stomatology hospital, as well as stomatology departments provided by their top ranking general hospitals. Specialised dental hospitals, especially those affiliated to the regional dental schools, play a key role in providing the majority of dental services in the region. Leading specialised dental hospitals include the Stomatology Hospital of Peking University, Hospital of Stomatology of the Chinese Medical University, Wuhan University Stomatology Hospital, Hospital of Stomatology of Sichuan University, and Guanghua Hospital of Stomatology at Sun Yat-sen University. Although most services are still being provided by hospitals and public providers, privately owned clinics have been developing rapidly compared with a decade ago. Dental clinics usually have two to five chairs and are located in residential neighbourhoods with a high population density. Leading chains of dental clinics in China include Arrail Dental Group (which provides high-end services), Jiamei Dental Group (middle to high-end services), Bybo Dental Group and iByer Dental Group.

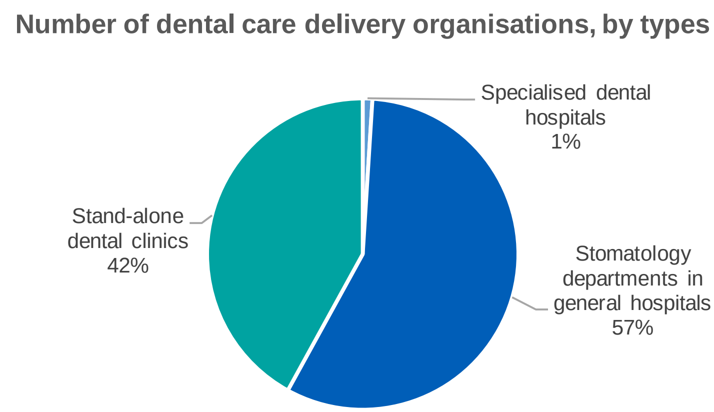


Figure 5 Number of dental care delivery organisations in China, by types

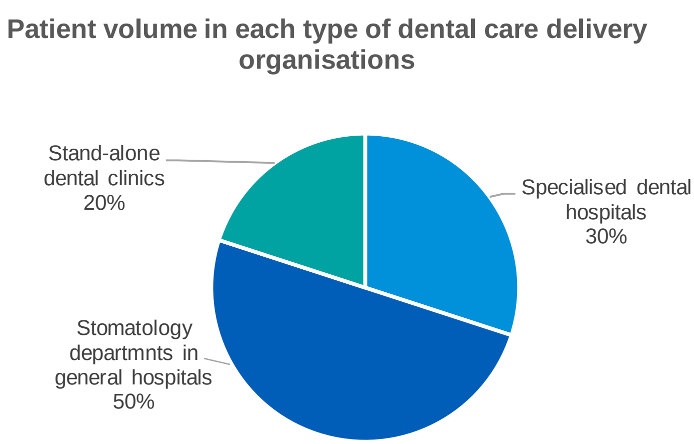


Figure 6 Patient volume in each type of dental care delivery organisations in China

Source: KPMG China Analysis

1.1.3 Workforce

In 2013 there were 130,000 registered dentists. Although the number of dentists for the size of the population is significantly lower than in developed countries, it has been growing in recent years, with a CAGR of 4% from 111,000 in 2010.

But only about 4.6% of registered physicians are dentists, indicating that dentistry is still considered a less attractive specialty for many medical professionals. Reasons include the type of work involved, lower pay, and the extra years of education required for specialties such as orthodontics and dental implants.

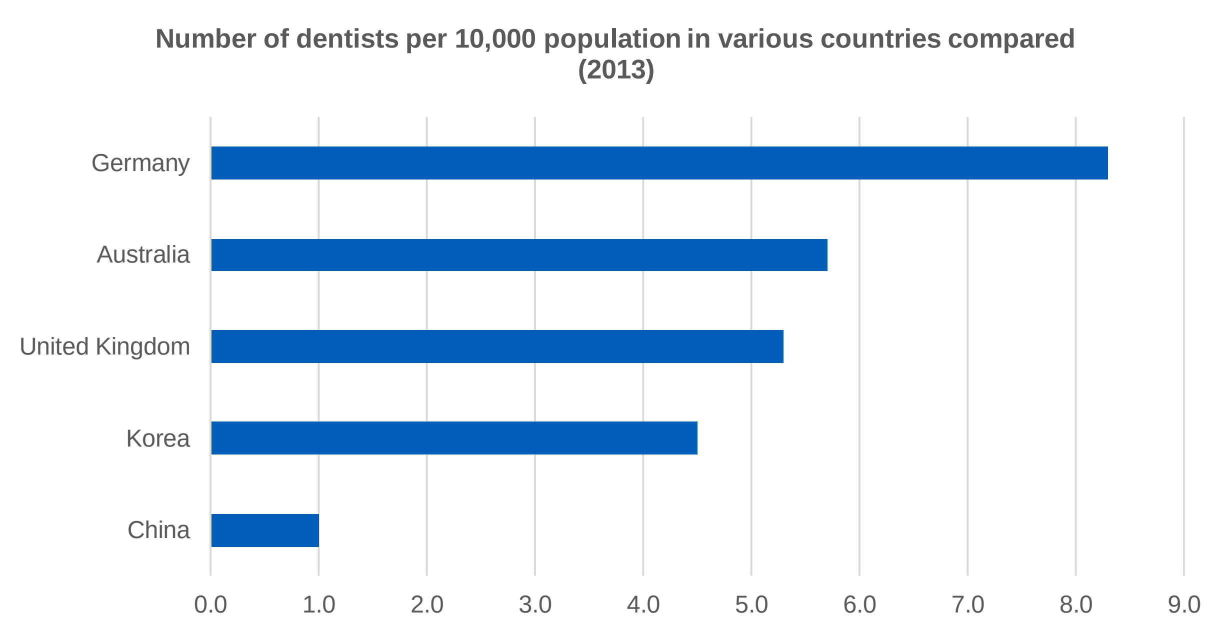


Figure 7 Number of dentists per 1,000 population in various countries compared, 2013

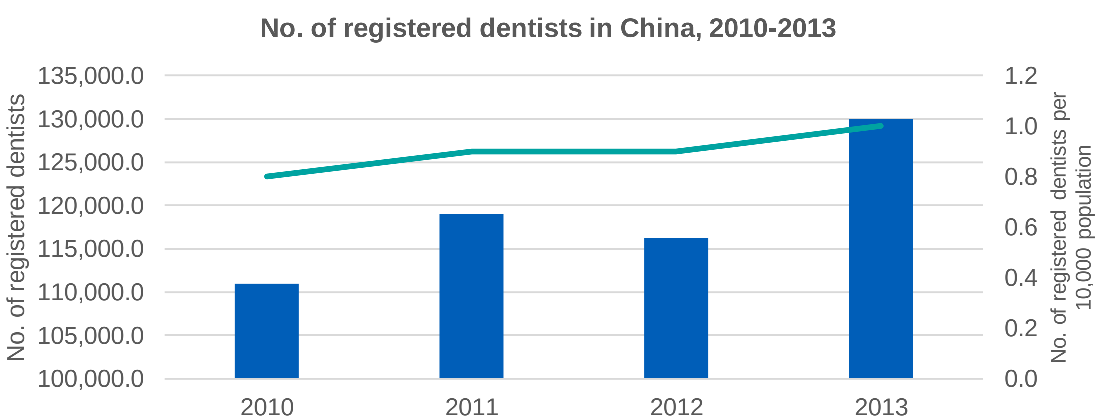


Figure 8 Number of registered dentists in China, 2010-2013

Source: *China Health Statistics Yearbook 2015;* KPMG China Analysis

1.1.4 Payers

Dental services are paid in three ways: social insurance, commercial insurance and out-of-pocket payments. Social insurance covers the most basic care services and treatment in public hospitals. Services that are usually covered by social insurance include dental fillings, odontectomy and basic periodontic treatments. Treatments that require better materials and more advanced skills (such as dental crowns, microscopic root canal surgery, orthodontics, dental implants and dental hygiene) are not included. Some of these services are included in commercial insurance, but the coverage rate is low. So out-of-pocket payments contribute significantly to the dental care market, especially in urban areas, where the demand from patients is greater.

Studies have also found that although procedures such as dental implants are currently not being reimbursed under social or commercial insurance, there are still insurance companies that coordinate with dental implant service providers to provide an implant service plan with a fixed fee (normally around RMB 10,000, or £1,111[1]). Such plans have been gradually penetrating many cities, and interviews with dentists and care providers have revealed that such plans are having a significant effect on the dental implant market. The cost of providing a dental implant service per tooth sometimes exceeds the RMB10,000 plan price. With widespread availability of such plans, patients believe that dental implant services should be as low as RMB10,000, so they avoid going to service providers which do not provide such plans.

1.1.5 Regulators

Regulation of the dental care sector is decentralised and comprises many regulators. The National Health & Family Planning Commission (NHFPC), together with regional HFPCs, is responsible for the establishment and operation of both public and private dental care delivery organisations as well as registration and practice of clinicians (dentists and nurses). The Ministry of Finance is responsible for funding public hospitals (including public dental hospitals), whereas the Ministry of Human Resources and Social Security is responsible for funding social insurance (not including the New Rural Cooperative Medical System, which is funded and regulated by the NHFPC). The China Insurance Regulatory Commission is responsible for regulation of commercial insurance. The Ministry of Commerce is responsible for the entry of foreign-funded dental care organisations.

1.1.6 Market size and growth potential

Studies and data show that there were more than 29,000 dental care delivery organisations in China in 2014, with a total service volume of more than 88 million. Revenue reached more than £3.6 billion, of which £1.8 billion were from the private sector[2]. If the market continues to grow at the current speed it is estimated that in 2020 there will be more than 42,000 organisations (CAGR of 6.6%), with revenue of more than £5.4 billion in the private sector (CAGR of 20.8%).

Studies also revealed that the dental implant care market, although it is still at an early stage, has shown dramatic growth over the past few years. Experts predict that this market will become a leading element in the Chinese dental industry in the coming decades. Estimates show that the current implant market (including planting bodies, crowns and other related procedures) is worth around £171-331 million[3]. However, the major barrier to many patients is the cost. The average cost per implanted tooth is around £2,200 to £3,800 in urban areas, not including many other associated costs that might be incurred, such as imaging. Without insurance cover this is a significant cost for most households.

[1] An exchange rate of £1 to RMB 9 is used in this report
[2] Euromonitor, Report on the China Dental Market, KPMG China Analysis
[3] <The China Dental Market – A rapidly growing blue ocean>, KPMG China Analysis

1.1.7 Competitor analysis

As discussed above, specialist dental hospitals affiliated to dental schools play a dominant role in regions where they have establishment.

Leading specialist dental hospitals are:

Name	Location	No. of chairs	Patient volume (outpatient, annually)
Hospital of Stomatology, PKU	Beijing	569	1,453,000
Hospital of Stomatology, Sichuan University	Chengdu, Sichuan Province	350	750,000
Hospital of Stomatology, The 4th Military Medical University	Xi'an, Shaanxi Province	270	500,000
Hospital of Stomatology, Wuhan University	Wuhan, Hubei Province	450	960,000
Hospital of Stomatology, Jilin University	Changchun, Jilin Province	195	255,550
Guanghua Hospital of Stomatology, Sun Yat-sen University	Guangzhou, Guangdong Province	326	360,000

Table 1 List of leading teaching dental hospitals in China

In addition to the specialised dental hospitals and stomatology departments within general hospitals, the number of privately owned dental hospitals and clinics has been gradually increasing. Private providers consist of multiple small clinics, as well as some chain clinics, with the latter taking a very small percentage of the market. Most dental clinics are owned by dentists who do not practice in public settings (which is one of the requirements of establishment), so they do not have enough capital to develop chain clinics. Leading chain clinics are usually owned by investors or corporate groups, and grow by acquiring small clinics in various cities**.** Leading chain clinics are:

Name	No. of clinics	Locations	Year established	Service type
Arrail Dental Group 瑞尔口腔	65	Beijing, Tianjin, Shanghai, Hangzhou, Guangzhou, Xiamen, Shenzhen, Chengdu, Chongqing	1999	High-end
Jiamei Dental Group 佳美口腔	30	Beijing, Dalian, Shanghai	1993	Middle to high-end
Bybo Dental Group 拜博口腔	200	Beijing, Shanghai, Guangzhou, Shenzhen, Jiangsu, Shandong, Zhejiang, Henan, Hebei, Liaoning, Sichuan, Hubei, Hunan, Fujian, Anhui, Shaanxi, Jiangxi, Chongqing, Heilongjiang, Jilin, Yunan, Guizhou, Hainan, Zhuhai, Dalian, Dongguan, Wenzhou, Jilin, Luoyang	1993	Middle-end

Table 2 List of leading private dental chain clinics in China

1.1.8 Opportunities

It is estimated that demand for dental care treatment will increase significantly in the coming decade. Large demand for treatment, as well as the growing economy, means more care with better services and facilities will be needed, providing opportunities for the private sector. The current private market consists of many small clinics, which offers a big opportunity for major chains with a reputation for quality.

1.2 Dental equipment

1.2.1 Demand and supply

The type of hardware used in the dental care market patient treatment can be categorised into dental equipment and dental instruments. Dental equipment is currently dominated by international brands such as Sirona, Kavo, Yoshida, and Morita, which provide a wide-range of devices ranging from dental chairs to X-ray equipment. Instruments range from needles to dental bone craft materials, with a variety of manufacturers dominating their special areas.

Nowadays most care organisations (except for large dental hospitals and a few stomatology departments in general hospitals) no longer have a denture lab. Once crowns are designed and measured, they are sent to a third-party lab for manufacturing. Third-party denture labs reduce cost by removing the need to directly employ technicians and buy the equipment.

Dental treatment units (also known as “dental chairs”) are the most basic devices needed. Units range in degrees of complexity and comfort, and are usually designed so that a range of functions can be added.

Imaging systems are also needed, such as dental film (dental X-ray), digital panoramic X-ray and cone beam computed tomography (CBCT). Almost all dental practices are equipped with X-ray, but only specialised dental hospitals and some stomatology departments within general hospitals, as well as some dental clinics, are equipped with digital panoramic X-ray machines and CBCTs, which are expensive. The penetration of CBCTs in China is only 25%.

1.2.2 Providers

(1) Dental devices

Sub category	Types of device	Domestic or International	Key providers
Diagnostic	• Digital panoramic X-ray machine • Dental X-ray machine	International	• Sirona • Kavo • Planmeca
Treatment	• Treatment unit • Dental surgical microscopes • CAD-CAM • Root canal equipment • Dental implant equipment	International	• Sirona • Kavo • Leica • A-DEC • Yoshida • Morita • 3M
Auxiliary	• Dental Sterilisation	International	• Tuttnauer • MELAG • EURONDA

Table 3 List of key providers of the various dental device sub-categories in China

(2) Dental instrument

Sub category	Types of device used in China	Domestic or International	Key providers
Intra-oral	• Root canal system • Pit and fissure sealant • Periodontal hygiene system	International	• Dentsply • 3M
Surgical	• Dental implants • Abutment • Implant system	International	• Nobel • BICON • Camlog • Ankylos
Prosthetic	• Direct prosthetic system • Indirect prosthetic system	International	• Dentsply
Orthodontic	• Orthodontic system	International	• Nobel • ITI • OSSTEM

Table 4 List of key providers of various dental instrument sub-categories in China

(1) Denture providers/labs:

There are currently 1,670 denture providers in China. The 10 provinces and cities with the largest number are:

1) Guangdong: 224
2) Shandong: 112
3) Shanghai: 103
4) Zhejiang: 94
5) Beijing: 85
6) Jiangsu: 82
7) Fujian: 78
8) Henan: 71
9) Liaoning: 67
10) Guangxi: 66

Almost all the denture providers are domestically owned. They are more popular than foreign brands due to lower cost, quicker turnaround time and good quality.

Most dentures and crowns are currently made manually. However, there are a few high-end denture labs using 3D printing. 3D dental printing was introduced a few years ago and has become a hot topic. In January 2016 the first dental crown printed by 3D printer, using a material called MFH, was fitted. Compared with manual manufacturing, this technology provides more precise measurements of the patient's requirements by using a 3D scan and CAD/CAM design before printing. In the future 3D dental printing is expected to be used widely as the technology advances, especially in areas such as orthodontics, dental implants and prosthetics. However, demand is currently low because the cost is high and people are unsure of the new technology.

1.2.3 Regulators

Medical equipment has strict requirements in China. It has to go through complex and time-consuming registration processes before it is licenced for sale, especially when it comes from a foreign manufacturer. The major dental equipment industry regulator is the China Food & Drug Administration (CFDA), which is responsible for registration and licences. For foreign manufacturers of dental devices, usually one to two years is needed for registration approval before sales. Different documents and processes are required depending on the types of device. Clinical trials in China may be needed for equipment which could pose a risk (such as radiation) before approval.

1.2.4 Market size and growth potential

The size of the overall dental equipment market is estimated to have reached £1.5 billion in 2015, and is expected to grow to more than £4.5 billion in 2020, with a CAGR of 24.3%[4]. The rapid increase is due primarily to the massive growth in the number of dental care organisations in mainland China.

According to a SmarTech report, the size of the global 3D dental printing market in 2014 was £0.8 billion, and was expected to reach £2.4 billion by 2020 (CAGR of 19%). According to studies found by PRNewstime the current 3D printing market in China accounts for 17.6% of the world market, so it is estimated that the current 3D dental printing market in China was worth approximately £141 million in 2014 and will reach £414 million by 2020.

1.2.5 Competitor analysis

Competition in the dental equipment market in China is intense. Leading foreign brands entered the country decades ago and have formed a stable base for competition in the dental device sector.

However, potential for new entrants in the dental instrument sector remains, especially for dental implants, which is a relatively new market in China. The current dental implant instrument sector is dominated by the leading international providers including Nobel, Biocare, Straumann, Dentsply, Fraiadent, Biomet, ITI, Zimmer

[4] China Association for Medical Device Industry, KPMG China Analysis

and OSSTEM, which jointly account for 90% of the market share. The remaining 10% consists of players such as the CDIC dental implant system from the West China School of Stomatology.

In interviews, specialists in the dental implant sector said that although the leading providers currently dominate, they believe new entrants with lower prices will have a chance to win market share.

1.2.6 Opportunities

Opportunities for future dental equipment players may include:

- **Export dental instruments from the UK to China :**
  The dental device market has been dominated by the key brands, but the major providers of dental instruments are less dominant.
- **Export 3D dental printers from the UK to China**
  Dentures and crowns are currently being manufactured by hand in China. However, technology such as 3D printing has allowed denture labs to automate design and manufacture of crowns, alongside other technologies such as oral scanning and CAD/CAM design. Such technology will allow denture labs to further improve their efficiency and product quality.

1.3 Dental education

1.3.1 Demand and supply

Dental education consists mainly of dental schools, which provide degrees for those interested in a dentistry career as well as continuing education for registered dentists. There are also foreign exchange programmes for Chinese dentists who want to secure training and experience abroad. More than 5,200 dental school students graduated in 2014, and this is expected to grow at 4% a year, reaching more than 6,600 in 2020. Dental degrees are exclusively provided by public institutions funded by the government, and students pay low tuition fees.

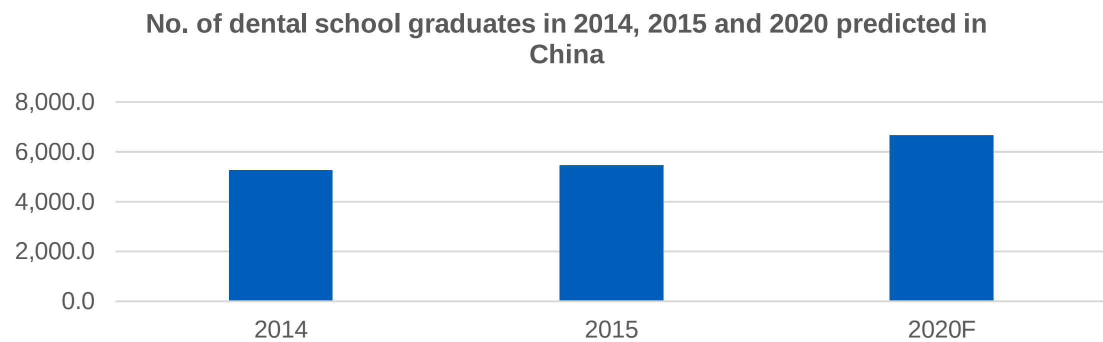


Figure 9 Number of dental school graduates in 2014, 2015 and 2020 predicted in China

Source: KPMG China Analysis

Continuing education plays a key role in the dental education sector in China. All registered dentists need to participate in continuing education courses (either virtually or face-to-face) to earn credits and maintain their licence status. There are more than 140,000 currently registered dentists in China[5], and each is required to take no less than 25 credits per year (each credit is worth around £22). It is therefore estimated that the dental continuing education market was worth more than £78 million in 2015. Dental continuing education is regulated by the two major professional associations, the Chinese Stomatology Association and the Chinese Medical Doctor Association. They are responsible for approving each provider to deliver relevant courses. Major providers include dental schools and hospitals, and they are usually sponsored by equipment/device manufacturers.

Tuition fees for continuing education courses are either paid by the dentists themselves or reimbursed by their employer. Most public employers (public hospitals) reimburse some portion of their employees' continuing

[5] China Health Statistics Yearbook 2015, KPMG China Analysis

education costs, with reimbursement caps and allowances. Continuing education serves as a key part of dental education, not only as a way to improve dentists' skills and techniques but also by promoting the use of new products and brands.

1.3.2 Types of education and major providers

Dental education is primarily provided by higher institutions, although some professional schools of associate level degrees still exist in less developed regions. The majority of hospitals in urban areas now require their dentists to hold at least a bachelor degree, while some major hospitals in large cities (such as 3A hospitals in Beijing and Shanghai) require at least a master's degree from one of the top dental schools in China.

- Bachelor's degrees in dentistry in China are four-year programmes provided by universities and dental schools.
- Master's degrees are either seven-year programmes provided by universities and dental schools for high school graduates, or two-year programmes provided by universities, dental school and teaching hospitals for people who have a bachelor degree in dentistry.
- Doctor's degrees in dentistry are either eight-year programmes provided by universities and dental schools for high school graduates, or two- to four-year programmes provided by universities, dental schools and teaching hospitals for those with bachelor's and master's degree in dentistry. Graduates with doctor's degrees will be able to practise in a specialty such as orthodontics.

According to the National Health & Family Planning Commission in 2012, nearly 47% of registered dentists hold a professional degree of bachelor's level and above. The remaining 53% mostly work in less developed regions and private clinics. Nowadays urban hospitals have higher requirements on the level of degree. Dentists in public hospitals need to go through a promotion system, in which the degree is one of the requirements. Most dentists practising in private clinics (if not registered elsewhere at a public hospital) are not eligible for professional promotion, making these clinics less attractive to doctors with higher degrees.

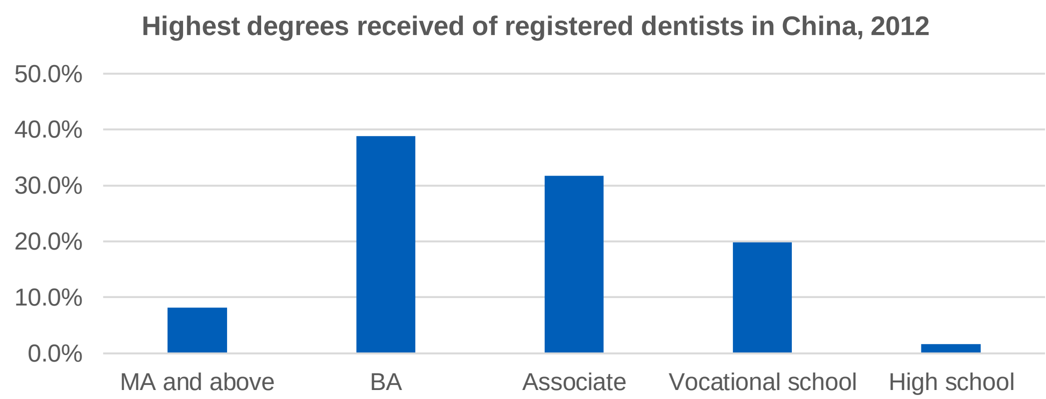


Figure 10 Distribution of highest degrees received of the registered dentists in China, 2012

Source: *China Health Statistics Yearbook 2015;* KPMG China Analysis

In terms of the requirement to participate in continuing education to maintain their licence and be promoted, dentists need to earn no less than 25 credits annually, within which 5-10 are type I credits, and 15-20 are type II credits. Credits are earned by participating in all kinds of continuing education classes and activities, which are provided/managed by either the Chinese Stomatology Association, Chinese Medical Doctor Association (and their associated provincial/city level associations), dental institutions/hospitals or online providers. Lessons are either taught in classrooms or online. Online providers include Dingxiangyuan and Haoyisheng, which are leading online platforms for both doctors and dentists.

Those who are interested in providing continuing courses for dentists need to apply through either the Chinese Stomatology Association or the Chinese Medical Doctor Association.

Steps of application are:
1) Complete the application forms and submit them to the Department of Continuing Education in the designated association
2) The association reviews the course and decides if revisions are needed.
3) The association publishes the outcome of the review online.

Requirements of the course application:
1) Application time: 15 April to 5 May annually
2) Courses need to include new theories, technologies and methods in modern dentistry, with a particular focus on the specialty selected
3) The person in charge of the course needs to be at least an associate chief physician (or equivalent), who is also working in a specialty matching the course content. The responsible person also needs to be one of the instructors
4) The responsible person can only apply for up to two courses within one association annually
5) Each course programme should host no more than six classes annually.

Other types of dental education providers include international exchange programmes and international testing counsellors.

International exchange programmes are provided by organisations that work with regional governments, dental organisations or dentists directly to provide international training/fellowship programmes (typically three to six months, and up to a year). Destinations are dental hospitals, education institutions or labs in overseas countries. As one of the preferred (but optional) requirements for promotion, international working and studying experiences are popular among urban dentists. Popular countries include the USA, UK, Japan and Germany.

Another type of international cooperation in dental education is when international dental institutions partner with a local school or organisation to provide training programmes for China registered dentists in specialties such as dental implants or orthodontics. Such international exchange programmes started to appear a few years ago, and are more popular among dentists practising in the private sector because of their high tuition fees (normally more than £11,130 per year).

International testing counsellors are organisations that assist dentists with professional degrees and practising licences in China who want to practise dentistry in other countries. Chinese licences are generally not directly accepted by foreign countries, so dentists need take local tests and go through various processes set by different countries. These counsellor organisations act as the intermediates to help those dentists with detailed instructions, courses and foreign contacts, to ensure that they can eventually obtain a foreign licence to practise.

1.3.3 Providers

Leading providers of degree-level professional dental educations include:

Name	Location	Year established	Types of degree offered
Sichuan University, West China School of Stomatology	Chengdu, Sichuan Province	1917	Bachelor (4-years); Master (5-years or 7-years) PhD (8 years) International students
Peking University School of Stomatology	Beijing	1941	Master (2 years after receiving a bachelor degree) PhD (8-years) International students
Wuhan University School of Stomatology	Wuhan, Hubei Province	1960	Bachelor (5-years) Master (7-years, or 2 years after receiving a bachelor degree) PhD (8 years) International students

Shanghai Jiaotong University School of Stomatology	Shanghai	1932	Master (7-years) International students
The Fourth Military Medical University School of Stomatology	Xi'an, Shaanxi province	1935	Bachelor (5-years) PhD (8-years)
Nanjing University School of Stomatology	Nanjing, Jiangsu Province	1935	Master (7-years)
Sun Yat-sen University, School of Stomatology	Guangzhou, Guangdong Province	1974	Bachelor (5-years) Master (7-years) PhD (8-years)
Shandong University School of Stomatology	Jinan, Shandong Province	1977	Bachelor (5-years) Master (7-years)
Capital Medical University School of Stomatology	Beijing	1982	Bachelor (5-years) Master (7-years)
Harbin Medical University School of Stomatology	Harbin, Heilongjiang Province	1999	Associate (4-years) Bachelor (5-years) Master (7-years)

Table 5 List of leading dental schools in China

Leading providers of continuing education include dental education institutions such as PKU School of Stomatology, Sichuan University West China School of Stomatology and the Guanghua School of Stomatology at Sun Yat-sen University.

Online providers such as Dingxiangyuan and Haoyisheng provide virtual classes, but not all online courses have authorised credits. Major hospitals also host their own classes, with credits offered, for the convenience of their staff.

There have not been many international dental programmes in China, but a few have succeeded. One example is Case Western Reserve:

Programme Name:	Case Western Reserve International Orthodontics Master Programme
Year entered China:	2013
Programme length:	1 year
Course plan:	• Required: 1 week of lecture every 1~2 month (in China) for 5 weeks; • Required: 1 week of lecture in Taiwan; • Optional: 1 month of lecture in the USA (on campus at Case Western Reserve)
Specialty:	Orthodontics
Course content:	Diagnosis, and advanced techniques commonly used in orthodontics
Application requirement:	• Associate level or above, in dentistry; **or** Vocational school graduates in the specialty of dentistry with 10+ years of clinical experiences. • Applicants have previously provided orthodontic services
Tuition fee	• £7,811 (for lectures in China and Taiwan) • $10,458 (for lectures in the USA)
No. of enrolees:	• 11-15 students per year

Table 6 Introduction to the international dentist certificate programmes provided by Case Western University, USA

1.3.4 Payers

Students normally pay for professional dental education directly. Most of the dental schools are public so tuition fees are low, ranging from £535 to £1,712 per year.

Different from professional dental education, continuing education is paid by either the employer, equipment manufacturers or the dentists themselves. According to interviews, most dentists working in public hospitals prefer to attend classes that are either hosted by their employer (free of charge) or classes sponsored by equipment manufacturers. They are less likely to pay for classes hosted by other organisations because:

(1) Their employer hosts many classes throughout the year so it is easier for them to fulfil the 25 credits requirement

(2) Classes hosted by outside organisations are expensive

(3) Dentists working in public hospitals have fewer incentives to learn new techniques and improve their skills because they are overloaded with patients. Dentists working in the private sector, however, have more incentives to pay out-of-pocket for outside classes because they need to learn new techniques to attract patients.

1.3.5 Regulators

Dental schools in China are regulated by the Ministry of Education, whereas continuing education providers are regulated by associations such as the Chinese Stomatology Association and Chinese Medical Doctor Association, as well as the National Health & Family Planning Commission.

1.3.6 Market size and growth potential

As previously mentioned, the market for continuing education (with credits offered) is expected to have reached £78 million in 2015. Judging by the current growth rate of the number of registered dentists (4% annually), the continuing dental education market is expected to reach £95 million in 2020.

There were about 5,200 dental school graduates in 2014, among which 2,000 hold a bachelor degree. These graduates are the major target for international certificate programmes. It is therefore estimated that, assuming 5% of bachelor degree holders wish to undertake further study programmes abroad, the total market size for international dentistry programmes will reach £2 million by 2020.

1.3.7 Competitor analysis

Competition in dental education varies significantly across different course types. Degree-level education has less competition and is relatively stable because all schools are publicly owned and operated. This is a difficult market for private and foreign players to enter.

The continuing education sector is more competitive. Although dominated by dental institutions and hospitals, entrants can still attract enrolees if courses can satisfy the market's needs or if they cooperate with a public institution or hospital. Foreign institutions and providers in China have cooperated with local providers to deliver lessons jointly, albeit with higher tuition fees than local courses. However, as the private dental sector in China develops, more dentists in the private sector will have higher needs and better capacity to pay out-of-pocket for such advanced lessons. This demonstrates potential for entrants and foreign players in the continuing education sector.

Competition within dental exchange programmes is gradually increasing, but has not reached an intense level, primarily due to the low demand. Most dentists working in the public sector have less incentive to study abroad or participate in an international course because of the high costs, which are not entirely reimbursed by their employer. International programmes tend to be aimed at dentists working in the private sector who need to improve their skills, reputation, degree of education and experience in order to attract more patients. Another reason why private sector dentists are the primary audience is that they tend to have a lower level of dental education compared with those in public hospitals. They have realised the importance of improving their education in order to improve their service quality and attract more patients. So providers of such international programmes must target dentists working in the private sector.

1.3.8 Opportunities

Potential opportunities in the dental education market are:

- **Provide credit-based lectures to registered dentists in China**
  Since dentists are required to fulfil 25 credits annually, the market is relatively large, with the number of dentists expected to rise in the coming decade. Foreign course providers could partner with a local institution or hospital when providing the lectures. To attract dentists to pay for such courses, providers need to consider the strengths of the dental market in their home country (new skills, techniques, products or management).
- **Provide management courses/degree programs to dental administrators**
  A specialty area that UK providers could focus on is management courses for private dental owners. Dental clinics are primarily owned and operated by practising dentists, who have little or no knowledge or experience of managing an independent practice. This area is well-developed in the UK, providing the potential for courses in healthcare management, including skills such as accounting, operations management, interpersonal communication and marketing.
- **Provide international certificate programmes to registered dentists**
  Similar to the programme offered by Case Western Reserve, foreign dental institutions could enter the China market by developing international certificate programmes for current dentists. Such programmes will focus on a specialty, and invite foreign professors to deliver lectures. Currently, 91.1% of registered dentists hold a bachelor degree or lower qualification, of which 57.8% do not have a bachelor level degree in dentistry. This 91.1% of dentists are the major target for such international certificate programmes because a significant proportion of them work in private practice and have a strong need to improve their reputation and education. A certificate needs to be offered at the end of the programme, which is the major incentive for many participants. If degrees (such as a master's degree) could be offered, more dentists holding bachelor degrees or below would be willing to participate. However, such degrees need to be authorised by the Ministry of Education.

1.4 Mobile health

1.4.1 Demand and supply

Mobile health – m-health – has started to develop in the China dental market and become popular only in the last one or two years. Primary products include HIT systems used in dental practices (such as PACS imaging systems and outpatient workstations), which have been widely used in most public hospitals. Private dental clinics, on the other hand, currently show less demand for HIT systems because of their smaller scale. Other products such as mobile apps and online portals have only started to develop within the last couple of years. This indicates strong potential for development of m-health in China.

The majority of healthcare-related Apps available in China are focusing on hospital patients and those suffering from chronic diseases. Online booking and rating portals have becoming very popular during the past few years in China. For the majority of clinical specialties, patients can go online to search for highly skilled doctors and hospitals, and manage to make appointments directly online. However, such portals are currently not available to the private dental care sector. Patients are not able to view ratings and descriptions of dental caregivers and providers, hence will tend to rely on recommendations from friends when deciding which dental practice to visit.

1.4.2 Key Stakeholders and competitor analysis

Types of m-health applied in dental industry and major providers:

Category	Content	Domestic players	Foreign players
Caregiver toolkit	Medical information browsing	• DXY (丁香园) • Xingshulin (杏树林) • Bioon (生物谷) • GBi Source (集博) • Yayou (牙友) • MedLive(医脉通) • MedSci (梅斯医学)	NA
	Patient management	N/A	N/A
	EHR database	N/A	N/A
	Caregiver communication	• DXY (丁香园)	N/A
Diagnostic/ consultation platform	Patient self-diagnostic/patient communication	• Dr Chunyu (春雨医生) • Kanchufang (杏仁医生) • 9yibao (就医宝) • Zxbas.cn (牙友网) • Zhangwojiankang (掌握健康)	N/A
	Online doctor consultation	• Haodaifu (好大夫) • UYa (优牙) • QPG Jiankang (青苹果健康) • 120ask （快速问医生） • Zhangshanghaoyi (掌上好医)	N/A
	Doctor/hospital rating	• Haodaifu （好大夫） • Dianping (大众点评) • The care voice (康语) • Dayayi.com（大牙网）	N/A
	Online appointment	• Haodaifu（好大夫） • Liaoya (獠牙) • Guahao.com（微医） • Baidu Doctor（百度医生） • 91160 (就医 160) • Wechat（微信）	N/A
Patient disease management	Data monitor/collection	• Kang (康康血压) • 37mhealth（37 健康） • Weitang（微糖） • Yuetang（悦糖）	• iHealth
HIT	HIS	• Donghua（东华软件） • Neusoft（东软集团） • PKU-HIT（北大医信） • Mediinfo（联众）	N/A
Online store/distributor	Pharmacy	• Taobao（淘宝） • JD（京东） • 111.com（1 药网）	N/A
	Device/ instrument	• 51aiyaku（爱牙库） • Dayayi.com（大牙网）	N/A
Media		• Jiankangjie（健康界） • VCBeat（动脉网） • Kq133.com (康强网) • Kqzx.net (口腔在线)	N/A

Table 7 List of key players within various sub-categories of dental m-health in China

It is clear from Table 7 that most m-health providers are domestic players; very few foreign brands have established themselves in the market. However, most players are involved in the wider healthcare industry, with only a few specifically targeting at the dental care sector. Similar to the overall IT sector, providers of the dental mHealth sector consist of numerous individual companies, each focusing on different aspects or functions, instead of a comprehensive or integrated large provider existing in the market. This indicates potential opportunities for foreign players with comprehensive and integrated mHealth solutions.

1.4.3 Opportunities

Opportunities in the m-health sector are:

- **Establish online portal for appointment making and provider rating within private sector**
  The private dental providers are relatively decentralised and currently there is no portal that could include the majority of private dental providers (by region). The end-users of this portal are patients who seek dental services in the private sector. Patients could view the available dentists in their designated community and select their preferred dentists or providers by ratings and reviews, as well as dentists' specialties and availability. Appointments could be made directly through the portal, and patients would receive confirmation and reminders through the portal from their provider.
- **Establish online referral and communication portal for dentists worldwide**
  Dentists working in foreign countries often encounter patients who had treatment in China, or will travel to China and are looking for a qualified Chinese provider. Similarly, many Chinese patients need to find a dentist in a foreign country to which they are moving (such as students studying abroad). Such a portal would allow participating dentists to communicate about patients' needs and refer patients to a qualified dentist in the foreign country.

1.5 Infrastructure services

1.5.1 Demand and supply

As mentioned in section 1.1.2 of this report, 57% of the dental care providers are Stomatology departments in general hospitals where infrastructure services are mainly provided by the support departments in those general hospitals. 42% of the dental care providers are stand-alone dental clinics with relatively small capacity and no inpatient ward. There is not a strong demand for infrastructure services at the moment.

1.5.2 Key stakeholders

There are very few companies providing infrastructure (design) services specifically for the dental sector in China. Those existing in the market are serving both clinics and hospitals. The following two companies are identified:

Providers	Services
JSDJ Design 极顶雅高设计	• Hospital design for general, specialized and TCM hospitals • Clinic design for plastic surgery, dental and TCM clinics
Zhong Huan Yi Gao 中寰艺高	• Design and contractor services for hospitals and clinics

Table 8 Key providers of dental clinic designing services

1.5.3 Opportunities

Opportunities in the dental infrastructure sector are primarily in the internal design industry. In the coming decade new facilities will be built as the number of private dental practices increases. Currently there are hardly any companies specializing in design services for dental providers. However, specialist design is needed because requirements such as floor tiles and chair allocations are unique to dental practices. General designers do not have the necessary expertise.

2. The dental market in Guangdong

2.1 Dental care service

2.1.1 Market overview

Guangdong is one of the few provinces that introduced the private sector into healthcare at a very early stage. Patients in Guangdong have a higher preference for private sector facilities. Privately owned businesses (especially small to medium enterprises) were developed early in Guangdong across all industries, so people are less reluctant to accept private dental care when deciding where to go for treatment.

There were approximately 650 stand-alone dental clinics, six specialised dental hospitals and 47 general hospitals providing dental services via their stomatology departments in Guangzhou in 2015. Compared to other cities, Guangzhou has relatively high public provision of dental services because of the dental school at Sun Yat-sen University. Unlike Guangzhou, Shenzhen has only two specialized dental hospitals (both private), 17 general hospitals with stomatology departments, and approximately 1,200 stand-alone dental clinics. This indicates that for cities such as Shenzhen, with fewer public medical resources and a higher capacity to pay compared with many other cities, the private dental sector has gradually gained a significant market share.

2.1.2 Demand and supply

Similar to the national picture, dental services are provided by stomatology departments in general hospitals, specialised dental hospitals and stand-alone dental clinics. Within the province, there are 158 general hospitals providing stomatology departments, 14 specialised hospitals (12 public and 2 private) and more than 4,000 stand-alone dental clinics. A rough estimate is that there are more than 14,000 dental chairs in the province, nearly 1.3 dental chairs per 10,000 population.

	Stomatology Department in General Hospital	Specialised dental hospitals (public)	Specialised dental hospitals (private)	Stand-alone dental clinics
TOTAL	158	12	2	4,074
Guangzhou	47	6	-	650
Foshan	20	1	-	137
Shenzhen	17	-	-	1,200
Dongguan	17	-	1	280
Zhuhai	7	1	-	70
Huizhou	6	1	1	83
Zhanjiang	5	-	-	266
Shantou	5	-	-	197
Zhongshan	5	-	-	89
Jiangmen	4	1	-	136
Maoming	3	-	-	228
Yangjiang	3	-	-	98
Heyuan	3	-	-	55
Qingyuan	2	-	-	139
Shanwei	2	-	-	117
Yunfu	2	-	-	83
Shaoguan	2	1	-	68
Chaozhou	2	-	-	65
Meizhou	2	-	-	51
Jieyang	2	-	-	40
Zhaoqing	2	1	-	22

Table 9 Number of dental care delivery organisations in Guangdong province in China

Source: *Municipal HFPC 2015;* KPMG China Analysis

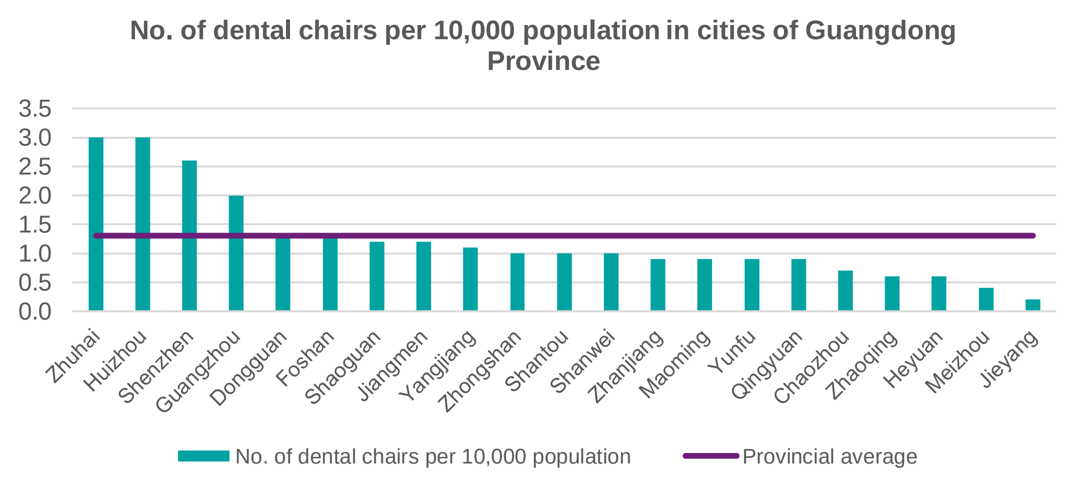


Figure 11 Number of dental chairs per 10,000 population in cities of Guangdong Province in China

Source: *Municipal HFPC 2015;* KPMG China Analysis

It is seen in Figure 11 that there are only four cities within Guangdong Province (Zhuhai, Huizhou, Shenzhen and Guangzhou) which have exceeded the provincial average in the number of dental chairs. This indicates that although Guangdong Province is one of the leading regions in China in terms of economic development, its residents still need more dental resources.

Similar to the pattern seen across the country, dental teaching hospitals affiliated to the dental schools are the leading provider of public dental services within Guangdong in terms of techniques, service volume, quality and capacity. In cities that do not have a specialised dental hospital, general hospitals provide most services. However, due to the early development of the private dental sector, private clinics play a more important role compared with other provinces. The chart below shows that Guangzhou and Shenzhen have considerably more private dental resources compared with other cities in China (Beijing and Shanghai were not selected for benchmarking because of their over-concentrated public provision of dental care).

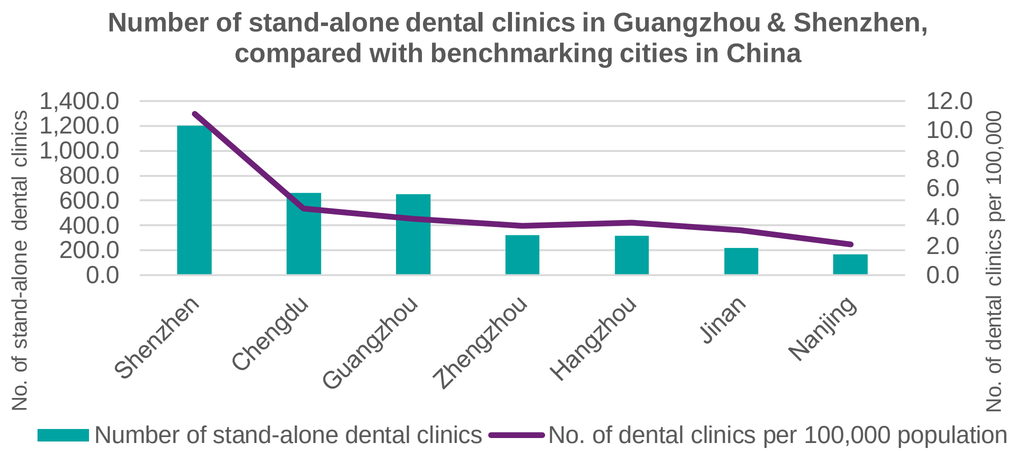


Figure 12 Number of stand-alone dental clinics in Guangzhou & Shenzhen, compared with other benchmarking cities in China

Source: *Municipal HFPC 2015;* KPMG China Analysis

The prevalence of dental-related diseases in Guangdong Province is relatively high. According to the most recent study, the prevalence of dental caries is 68.0%, 32.9%, 90.0% and 64.3% in age groups of 5 year-olds, 12 year-olds, 35-44 years-olds and 65-74 years-olds respectively. Apart from the 65-74 age group, all of the remaining age groups in Guangdong have a higher prevalence of dental caries than the national average. This indicates that there is a relatively high demand for dental services in Guangdong Province.

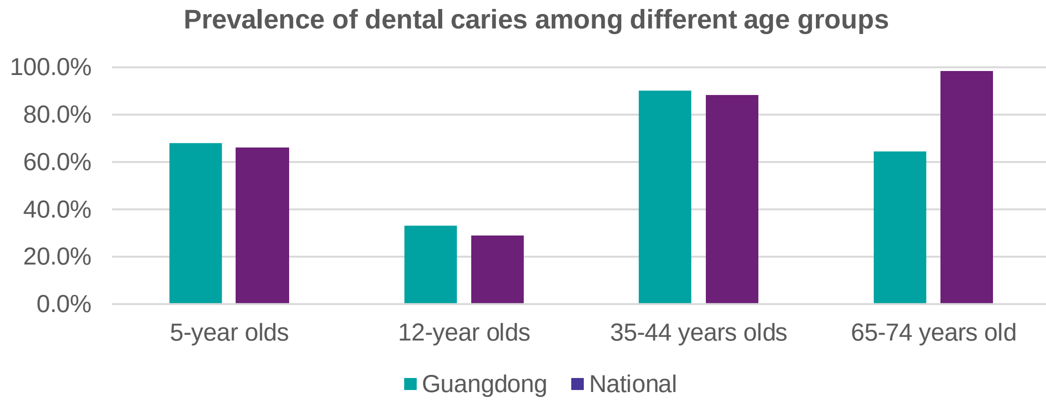


Figure 13 Prevalence of dental caries among different age groups in Guangdong, compared with National average

2.1.3 Workforce

According to the latest statistics there were 11,488 registered dentists in Guangdong Province in 2013, or 1.08 dentists per 10,000 population. This was 13.7% higher than the national figure (0.95 per 10,000 population). In addition, the number of dentists within Guangdong Province accounted for 5.5% of the total registered physicians, which was 19.6% higher than the national average (4.6% of total registered physicians were dentists). This indicates that, compared with the national picture, there are more dental staff in Guangdong Province and there is a greater willingness to become a dentist.

	Guangdong	China
Registered dentists	11,488	129,504.0
Registered dentists per 10,000 population	1.08	0.95
Total number of registered physicians	210,306	2,794,754
Percentage of dentists among total physicians	5.5%	4.6%

Table 10 Number of workforce in Guangdong compared to China

Source: *China Health & Family Planning Statistics Yearbook 2014*

2.1.4 Regulators

The major regulator of dental care services in Guangdong is the Guangdong Health & Family Planning Commission, which is responsible for approving the setting up and running of dental care organisations. All joint-venture dental care organisations need to be approved by and registered with the provincial HFPC. It currently takes around 6 to 12 months for the HFPC to approve the establishment and operating licenses of a new dental care organisation.

There are other regulators associated with dental care organisations, which are listed in Table 11, along with their responsibilities:

Regulators	Responsibilities
Guangdong provincial Health & Family Planning Commission (HFPC)	• Establish & operation approval (licences) • Establish guidelines and plans for development within the province • Control of New Rural Cooperative Medical Insurance
Guangdong provincial Social Security and Human Resource Commission	• Control of Urban Residents/Employee Medical Insurance
Municipal and district level HFPCs	• Establish regional plans for development • Monitor care quality • Oversee and control medical waste
Municipal and district level Environmental Protection Commission	• Approval of radiation equipment (Dental X-rays)

Table 11 List of major regulators for dental services in Guangdong

2.2 Dental education

2.2.1 Demand and supply

There are currently six higher institutions within Guangdong Province, which provide degree level professional dentistry education:

- Guanghua School of Stomatology, Sun Yat-sen University (30 seven-year Master degree students and 50 five-year Bachelor degree students admitted annually)
- Southern Medical University
- School of Stomatology, Guangzhou Medical University
- Guangdong Medical University
- Medical College of Shaoguan University (Associate level degree)
- Zhaoqing Medical College (Associate level degree)

Like other provinces, all registered dentists in Guangdong need to earn 25 credits annually to maintain their licence. Major providers of continuing dental education in Guangdong are the dental schools and the teaching hospitals affiliated to these schools. Similarly, providers of provincial level (courses open to all dentists within the province) credit-based lectures in dentistry need to register with the Guangdong Medical Association (rather than the Guangdong Stomatology Association) at the designated time in order to get accreditation. Some of the municipal level (courses open to dentists within the city) credit-based lectures could be registered and approved by the municipal level authority. The price charged per credit for courses in Guangdong is about the same as the national average.

Southern Medical University provides various management courses for medical professionals who are interested in developing their managerial skills. They are working with Florida International University to run an MBA programme with a focus on health policy and management. There are currently no other schools in the province that provide similar programmes, indicating a potential market for foreign players.

2.2.2 Market size and growth potential

The dental continuing education (credit-based) market in Guangdong Province is worth nearly £5.9 million (There are currently 11,488 dentists registered[6], and each is required to earn no less than 25 credits per year). If the number of dentists in continues to grow at the current rate (10.3% in 2013), it is predicted that the size of dental continuing education market will have doubled to nearly £11.8 million by 2020.

According to the NHFPC statistics, 91% of dentists working in the province have qualifications of bachelor degree level or below. This means there are more than 10,400 dentists in Guangdong Province who are potential customers for degree or certificate level continuing education (such as international certificate programmes for existing dentists).

Since the percentage of privately owned dental clinics is much higher than the national average, there are more potential buyers of management-related degree programmes or courses

2.2.3 Conclusion

Overall, the potential size of the dental education market in Guangdong Province is relatively large. The province has a relatively large number of registered dentists compared with many other provinces, and a higher percentage of them work in the private sector, while most of them hold qualifications of bachelor degree level or below. This means there is a high need to improve their education and managerial skills by participating in degree or certificate level programmes.

[6] Guangdong Health Statistics Yearbook 2015, KPMG China Analysis

2.3 Dental equipment

Like the rest of the country, most dental equipment and devices used by dental hospitals and clinics in Guangdong Province are manufactured by the leading providers such as Kavo, Sirona, Dentspy, 3M and other well-known companies. With the number of dental clinics expected to increase over the coming decade under the provincial plan and guidelines, the demand for dental equipment and instruments will grow.

With a strong handmade manufacturing sector and the relatively low labour costs, denture labs are well-developed in the province. Currently there are 224 labs in Guangdong, accounting for 13.4% of the total denture labs in the country. They supply dentures within the province and in nearby regions.

3.Analysis of commercial opportunities in the mainland China dental market

3.1 Summary of the commercial opportunities identified

1) **Develop dental care service delivery organisations in China**
With large demand for services and a growing economy, the population will need more care from qualified dentists with higher quality services and facilities, so there will be opportunities for the private sector. However, with the current private market dominated by many small clinics, it is likely that big chains with a reputation for good quality will be better able to attract patients.

2) **Equipment: export dental instruments from the UK to China**
The dental device market has been dominated by the key brands, making it difficult for entrants to win business. However, the big-name providers are less dominant in the dental instruments market, offering opportunities for other players.

3) **Equipment: export 3D dental printers from the UK to China**
Dentures and crowns are currently being manufactured by hand in China. However, technology such as 3D printing has allowed denture labs to automate the design and manufacture of crowns, alongside other technologies such as oral scanning and CAD/CAM design. Such technology will allow denture labs to further improve their product quality and efficiency.

4) **Education: provide credit-based lectures to registered dentists in China**
With dentists required to fulfil 25 credits annually and the total number of dentists expected to grow in the coming decade, the lecture market is relatively large. Foreign course providers could partner with a local institution or hospital. Providers need to consider the strengths of the dental market in their own country (such as skills, techniques, products and management) so that they provide courses for which dentists will be willing to pay.

5) **Education: provide management courses/degree programs to dental administrators**
A specialty that UK providers could focus on is management courses for private dental owners. Dental clinics in China are primarily owned and operated by practising dentists who have little or no knowledge of or experience in managing an independent practice. Thus it is believed that management training dedicated into the healthcare or dental care sector would be beneficial and attractive to many of the dental practice owners and administrators.

6) **Education: provide international certificate programmes to registered dentists**
Similar to the programme offered by Case Western Reserve, foreign dental institutions could enter the China market by developing international certificate programmes for current dentists. Such programmes would focus on a specialty, and invite foreign professors to deliver lectures. A degree or a certificate needs to be offered at the end of the programme, because this is the major incentive for many of the participants. If degrees (such as a master degree) could be offered, more dentists holding bachelor degrees or below would be willing to participate. However, such degrees will need to be approved by the Ministry of Education.

7) **M-health: establish online portal for appointment making and provider rating within private sector**
The private dental care service providers are relatively decentralised and currently there is no portal that could include the majority of private dental providers (by region). The end-users of this portal would be patients seeking dental services in the private sector. Patients could view the available

dentists in their community and select their preferred dentists or providers by ratings and reviews, as well as by their specialties and availability. Appointments could be made directly through the portal, and later on patients would receive confirmation and reminders through the portal from their provider.

8) **M-health: establish online referral and communication portal for dentists worldwide**
Dentists working in foreign countries often encounter patients who have had treatment in China, or people travelling to China are looking for a qualified Chinese provider. Similarly, many Chinese patients need to find a dentist in a foreign country to which they are moving. Such a portal would allow participating dentists to communicate about patients' needs and refer patients to a qualified dentist in the foreign country.

9) **Infrastructure: design of infrastructure and interiors for dental practices**
With the number of private dental practices increasing in the coming decade, new facilities will be needed. Currently there are few companies that specialise in designing for dental providers. Specialist design is necessary because elements such as floor tiles and chair allocations are unique to dental practices and general designers do not have the expertise.

3.2 Assessment of identified opportunities with UK's capabilities

To identify the best opportunities in China for potential UK players, a match analysis with the UK's capabilities was conducted, which considered the strengths and leading players.

Opportunity	UK strengths	Leading players	Comments
(1) Develop dental care service delivery organisations in China	• Chain brands • High standards and quality of care • Experience in operations management • Experience in corporate group management	• IDH-Mydentist (700) • Oasis (370) • Southern (80) • Rodericks (61) • Perfect smile (30) • Smile dental care (23)	• Could bring UK's brands and reputation into China, and acquire or invest in individual clinics in the designated region. • Leading UK brands could help set care standards and improve care quality
(2) Export of dental instruments (such as for dental implant) to China	• N/A (products used are foreign brands)	• N/A	• Not feasible because the UK currently doesn't have well-known manufacturers in dentistry
(3) Export 3D dental printers from the UK to China	• One of the pioneering countries in 3D printing technology • Have applied 3D printing technology to dentistry and manufactures 3D dental printers • Developed research centres for 3D dental printing technologies	• Stanford Marsh • Laserlines	• Many labs and researchers in China are working on using 3D printing technology for dental implant and crown making processes • No domestic manufacturer of 3D dental printer exists in China • Exporting of 3D dental printers to denture labs and research centres in China is feasible

(4) Provide credit-based lectures to registered dentists in China	• Dental education is strong in the UK, with leading universities providing courses and continuing education programmes • High reputation	• Barts and the London School of Medicine and Dentistry, University of London • School of Dentistry, University of Birmingham • School of oral and dental sciences, Bristol University • Guy's, King's & St Thomas's Dental Institute, King's College London • Leeds School of Dentistry, University of Leeds	• Credit based lectures to dentists provided by leading UK universities will be feasible in China
(5) Provide management courses/degree programmes to dental administrators	• Experienced in clinical operations and management • High reputation in education (such as MBA programmes)	• Imperial College Business School (Healthcare Management, MBA) • Anglia Ruskin University (Healthcare Management, MBA)	• Management programmes such as MBA with a concentration in healthcare or hospital management are feasible in China
(6) Provide international certificate programmes to registered dentists	• Dental education is strong in the UK, with leading universities providing courses and continuing education programmes • High reputation	• Barts and the London School of Medicine and Dentistry, University of London • School of Dentistry, University of Birmingham • School of oral and dental sciences, Bristol University • Guy's, King's & St Thomas's Dental Institute, King's College London • Leeds School of Dentistry, University of Leeds	• UK is capable of delivering high-quality education programmes to dentists in China • Incentives for Chinese dentists to participate include learning advanced skills and improving their reputation and background
(7) Establish online portal for appointment making and provider rating within private sector	• Well-developed in healthcare online portals	• NHS Choice • ToothPick	• UK is well placed to establish online portals for patients and dental caregivers in China although domestic players may also look to enter and compete in this space
(8) Establish online referral and communication portal for dentists worldwide	• Experienced in referral systems • Well-developed in healthcare online portals	• N/A (no portal established for international referrals) • Majority of patients are referred by insurers	• Although referral system is well-developed in the UK, international referrals are not common
(9) Design of infrastructure and interiors for dental practices	• Frequently used for healthcare practices • Expertise in interior and operations design for healthcare practices	• Strategic Health Planning	• UK has capability in interior design for healthcare practices

Table 12 Assessment of identified opportunities with UK's capability

Based on the above opportunity assessment against UK capabilities and strengths, we recommend the following opportunities be considered:

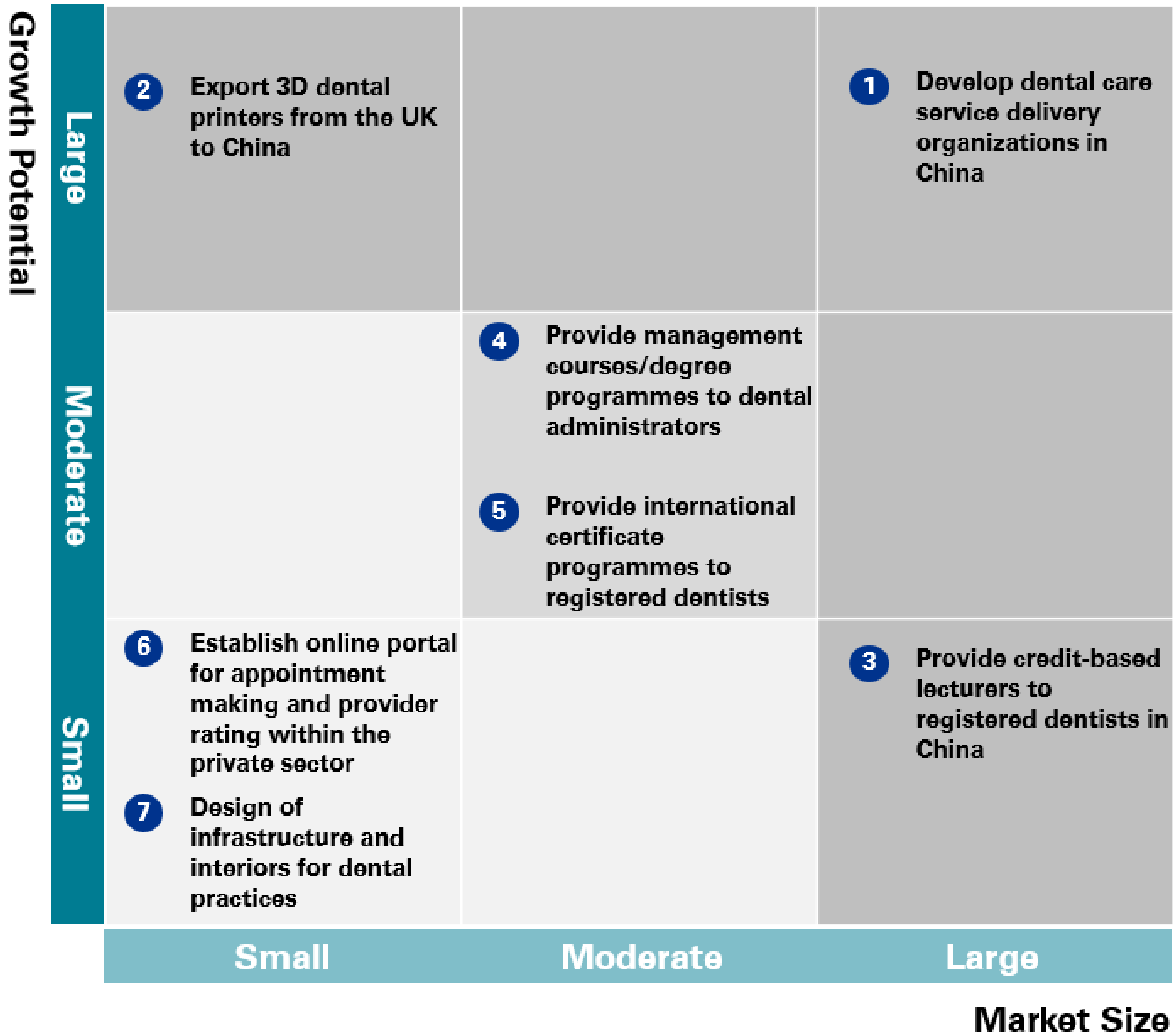
(1) Develop dental care service delivery organisations in China
(2) Export 3D dental printers from the UK to China
(3) Provide credit-based lectures to registered dentists in China
(4) Provide management courses/degree programmes to dental administrators
(5) Provide international certificate programmes to registered dentists
(6) Establish online portal for appointment making and provider rating within private sector
(7) Design of infrastructure and interiors for dental practices

3.3 Comparison of identified opportunities with market size and growth potential

To further assess whether the identified opportunities are feasible in the China dental market, it is important to consider the market size and growth potential. Some opportunities may show a small market at the moment but are expected to grow significantly.

Opportunity	Market size	Growth potential	Assessment result
1) Develop dental care service delivery organisations in China	Large	Large	Y
2) Export 3D dental printers from the UK to China	Small	Moderate	Y
3) Provide credit-based lectures to registered dentists in China	Moderate	Moderate	Y
4) Provide management courses/degree programmes to dental administrators	Small	Moderate	Y
5) Provide international certificate programmes to registered dentists	Moderate	Moderate	Y
6) Establish online portal for appointment making and provider rating within private sector	Small	Small	X
7) Design of infrastructure and interiors for dental practices	Small	Small	X

Table 13 Assessment of identified opportunities with current market size and future growth potentials



Market Size	Growth Potential
Large: over £50 million	Large: over 15% CAGR
Moderate: £1-50 million	Moderate: 5-15% CAGR
Small: less than £1 million	Small: less than 5% CAGR

*Figure 14 Assessment of identified opportunities in dental care market in China, using 3*3 evaluation matrix*

3.4 Assessment of regulation and competition issues around identified opportunities

Opportunity	Regulatory	Competition
1)Develop dental care service delivery organisations in China	• Although wholly-foreign owned private organisations are allowed in seven provinces or cities (Beijing, Tianjin, Shanghai, Zhejiang, Fujian, Hainan and Guangdong), the detailed implementation guidance is lacking according to officials in these provinces and cities • Joint ventures are currently allowed and are proceeding (Proportion of capital from China investors need to reach at least 30%) • Privately owned healthcare organisations are being promoted in China at the moment • No detailed goals or plans regarding development of dental care organisations (so market will be the major driver) • Guangdong aims to further develop its private healthcare sector • Specialised dental clinics/hospitals are currently being encouraged in Guangdong Province	• Market is dominated by individual clinics • Chain clinics started to develop a few years ago but are mostly targeting the high-end market, and current service quality is not highly respected
2)Export 3D dental printers from the UK to China	• Existing policies encourage the development of 3D printing technology	• Very few 3D dental printer manufacturers are active in the China market
3)Provide credit-based lectures to registered dentists in China within private sector	• Currently allowed, but certain regulatory processes need to be followed ahead of time in order to register	• Competition is intense • Major providers include leading dental schools and stomatology hospitals, which have the advantages in price and familiarity with the market
4)Provide management courses/degree programmes to dental administrators	• Currently allowed, but certain regulatory processes need to be followed • Degree programmes have much stricter regulatory processes compared with non-degree courses	• Major providers are the business schools within universities • Very few schools currently provide healthcare-concentrated management degree programmes (most of them are certificate programmes)
5)Provide international certificate programmes to registered dentists	• Currently allowed, but certain regulatory processes need to be followed	• Competition is currently not intense • Very few US dental schools are currently active in the market

Table 14 Assessment of regulation and competition issues around identified opportunities

4. Go-to-market strategy

4.1 Develop dental care service delivery organisations in China

	Sales/Marketing	Delivery	After-sales
What could be offered?	• Reputation of high quality of care from the UK • Experience in promotion and marketing activities • Experience negotiating with insurers • Deal/acquisition experience	• High care standard • Experience in training dentists and other caregivers • Internal design experiences and expertise for dental practices	• Mature care quality and process improvement plans • Experience in marketing events • Experience in acquisitions and deals
What is needed?	• Brand awareness promotion to targeted local population • Negotiation skills with local insurers, manufacturers, and regulators	• Highly skilled caregivers that could provide the high standard and quality of care needed	• Further expand the market by acquiring more clinics in the desired region • Increase brand awareness in the desired region
What needs to be done?	• Find a local partner who has connections in the local areas (such as with regulators, insurers or manufacturers) • Attend local dental conferences to increase brand awareness and meet with key local stakeholders	• Provide high salaries to attract highly skilled caregivers from leading hospitals • Establish a flagship clinic and hand-pick caregivers who works in this practice to ensure high standard of care is provided • Use internal design experts from the UK to help with design of the flagship and other clinics • Partner or acquire local practices that have good reputation	• Acquire or invest in more clinics in the desired region • Provide high standard of training to caregivers working in the clinics • Send high quality caregivers to each clinic as champions to ensure quality of care is met and can be further improved • Develop training programmes and events for all dentists in the region and use the clinic as the course location

Table 15 Go-to-market strategy for establishing chain clinics in China

4.2 Export 3D dental printers from the UK to China

	Sales/Marketing	Delivery	After-sales
What could be offered?	• Sales and marketing experience in the home country • Brochures that capture the key capability and function of the equipment • Specialists who are experts in using the equipment	• Training for users	• Training for installation, maintenance and repair
What are needed?	• Local distribution channels • Registration of product before sales in China	• Sales in the desired region • Training of buyers and current users to make better use of the product	• Qualified local engineers who could provide maintenance services
What needs to be done?	• Find a general distributor in China as the local partner, who has connections with local dental care providers and existing distribution channels in the country • Let the general distributor do the product registration	• Let general distributor hold events and send experts to China to provide training sessions for local users • Focus on both denture labs and dental care delivery organizations (such as teaching hospitals) which conduct research on the use of 3D printing technologies	• Accredit the general distributor to provide maintenance services • Provide high quality of training to engineers from the general distributor to ensure they provide high quality of services • Send local researchers and users of the 3D printing technologies to the UK to visit advanced labs and learn the technology

Table 16 Go-to-market strategy for exporting 3D dental printers to China

4.3 Provide credit-based lectures to registered dentists in China within private sector

Sales/Marketing		Delivery	After-sales
What could be offered?	• Brand and reputation	• Qualified and experienced dental professors • Course location (with the establishment of the flagship clinic)	• Diversified courses to meeting the future needs
What are needed?	• Accreditation for providing credit-based lectures	• Attract dentists to pay and attend lectures • Know the needs of the prospective students	• Ongoing communications to attract them to future courses
What needs to be done?	• Find a local partner (preferably a famous dental institution) which has connections with the Stomatology Association, in order to apply for course accreditation.	• Let the local partner analyze the needs of the prospective students so that course structures could be designed to meet the demands • Cooperate with dental manufacturers to sponsor dentists to attend courses	• Communicate with previously enrolled dentists on course experiences, and adjust course structure and topics according to feedback • Provide diversified courses in order to attract further new business

Table 17 Go-to-market strategy for providing lectures (with credits) to registered dentists in China

4.4 Provide management courses/degree programmes to dental administrators

Sales/Marketing		Delivery	After-sales
What could be offered?	• Brand and reputation of famous business schools • Existing programmes of MBA with a concentration on healthcare	• Qualified and experienced professors in healthcare management • UK campus	• Existing alumni network in the UK
What are needed?	• Approval for providing such programmes • Marketing activities	• Provide courses that meet the needs of prospective students	• Hold further activities and conferences
What needs to be done?	• Partner with a local education institution to ensure that programme could be accredited by the Ministry of Education	• Deliver the majority of courses in China while offering a small period of study in the UK • Ensure course is comprehensive and	• Host future activities and conferences jointly with the UK students as both a marketing strategy to attract future students, and a way to let administrators in China communicate with those in

Sales/Marketing		Delivery	After-sales
	• Hold marketing activities to increase awareness	practical for future applications	the UK for future market opportunities

Table 18 Go-to-market strategy for providing management courses and degree programmes to dental administrators and practice owners in China

4.5 Provide international certificate programmes to registered dentists

Sales/Marketing		Delivery	After-sales
What could be offered?	• Brand and reputation of famous dental schools • Existing continued education programmes in various dental specialties	• Qualified and experienced professors in the various specialties • UK campus	• Existing alumni network in the UK
What are needed?	• Approval for providing such programmes • Marketing activities	• Provide courses that meet the needs of prospective students	• Hold further activities and conferences
What needs to be done?	• Find a local partner to help with regulation and approval processes • Holds marketing activities to increase brand awareness	• Deliver the majority of courses in China while offer a small portion in the UK • Ensure course is comprehensive and practical for future applications	• Host future activities and conferences jointly with the UK students as both a marketing strategy to attract future students, and also a way to let administrators in China communicate with those in the UK for future market opportunities

Table 19 Go-to-market strategy for providing international clinical certificate/degree programmes to dentists in China

5.Key success factors

5.1 Develop dental care service delivery organisations in China

- Form joint venture clinics

  It is essential that foreign chains wishing to enter the China dental market partner with local firms to operate and grow their business. The market in China is very different to that of the UK, and varies significantly between regions. Foreign players which do not understand the market and do not have strong connections with local stakeholders will face high barriers to entry from processes ranging from license applications to equipment procurement, location selection, recruitment, and acquisition of other clinics.

  Although policy permits wholly foreign-funded healthcare organizations in Guangdong Province, the actual application process and likely outcome are unclear. There has not been a specific policy in Guangdong Province to guide such applicants or a process for how they would be approved. So to secure a license, it is best for UK providers to find a local partner from the outset and form joint venture clinics to speed up applications and processes.

- Establish a flagship clinic in a well-developed region

  The chain clinics aiming to enter China need to provide high quality services. The best way to control and promote service quality is by establishing a flagship clinic in a well-developed region as the first move in China. Resources such as managers and qualified dentists could be brought from the UK to this flagship branch to promote brand awareness in the designated region.

  Although branded clinics exist in cities such as Guangzhou and Shenzhen within Guangdong Province, their capacities are modest. These two cities have relatively high paying capacity and better awareness of oral health, so the flagship branch should be in one of these two cities. There is another advantage if Shenzhen is chosen – its closeness to Hong Kong. UK brands are well-known and highly accepted by people in Hong Kong because of its historic relationship with the UK. Dental treatments cost less compared with Hong Kong, and with the convenient transport links between Hong Kong and Shenzhen, potential patients could travel to Shenzhen for dental treatment.

- Acquire or invest in clinics to expand market share rapidly

  Once the flagship clinic is developed and the first move made into China, the UK provider will need to acquire or invest in clinics within the region to rapidly penetrate further into the market. Acquisition has lower cost and grows market share faster than establishing new clinics.

  However, the clinics acquired/invested need to meet the needs of the UK provider's China strategy. In addition, the UK provider will need to provide high quality training to ensure that the acquired clinics are providing a standard of care that is as high as that in the UK, since care quality and standards are the key advantages for UK chain brands, and it is a reputation for quality on which their success will be built.

  A way to acquire or invest in high quality clinics is to look at those in the region that are owned and operated by qualified dentists (for example, dentists who graduated from leading dental schools or who are working in top hospitals in the region). These dentists tend to have better training and skills.

5.2 Export 3D dental printers from the UK to China

- Find a general distributor instead of establishing a branch in China

  Finding a general distributor with existing networks and connections with local denture labs, care delivery organizations and regulators will help the UK provider enter and expand in the Chinese market. The local distributor with its existing distribution channels could get into the market more quickly than the UK provider establishing new branches.

- Target both denture labs and dental care delivery organizations

Not only denture labs need 3D printing technologies when making crowns for patients and care providers; many high-end or leading dental care delivery organizations might need such equipment to research advanced dental techniques in specialties such as orthodontics, dental implants and dental prosthetics.

5.3 Provide credit-based lectures to registered dentists in China within private sector

- Partner with a local dental institution

  One of the requirements for providing credit-based lectures is that the major supervisor of the programme holds a Chinese license for practicing dentistry. So partnership with a local dental institution is important for processes such as accreditation by the Stomatology Association. In addition, local partnerships with a leading hospital or dental school will help the UK provider to attract dentists to attend programmes because the local providers know their needs better, and could assist in designing course structures to fit current demands.

- Reduce the cost to be comparable with other similar programmes in the dental market

  Because the majority of dentists pay for themselves when attending these courses, the UK providers need to set costs equivalent to similar programmes within the region so that price will not become a barrier when selecting courses.

- Cooperate with dental manufacturers in the specialty as sponsor for many dentists

  Dentists, especially those working in the public sector, are used to not paying for courses themselves; courses are normally paid for by their hospitals or sponsored by manufacturers. Therefore, cooperation with a dental manufacturer of the designated specialty or technique relating to the lecture will help provide sponsorships for many of the dentists, thus helping to attract them.

5.4 Provide management courses/degree programmes to dental administrators

- Partner with a local business school and offer dual-degree programmes

  Partnership with a local business school within a university will speed up getting accreditation. In addition, the dual-degree or certificates offered could help the UK provider entice students to enrol.

- Host timely activities for current students and alumni

  Once enrolled into the programmes, dental administrators could further use this group as a way to meeting colleagues who work in the same field. It becomes a platform that enables dentists and dental administrators to network, and promotes brand awareness among future students.

5.5 Provide international certificate programmes to registered dentists

- The UK provider needs to be a highly reputable, leading dental school

  Most potential buyers of this programme are dentists working in the private sector who hold a bachelor degree or below from lesser known (or less reputable) dental schools in China. One of the major reasons for their enrolment is to improve their reputation by getting a higher degree from a famous dental institution. They need this to help them attract patients in the private sector, and compete with dentists in the public hospitals. These programmes will normally cost more than local fellowships or degree programmes, so dentists are more likely to be willing to pay this extra money if the foreign provider has a strong reputation.

- Provide most of the courses in China

  Because the potential buyers are local dentists working in the private sector, they are unable to completely stop working for a few months or up to a year since they are running a practice and possibly supporting families. So it is important that the majority of courses are offered in China, with lecturers and professors invited from the UK.

6.Challenges, barriers and risks

	Challenges, barriers and risks
1)Develop dental care service delivery organisations in China	• Lack of brand awareness in the local region • Implementation process highly depends on application processes • Quality of dentists varies significantly according to school where dental degree is obtained and will affect future care quality provided to patients • Incentives may affect the choice of care dentists select for patients, and are difficult to control, so they will eventually influence the care quality and patients' experiences • Trust between dentists and patients is weak in China
2)Export 3D dental printers from the UK to China	• Cost of using 3D printing technology to make crowns are high and therefore market will be smaller compared with manufacturing by hand. • 3D printing technology is not fully trusted by patients in China as something to put into their body
3)Provide credit-based lectures to registered dentists in China within private sector	• Charges are higher compared with local programmes • Failure to meet local demands
4)Provide management courses/degree programmes to dental administrators	• Charges are higher compared with local programmes • Failure to meet local demands
5)Provide international certificate programmes to registered dentists	• High cost • Failure to meet local demands

Table 20 Challenges, barriers and risks for the identified opportunities

7. Future roadmaps

7.1 Develop dental care service delivery organisations (Guangdong for instance)

Steps		Description	Time duration
a)	Find a local partner to form JV	Potential local partners may include: • Registered dentists in the designated region • Local investors • Existing dental practices or chains (such as Arrail, Jiamei, iByer Group, Pearl Dental, etc.)	2-3 months
b)	Partnership negotiation	Negotiate on types of partnership and agree development strategies	1-2 months
c)	Location selection of the flagship clinic	Carefully select the designated city for the first flagship clinic, and then conduct detailed location selections based on market research and profile of targeted populations	1-3 months
d)	Application for establishment and operation license	Submit the establishment and operation application to the Health and Family Planning Commission of the selected city, and submit any other documents as needed by the local HFPC.	6-12 months
e)	Design and renovation of the flagship clinic	Use expertise that UK has in dental practice design to renovate the clinic, also make sure it complies with local requirements such as fire and radiation safety	4-6 months
f)	Dentists recruitment	Recruit highly qualified dentists. Possible sources of recruitments include: • Existing dentists working in top public or teaching hospitals • Dentists graduated from leading dental schools • Referrals from existing qualified dentists (such as students trained by qualified dentists)	4-6 months
g)	Equipment and instrument procurement	Procurement of equipment from local distributors or manufacturers (all major brands currently have local distributors in Guangdong Province)	4-6 months
h)	Acquire or invest in more dental clinics within the region	Acquire or invest in existing clinics in the region, which may include: • Chain clinics such as Arrail, Jiamei, iByer Group and etc. • Clinics owned by qualified dentists	1-3 years

Table 21 Future roadmap for establishing chain clinics in China (Guangdong for instance)

7.2 Export 3D dental printers from the UK to China

Steps	Description	Time duration
a) Find a general distributor based in Guangdong Province	Find an existing distributor of dental equipment or devices that has its own distribution channels in different cities, and is familiar with product registration processes	1-3 months
b) Register of product before sales	Let the general distributor apply for registration	3-6 months
c) Hold marketing activities with local denture labs and high-end dental care delivery organisations	Hold marketing activities to increase the brand and product awareness	3-6 months
d) Train the distributors and engineers	Provide trainings for distributors and engineers to ensure they completely understand the product, and are able to provide high quality maintenance services to users	3-6 months

Table 22 Future roadmap for exporting 3D dental printers to China (Guangdong for instance)

7.3 Provide credit-based lectures to registered dentists in China within private sector

Steps	Description	Time duration
a) Find a local partner	Partners may include: • Dental schools such as Guanghua School of Stomatology, Sun Yat-sen University • Teaching dental hospitals such as the Hospital of Stomatology, Sun Yat-sen University	1-3 months
b) Register of courses with the Stomatology Association	Register course with the China Stomatology Association	2-3 months

Table 23 Future roadmap for providing lectures (with credits) to registered dentists in China (Guangdong for instance)

7.4 Provide management courses/degree programmes to dental administrators

Steps	Description	Time duration
a) Find a local partner	Partners may include: • Existing schools of managements such as Sun Yat-sen Business School	1-3 months
b) Register of courses with the Stomatology Association	Register course with the Ministry of Education	6-12 months

Table 24 Future roadmap for providing management courses and degree programmes to dental administrators and practice owners in China (Guangdong for instance)

7.5 Provide international certificate programmes to registered dentists

Steps	Description	Time duration
a) Find a local partner	Partners may include: • Dental schools such as School of Stomatology, Sun Yat-sen University	1-3 months
b) Register of courses with the Stomatology Association	Register of course with the Ministry of Education	6-12 months

Table 25 Future roadmap for providing international clinical certificate or degree programmes to dentists in China (Guangdong for instance)

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