



CENTRE
FOR
WORKFORCE
INTELLIGENCE

Securing the future workforce supply

Dental care professionals stocktake



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Executive summary

The Centre for Workforce Intelligence (CfWI) was commissioned by Health Education England (HEE), through the Department of Health (DH) contract, to forecast and analyse demand and supply for the dental care professional (DCP) workforce in England between 2013 and 2025. The report will support HEE, the DH and the Department for Business, Innovation and Skills (BIS) in policy decision-making to secure the DCP workforce of the future.

Context for this review

This stocktake follows the CfWI's 2013 review of dentistry student numbers (CfWI, 2013), which resulted in a decision to reduce the annual dental school intake. That review recommended that HEE commission the CfWI to conduct a stocktake of the multi-professional dental workforce, focusing on DCPs. The purpose of this stocktake is to enable HEE to develop its strategic position on the DCP workforce in advance of the next annual workforce planning round (i.e. to inform 2015 education commissioning). This stocktake looks at the DCP workforce required to deliver services in both the NHS and the private sector, and focuses on the changing dental 'skill mix' in the context of the proposed reform of the NHS dental contract.

Project approach

All six dental care professions were included in this review: dental hygienists, dental therapists, orthodontic therapists, clinical dental technicians, dental technicians and dental nurses.

In this report we refer to the outputs of the 'system dynamics' model developed by the CfWI to forecast demand and supply for the DCP workforce in England. Our workforce modelling focuses on dental hygienists, dental therapists and orthodontic therapists – as these were considered likely to be impacted by factors such as the reformed contractual arrangements. We also considered dental nurses, although we acknowledge that the supply of the dental nurse workforce is largely market driven. This review has been informed by two workshops, site visits to dental practices, consultation with stakeholders, various data sources and trends in oral health.

The projections included in this report compare workforce supply with future demand. We first produced 'baseline projections', which show demand and supply up to 2025 if everything stayed the same between now and then (for example if the 'skill mix' and training intake did not change). Baseline projections are useful for comparison purposes.

We then produced 'principal projections', which represent the expected or 'most likely' future scenario. These projections take into account significant expected changes to the skill mix. To quantify the potential alteration to the dental skill mix we ran an 'elicitation workshop' to estimate the potential shift of activity towards the various dental care professions, and to understand the uncertainty around these estimates.

Stakeholders believe that the skill mix in the multidisciplinary dental workforce is likely to change over the period this report covers, with DCPs taking on more of the activity currently undertaken by dentists. It is important to emphasise that it is our intention in the report to illustrate the likely direction of travel for the workforce, expressed by stakeholders and supported by proposed changes to the dental care contract, currently being piloted and subject to consultation. What the report does not do is attempt to forecast precise workforce numbers. It is important to recognise when considering the information in this report that for changes in skill mix to happen there will need to be a concerted effort and commitment across the system.

For the principal projections, our calculation of future demand is based on the population's total need for dental care and an estimate of the proportion of care that could be delivered by DCPs in future (i.e. the future skill mix). The variables that have the greatest impact on workforce supply include training numbers, workforce attrition (including retirements) and participation rates (i.e. the extent to which people work part time).

Key findings

Our rising demand forecasts for dental hygienists, dental therapists, orthodontic therapists and dental nurses reflect the view expressed to us by stakeholders across the dental sector that, in future, DCPs could undertake a significantly greater share of the dental care workload (possibly as much as between 40 and 50 per cent by 2025 as opposed to 20 per cent today, provided there is a concerted and coordinated effort to achieve this across the system).

Our supply forecasts – which are based on current annual training intakes – show that the numbers of dental hygienists, dental therapists and dental nurses are not likely to grow significantly without intervention.

Our demand forecasts reflect the skill mix stakeholders told us they believe to be appropriate for the future DCP workforce. On this basis there is a risk of a potential undersupply of dental hygienists, dental therapists and dental nurses, and a potential small oversupply of orthodontic therapists (if this workforce were to continue to expand rapidly at the current rate¹); it would therefore be prudent to keep the number of training places under review over the next 10 years. We acknowledge it may take longer than 10 years to implement a major shift in the dental workforce.

Increasing the supply of DCPs by creating additional training places will need to be reinforced by other measures such as:

- implementation of a dental contract that no longer bases remuneration purely on practice activity
- introduction of a scheme to incentivise supporting older people in maintaining their oral health
- training for dentists in the effective use of DCPs
- actions to remedy dental estate (space) restrictions.

Modelling forecasts

The forecasts below – which are approximate – are based on available data, assumptions and the results from our elicitation workshop, which took place in June 2014.

- **Dental hygienists and therapists:** Demand for dental hygienists and therapists is expected to rise and exceed supply. If, by 2025, dental hygienists and therapists were to carry out 18 per cent of all direct patient care, as estimated by our expert panel, around 7,700 more full-time equivalent (FTE) dental hygienists and around 2,000 more FTE dental therapists would be needed.
- **Orthodontic therapists:** At the current rate of expansion and with the course duration being just one year, supply for orthodontic therapists has the potential to outweigh demand in the next 10 years (though demand is also rising). If, by 2025, orthodontic therapists were to carry out 6 per cent of all direct patient care, as estimated by our expert panel, around 200 fewer FTE orthodontic therapists would potentially be needed. However, orthodontic therapy is a relatively new category and may need to be monitored on a more frequent basis than the other professions due to its shorter length of training (dental hygienists complete two years of training, while dental hygienist/therapists complete either 27 months or three years of training). It is worth noting that our stakeholders suggest orthodontic therapists are not currently being utilised to their full potential.
- **Dental nurses:** Demand for dental nurses is expected to rise and exceed supply. If, by 2025, dental nurses were to carry out 25 per cent of all direct patient care, as estimated by our panel (in addition to their statutory role supporting dentists) up to 48,000 more FTE dental nurses would be needed. It is important to note that the training of dental nurses – though the biggest dental workforce group by headcount – is not nationally commissioned and is driven predominantly by market forces. Supply is seen as sufficiently flexible to meet fluctuations in demand.

¹ The number of orthodontic therapists has recently grown rapidly from a zero base. The training course is one year long, so continued growth at the same rate – though unlikely – could eventually produce a surplus.

Summary of suggestions for Health Education England

Ongoing monitoring and review of the dental workforce as a whole

Our forecasts of future demand and supply of DCPs suggest it would be sensible to continue to monitor demand and supply, and any system changes that may affect their balance in the medium to long term. We believe it is important that the local needs and training for the future workforce are regularly reviewed to meet the needs of the population. Stakeholders tell us that currently, training provision is not strategically distributed according to where the workforce is most needed, so a national plan for training provision may be helpful in this regard.

Furthermore, it would be beneficial for dentist and DCP training provision to be planned in a joined-up way to provide greater consistency and enable more holistic future workforce planning. The CfWI believes it would be beneficial to review dentists and DCPs together every three years to ensure the impact of any intervention and emerging risks can be appropriately tracked. Reviewing the dental workforce as a whole (dentists, dental hygienists, dental therapists, orthodontic therapists, dental nurses, dental technicians and clinical technicians) would take into account the changing skill mix.

A continued drive to improve DCP data

To improve the quality and robustness of future modelling, it would be helpful to the system to conduct a survey on General Dental Council (GDC) registrants to gain more data on participation rates of the DCP workforce.

1. Introduction and context

1.1 Introduction

Why this review?

The Centre for Workforce Intelligence (CfWI) was commissioned by Health Education England (HEE), through the Department of Health (DH) contract, to forecast and analyse the future supply of, and demand for, the dental care professional (DCP) workforce in England looking ahead to 2025. This report will support HEE, the DH and the Department for Business, Innovation and Skills (BIS) in workforce planning policy decision-making to secure the DCP workforce of the future.

This review was driven by the CfWI's dental student intakes review in 2013 (CfWI, 2013) which led to a subsequent 10 per cent reduction in dentist student intake numbers for the 2014/15 academic year. This was based on improvement in the oral health of the population and the scope for greater delegation from dentists to DCPs. Workforce planning to ensure we have the right number of DCPs to meet the needs of the population is therefore essential.

Shape of the report

Our work is set out in this report to enable the reader to fully understand the purpose of the review, the project approach, the findings, and the CfWI options for change. The report covers:

- contextual factors impacting the DCP workforce (e.g. the changing needs of the population)
- the makeup of the DCP workforce, the current sources of supply and the training numbers
- the workforce planning methodology
- the findings, including demand and supply forecasts
- conclusions and suggestions.

1.2 Context

It is important to look at DCPs in context and consider the factors which may impact on the DCP workforce numbers and proportions. Some of these contextual factors promote the use of DCPs and enable further delegation to occur.

Commissioning of primary care dental services

Equity and Excellence: Liberating the NHS (DH, 2010) proposed a significant change to commissioning services. Specifically: to devolve commissioning responsibilities and budgets as far as possible to those best placed to act in the interest of the patient and their local community. It also proposed that – from April 2013 and as part of its commissioning responsibilities – NHS England commissions all NHS dental services: primary, community and secondary care, including dental hospitals and out-of-hours services. The successor to the Dental Programme Board (DPB) is now the HEE Dental Advisory Group. This group works with HEE local education and training boards (LETBs) and NHS Trusts to meet local dental workforce needs using a multidisciplinary approach.

Pilots and implementation of NHS dental contract reforms

In December 2010, the DH announced proposals for the piloting of reformed dental contractual arrangements based on registration, capitation and quality. Around 90 general dental practices in England are piloting the reformed contractual arrangements. Although there is no fixed date for implementation, an engagement exercise was held by the dental contract reform programme, which ended in July 2014. This report is not based on any outcomes from this exercise. The proposed reform of current contractual arrangements would aim to reward dentists on the basis of clinical outcomes and quality, with remuneration determined by weighted capitation. This is unlike the current contract, which measures

outputs as Units of Dental Activity (UDAs). Our stakeholders and research suggest that the remuneration arrangements proposed in the contract reform may offer greater incentive for the delegation of duties from dentists to DCPs, by removing the obstacles created by remuneration based on banded activity targets (Harris and Sun, 2011). Until contract reform takes effect, the impact on practices and new ways of working cannot be quantified, but it is likely to lead to a restructuring of the dental practice team (CfWI, 2013). Stakeholders suggest that restructuring of the dental team and implementation of contract reform may open up more work for dental hygienists/therapists.

These pilots are also testing the use of personalised care plans, and place greater emphasis on the prevention of dental disease through improvements in oral hygiene. Dental hygienists, dental hygienist/therapists and dental nurses already contribute to prevention programmes as a significant range of preventive procedures are within the scope of the DCP's practice (MEE, 2010). As a result, implementation of contract reform could lead to DCPs being increasingly utilised in this way. Our stakeholders suggest there may also be greater opportunities for dental nurses to contribute to both practice-based oral health promotion initiatives and more community-based initiatives, e.g. working in residential care and nursing homes in collaboration with other members of the dental team. The British Dental Association (2003) has suggested that there is a good case for considering the use of dental therapists, dental hygienists and clinical dental technicians (CDTs) for identifying older domiciliary care users and residents of nursing and residential care homes who are at risk of poor oral health, as well as for the provision of oral hygiene advice.

In connection with preparation for reform of the NHS dental contract, NHS England is developing a series of commissioning guides including one on the maintenance of periodontal health and the most appropriate form of treatment and prevention of periodontal disease. This may lead to more focused utilisation of dental hygienists.

Direct access to dental care professionals and team working

Developments in team working in dentistry received added impetus from the General Dental Council's (GDC) decision to register all DCPs in 2007. In March 2013, the GDC removed the barrier preventing patients from having direct access to selected groups of dental care professionals. Subject to certain conditions, patients no longer have to be seen by a dentist before being treated by another member of the dental team (GDC, 2013a). Dental hygienist/therapists are now permitted to provide dental treatment within their scope of practice without a prescription from a dentist. Orthodontic therapists, dental technicians, clinical dental technicians and dental nurses continue to practice on prescription of a dentist with the following exceptions:

- dental nurses can participate in oral health programmes without patients having to see a dentist first
- orthodontic therapists can carry out Index of Orthodontic Treatment Need (IOTN) screenings without a prescription from a dentist
- clinical dental technicians continue to see edentulous patients (those with no teeth) to supply and fit full dentures.

These changes are likely to lead to changes in the workload for dentists by allowing them to focus on more complex treatments (CfWI, 2013). Stakeholders also suggest direct access may lead to increased opportunities for dental hygienists with the establishment of standalone hygiene practices, although given the constraints on the range of treatments allowed and the flexibility offered by dual-trained hygienist/therapists, this is likely to be a limited marketplace. Overall, our site visits and stakeholder involvement show that the removal of the need for a referral by a dentist has been warmly welcomed by all DCP groups. However, this should be seen as an opportunity for all members of the dental team to work in a collaborative way to provide treatment, especially to children with high caries (decay) rates and older people in residential settings.

Research supports the need for team working within dental care. Jones and Colleagues (2008) conducted a survey looking at dental therapists'/hygienist-therapists' workloads. Responses from 209 dental therapists/hygienist-therapists concluded that primary care dentists working with dental therapists/hygienist-therapists are currently utilising only a small range of these professionals' skills within the hygienists'/therapists' scope of practice. The report recommends consideration should be given to (a) meeting the wishes of dentists by training singly qualified hygienists, or (b) developing a system that encourages dentists to use dental therapists/hygienist-therapists differently. Similarly, Evans and colleagues (2007) demonstrated that a considerable proportion of the work that takes place in UK general dental

practices could be delegated to dental hygienists and therapists. Team working may also increase feelings of well-being; Buunk-Werkhoven and colleagues (2014) showed dental hygienists having high work engagement and high levels of well-being within dental practices.

Shifting the balance of services from secondary care to the primary care sector

The strengthening role of primary and community services (through the balance of care shifting away from hospitals) would be facilitated by increased use of general dental practitioners with enhanced skills, with a corresponding reduction in secondary care. Selected clinicians should be enabled to concentrate on more complex clinical work, practice leadership and management. Less complex work, within the scope of practice of DCPs, could then be delegated to the rest of the team. During our site visits, we noted that dental therapists were taking over the management of more difficult child patients, resulting in fewer referrals to secondary care for general anaesthetic (GA) extractions. In addition, referrals to the salaried services were reduced. However, some salaried service dental therapists are providing sedation services in place of the patient having a dental GA for conservation and extractions on deciduous (baby) teeth.

Changing needs of the population

Older adults could become the main consumers of interventional oral healthcare in the UK (BDA, 2003). Although there are fewer edentulous people, there is an increasing 'heavy metal generation'². These are people aged over 40 with complex restorations and numerous fillings that will become difficult to treat as they get older. As people live much longer, these treatments will become part of routine care, and some of these people will have high maintenance needs as they age (Steele, 2009). In contrast, the oral health of the population in England has been steadily improving over the past 40 years, and access to NHS dental services has improved in the past five years. This can be attributed to wider access to fluorides, mainly in toothpaste but also from fluoridation of water in some areas (NHS, 2014). Dentists' work may therefore focus more on this older generation, with increasing delegation to DCPs to manage preventive care for the younger generation. For example, there are high levels of decay in children in deprived areas of England (HSCIC, 2013) where more preventive care would be beneficial.

Increased longevity and retention of natural dentition (teeth and their arrangement in the mouth) means the demand for both domiciliary and residential/nursing home dental care will continue to increase (Sweeny et al., 2007). This could lead to increased use of dental therapists who are well suited to providing the care these patients need. Gallagher et al. (2010) suggest that with widening skill mix, dental care professionals such as clinical dental technicians (CDTs) and dental hygienists can play a major role in building dental care capacity for older people in the future.

Contextual factors preventing increased delegation to DCPs

The requirement to register with the GDC, changes brought in by The Dentists Act 1984 (Amendment) Order 2005, a defined scope of practice and an increasing number of DCP training courses have ensured that DCP career choices have grown in popularity (MEE, 2010). A key speaker to the third annual DCP Research Symposium in December 2012 noted that there was a demonstrable mismatch between procedures that DCPs had been trained to do and the degree to which those skills were used. This mismatch may be affected by the following:

- financial constraints from a remuneration system based on UDAs, which it is assumed are largely delivered by a dentist
- uncertainty among dentists about the extent of the scope of practice for DCPs
- lack of free time for dentists to act not just as clinicians, but as team managers and leaders
- dental estate restrictions – infrastructure difficulties such as lack of spare chairs in singlehanded practices (which make up 30 per cent of all practices).

Furthermore, there is a lack of understanding among many dentists about how DCPs' skills can be maximised for the benefit of patients, as highlighted in several research studies (Csikar et al., 2009; Gallagher and Wright, 2003; The Scottish

² <http://www.wales.nhs.uk/sitesplus/888/page/63520#metal>

Government, 2011). Csikar and colleagues (2009) asked 470 dental therapists if they agreed with the statement: ‘the dentist has more patients that could be referred to me’ and 70 per cent of respondents agreed or strongly agreed.

There are complex issues affecting demand for dental hygienists/dental therapists. Anecdotal information suggests most dual-qualified staff undertake a combination of dental therapy and hygiene duties, often at different locations. Information gathered through our interviews with practices indicates there may be limited opportunities for dental therapists. Often, newly qualified hygienist-therapists find that once they enter a practice they are utilised only for dental hygienist roles, and as a result their dental therapy skills are wasted. The May 2014 issue of Dental Health (BSDHT) highlights this underemployment/unemployment problem in dental therapists, suggesting there is saturation in the market for dental therapists and dental hygienists:

Many dental hygienists and therapists are acutely aware of the dreadfully poor employment market that currently exists and threatens to exist for some time to come. Many have left the profession; some are threatening to leave and yet more are in despair with the profession.

The DCP workforce could also be affected by the inward migration of overseas dentists. In response to the 2004 dental workforce review (DH, 2004), 1,000 additional dentists were recruited to the NHS over time, including dentists returning to practice and overseas dentists. Immigration of overseas dentists – particularly from the EEA – has continued. The Government’s commitment to reduce immigration through tiers only applies to immigrants from outside the EEA, and overseas dentists that have continued to be added to the GDC register between 2007 and 2012. Numbers have decreased in the last two years, but the overseas workforce could continue to fill any gap in workforce supply in the short-to-medium term. Stakeholders we have engaged throughout this project told us that dentists from overseas are willing to accept lower salaries, which removes an economic incentive to employ DCPs.

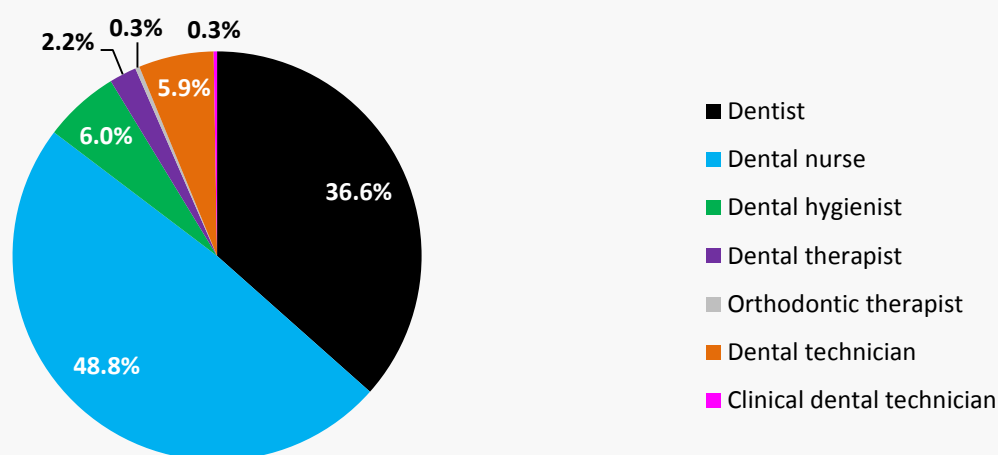
2. The dental care professional workforce

2.1 Overview

Dentists do not work in isolation, and the wider dental team will have an increased role to play in the future delivery of dental care (CfWI, 2013; Evans et al., 2007). Most dentists are already supported by a multi-professional team; enhancing skill mix and delegation of responsibilities has been shown to be a cost-effective method of improving patient access and making the best use of the wide range of skills found in the dental team (MEE, 2010).

The current dental workforce of the UK is detailed in Figure 1 below. In June 2014 the total UK dental workforce was made up of 63 per cent DCPs (dental hygienists, dental therapists, orthodontic therapists, dental technicians, clinical dental technicians and dental nurses) and 37 per cent dentists (GDC, 2014).

Figure 1: Dental workforce totals in UK, 2014



Source: GDC figures for UK, June 2014

2.2 Dental care professional workforce

The dental care professional workforce consists of:

- dental hygienists
- dental therapists³
- dental hygienist-therapists
- orthodontic therapists
- dental technicians
- clinical dental technicians
- dental nurses

This stocktake looked at the following job roles in greater depth: dental hygienist, dental hygienist/therapist, orthodontic therapist and dental nurse. Our modelling considers dental hygienists and dental therapists separately as the GDC has separate lists for both roles. Outlined below are the GDC Scope of Practice (2013b) job role descriptions for all six DCP roles: dental hygienist, dental therapist, orthodontic therapist, dental technician, clinical dental technician and dental nurse.

Dental hygienists

Dental hygienists are registered dental professionals who help patients maintain their oral health by preventing and treating gum disease and promoting good oral health practice. They carry out treatment under prescription from a dentist. According to the GDC Scope of Practice (2013b), dental hygienists:

- provide dental hygiene care to a wide range of patients
- plan the delivery of care for patients to improve and maintain their periodontal health
- obtain a detailed dental history from patients and evaluate their medical history
- complete periodontal examination and charting and use indices to screen and monitor periodontal disease
- provide preventive oral care to patients and liaise with dentists over the treatment of caries, periodontal disease and tooth wear
- undertake supragingival and subgingival scaling and root debridement using manual and powered instruments
- use appropriate anti-microbial therapy to manage plaque-related diseases
- adjust restored surfaces in relation to periodontal treatment
- apply topical treatments and fissure sealants
- give patients advice on how to stop smoking
- take, process and interpret various film views used in general dental practice
- give infiltration and inferior dental block analgesia
- place temporary dressings and re-cement crowns with temporary cement
- take impressions
- identify anatomical features, recognise abnormalities and interpret common pathology, and carry out oral cancer screening
- if necessary, refer patients to other healthcare professionals
- place rubber dams.

Dental therapists

Dental therapists are registered dental professionals who carry out certain items of dental treatment under prescription from a dentist. Dental therapy covers the same areas as dental hygiene, but according to the GDC Scope of Practice (2013b), dental therapists also:

³ All dental therapy courses now lead to registration as a dental hygienist-therapist.

- carry out direct restorations on permanent and primary teeth
- carry out pulpotomies on primary teeth
- extract primary teeth
- place pre-formed crowns on primary teeth
- plan the delivery of a patient's care.

Orthodontic therapists

Orthodontic therapists are registered dental professionals who carry out certain parts of orthodontic treatment under prescription from a dentist. This new class of DCP was only formally established in 2007 but already it is widely accepted that the development of the role of orthodontic therapist has been a success.

According to the GDC Scope of Practice (2013b), orthodontic therapists:

- clean and prepare tooth surfaces ready for orthodontic treatment
- identify, select, use and maintain appropriate instruments
- insert passive removable orthodontic appliances
- insert active removable appliances adjusted by a dentist
- remove fixed appliances, orthodontic adhesives and cement
- take impressions
- pour, cast and trim study models
- make a patient's orthodontic appliance safe in the absence of a dentist
- fit orthodontic headgear
- fit orthodontic facebows which have been adjusted by a dentist
- take occlusal records including orthognathic facebow readings
- place brackets and bands
- prepare, insert, adjust and remove archwires
- give advice on appliance care and oral health instruction
- fit tooth separators
- fit boded retainers
- make appropriate referrals to other healthcare professionals.

There are extended duties which an orthodontic therapist could carry out, for example, applying fluoride varnish on the prescription of a dentist.

Dental technician

Dental technicians are registered dental professionals who make dental devices to a prescription from a dentist or clinical dental technician. They also repair dentures directly for members of the public. A fully trained, competent and indemnified dental technician can undertake the following:

- review cases coming into the laboratory to decide how they should be progressed
- work with the dentist or clinical dental technician on treatment planning and outline design
- give appropriate patient advice
- design, plan and make a range of custom-made dental devices according to a prescription
- modify dental devices, including dentures, orthodontic appliances, crowns and bridges, according to a prescription
- carry out shade taking
- carry out infection prevention and control procedures to prevent physical, chemical and microbiological contamination in the laboratory
- keep full and accurate laboratory records
- verify and take responsibility for the quality and safety of devices leaving a laboratory
- make appropriate referrals to other healthcare professionals.

Dental technicians can see patients directly to repair dentures.

Clinical dental technician

Clinical dental technicians are registered dental professionals who provide complete dentures directly to patients and other dental devices on prescription from a dentist. They are also qualified dental technicians. As a CDT, you can undertake the following if you are trained, competent and indemnified:

- prescribe and provide complete dentures directly to patients
- provide and fit other dental devices on prescription from a dentist
- take detailed dental history and relevant medical history
- perform technical and clinical procedures related to providing removable dental appliances
- carry out clinical examinations within your scope of practice
- take and process radiographs and other images related to providing removable dental appliances
- distinguish between normal and abnormal consequences of ageing
- give appropriate patient advice
- recognise abnormal oral mucosa and related underlying structures and refer patients to other healthcare professionals if necessary
- fit removable appliances
- provide sports mouth guards
- keep full, accurate and contemporaneous patient records
- vary the detail, but not the direction, of a prescription according to patient needs.

Additional skills which CDTs could develop include:

- oral health education
- re-cementing crowns with temporary cement
- providing anti-snoring devices on prescription of a dentist
- removing sutures after the wound has been checked by a dentist
- prescribing radiographs
- replacing implant abutments for removable dental appliances on prescription from a dentist
- providing tooth whitening treatments on prescription from a dentist.

Dental nurse

Dental nurses are registered dental professionals who provide clinical and other support to other registrants or patients. As a dental nurse, you can undertake the following if you are trained, competent and indemnified:

- prepare and maintain the clinical environment, including the equipment
- carry out infection prevention and control procedures to prevent physical, chemical and microbiological contamination in the surgery or laboratory
- record dental charting and oral tissue assessment carried out by other registrants
- prepare, mix and handle dental biomaterials
- provide chair-side support to the operator during treatment
- keep full, accurate and contemporaneous patient records
- prepare equipment, materials and patients for dental radiography
- process dental radiographs
- monitor, support and reassure patients
- give appropriate patient advice
- support the patient and your colleagues if there is a medical emergency
- make appropriate referrals to other health professionals.

Additional skills dental nurses could develop include:

- further skills in oral health education and oral health promotion
- assisting in the treatment of patients who are under conscious sedation
- further skills in assisting in the treatment of patients with special needs
- further skills in assisting in the treatment of orthodontic patients
- intra and extra-oral photography
- pouring, casting and trimming study models
- shade taking
- tracing cephalographs.

Additional skills carried out on prescription from, or under the direction of, another registrant:

- taking radiographs
- placing rubber dams
- measuring and recording plaque indices
- removing sutures after the wound has been checked by a dentist
- constructing occlusal registration rims and special trays
- repairing the acrylic component of removable appliances
- applying topical anaesthetic to the prescription of a dentist
- constructing mouth guards and bleaching trays to the prescription of a dentist
- constructing vacuum-formed retainers to the prescription of a dentist
- taking impressions to the prescription of a dentist or a CDT (where appropriate).

Dental nurses can apply fluoride varnish either on prescription from a dentist or directly as part of a structured dental health programme. Dental nurses do not diagnose disease or plan treatment. All other skills are reserved to one or more of the other registrant groups.

The CfWI acknowledges that a dental nurse's work falls within two categories:

- assisting the dentist, dental hygienist and dental therapist
- extended duties.

2.3 Training and qualifications

This section covers the training path and qualifications needed for each DCP job role and its training numbers. The DCP roles being looked at in this section are:

- dental hygienist/therapist
- orthodontic therapist
- dental technician
- clinical dental technician
- dental nurse.

Since July 2008, it has been mandatory for all DCPs to register with the GDC. The GDC is the sole regulatory body governing the practice of dentistry in the UK. Registration with the GDC is a legal requirement for people working in any branch of dentistry, and this applies to all dental professionals whether they trained in the UK, EEA or overseas.

Dental hygienist/therapist

▪ Training path and qualifications

There are four training providers in England that offer a three-year BSc programme in oral health science and nine providers that offer a 27-month diploma in dental hygiene and therapy. Most training leads to a dental hygiene/dental

therapy qualification with only three providers offering a qualification that provides for registration as a dental hygienist only. Stakeholders tell us there are two providers that offer conversion courses for dental hygienists to qualify as dental therapists.

- **Training numbers**

In 2013, 41 students commenced dental hygiene courses, 225 students commenced dental hygiene/dental therapy courses and six dental hygienists commenced conversion courses in dental therapy (GDC Facts and Figures). The dental deaneries we contacted told us these courses are popular, with approximately 2.5 times the number of applicants as places.

Orthodontic therapist

- **Training path and qualifications**

It was not until 2007 that the GDC was able to introduce arrangements for the registration of orthodontic therapists and the first formal training courses were established. To access training, applicants need to be qualified in dental nursing, dental hygiene, dental therapy or dental technology and to have completed a period of post-qualification experience.

The GDC has approved a course that follows a modular format. The core teaching, comprising 20 days, is delivered at the start of the course over a four-week period. A further 10 teaching days are attended, approximately one day per month, during the remainder of the 12-month course.

- **Training numbers**

In March 2014 there were 280 orthodontic therapists registered with the GDC in England, and in the year ending 31 December 2013, 58 orthodontic therapists were admitted to the GDC register in England (GDC Facts and Figures). Initially courses were offered at a number of training institutions with fees paid by orthodontic practices.

Since 2008 the GDC has accredited orthodontic therapy courses in the following locations: Bristol Dental Hospital, Kings Health Partners (London), Dental Hospital of Manchester, University of Central Lancashire, University of Leeds and Warwick University. On average, each course has between 10 and 12 students in training. Currently, courses are running, or have activity recruiting for new students, in all centres apart from Leeds.

Dental technicians

- **Training path and qualifications**

Training courses which lead to qualifications recognised for registration by the GDC include the Business and Technology Education Council (BTEC) National Diploma in Dental Technology, a foundation degree or a BSc (Hons) degree in dental technology. These are courses for which the student must obtain a post as a trainee dental technician. All dental technicians are required to register with the GDC, but support staff, to whom registered technicians delegate different elements of the process of manufacturing appliances, do not have to register with the GDC.

- **Training numbers**

In March 2014 there were 5,275 dental technicians registered with the GDC in England, and in the year ending 31 December 2013, 163 newly qualified technicians registered with the GDC for the first time in England (GDC Facts and Figures).

Clinical dental technicians

- **Training path and qualifications**

There are currently two part-time training courses in England for which students self-fund their training. The largest course is run by the Kent, Surrey and Sussex (KSS) Postgraduate Dental Deanery, which offers the Diploma in Clinical

Dental Technology awarded by the Faculty of General Dental Practice (FGDP) of the Royal College of Surgeons of England. The training programme runs over a two-year period.

- **Training numbers**

There were 86 students in the first cohort of the programme at the end of 2010, with 69 students from England graduating in 2011. Cohort two graduated in the summer of 2013, with around 71 dental technicians from England completing CDT training successfully, and 43 then registering with the GDC (Health Education Kent, Surrey and Sussex, 2013). A second training course for CDTs in England is provided by the University of Central Lancashire at its Preston campus, which offers 10 places on its one-year course. In 2013, seven dental technicians from England completed this course successfully (University of Lancashire, 2013).

Dental nurse

- **Training path and qualifications**

The largest providers of courses in dental nursing are independent training companies or individuals accredited by the National Examination Board for Dental Nurses or City and Guilds. Some are run by dental hospitals and further education colleges. The main qualifications eligible for registration with the GDC are the National Diploma in Dental Nursing awarded by the National Examining Board for Dental Nurses (NEBDN), or a City and Guilds Level Three Diploma in Dental Nursing which replaced the National Vocational Qualification (NVQ) in Dental Nursing.

A foundation degree in dental nursing is also available. The University of Northampton offers a foundation degree (FdSc) in dental nursing. This is a two-year full-time course currently with 10 students in training. This may open the doors to more foundation degrees in dental nursing and provide more consistency within dental nurse training.

- **Training numbers**

In 2013, 2,440 students were awarded NVQs in dental nursing and 2,064 awarded the diploma of the NEBDN (NEBDN, 2013). This makes a total of 4,504 new qualifiers, yet the GDC only registered 3,108 dental nurses in 2013. This appears to confirm the view of stakeholders that attrition is a problem in dental nursing. Our stakeholders suggest that extended duties may help to stabilise the workforce and reduce attrition.

2.4 Workforce numbers

Workforce headcounts and newly registered figures are shown below. It is important to note that people who are registered as both a hygienist and a therapist are included on both lists, resulting in some 'double counting'.

Table 1 below shows the headcount figures and number of new registrants to the GDC across the UK from 2007 to 2012.

Table 1: Headcounts, 2007 to 2012

Year	Totals	Dentist	Clinical dental technician	Dental hygienist	Dental nurse	Dental technician	Dental therapist	Orthodontic therapist
2007	Total registered	35,419	59	5,160	14,757	1,442	977	n/a
	Total new joiners	2,359	60	379	14,036	1,367	230	n/a
2008	Total registered	36,281	100	5,367	42,959	7,460	1,164	16
	Total new joiners	2,362	42	349	28,215	6,026	211	16
2009	Total registered	37,049	120	5,545	42,719	7,111	1,393	86
	Total new joiners	2,053	26	410	3,955	228	270	70
2010	Total registered	38,379	134	5,777	44,147	6,910	1,606	134
	Total new joiners	2,737	15	387	4,997	271	261	49
2011	Total registered	39,307	226	5,962	45,628	6,666	1,800	212
	Total new joiners	2,539	102	357	5,519	294	247	80
2012	Total registered	39,894	228	6,119	47,497	6,494	1,981	273
	Total new joiners	2,232	7	403	6,074	334	274	66

Source: GDC Annual Reports, 2007–2012

Table 2 shows the percentage increase in GDC registrants from 2007 to 2012.

Table 2: Percentage increase in GDC registrants 2007 to 2012

Job role	Percentage (%) increase from 2007–12
Dental hygienist	18%
Dental therapist	102%
Orthodontic therapist	1,606%
Dental technician	350%
Clinical dental technician	286%
Dental nurse	222%

Source: GDC Annual Reports, 2007–2012

The workforce totals for England are shown below in Table 3.

Table 3: Workforce headcount totals in England

Job role	Total
Dental hygienist	5,342
Dental therapist	1,983
Orthodontic therapist	285
Dental technician	5,303
Clinical dental technician	249
Dental nurse	42,256

Source: GDC headcount figures for England, June 2014

Table 4 shows the total headcount for individual DCP roles in England broken down by gender as at June 2014. The majority of dental hygienists (96 per cent), dental therapists (95 per cent), orthodontic therapists (98 per cent) and dental nurses (99 per cent) are women. This indicates ‘feminisation’ of these professions. Newton and colleagues (2001) demonstrated the impact that increasing numbers of women entering the profession is likely to have on the dental workforce supply, both through the taking of career breaks and the increased likelihood of part-time working due to caring responsibilities. The majority of dental technicians (78 per cent) and clinical dental technicians (94 per cent) are men.

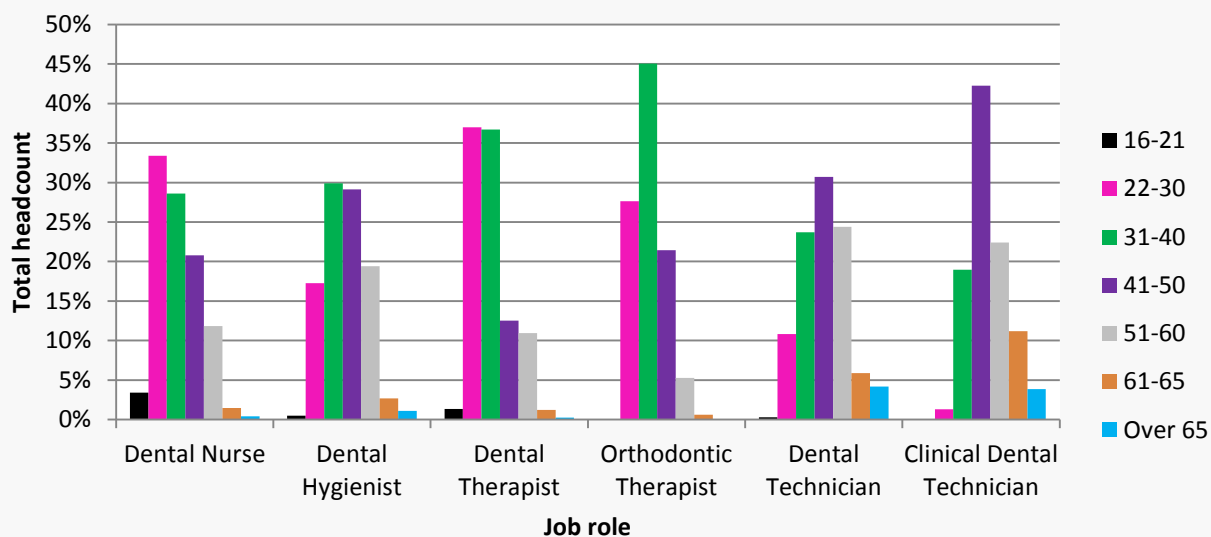
Table 4: Workforce totals in England by gender

Job role	Men		Women	
	Total	%	Total	%
Dental hygienist	193	4%	5,149	96%
Dental therapist	97	5%	1,886	95%
Orthodontic therapist	7	2%	278	98%
Dental technician	4,150	78%	1,153	22%
Clinical dental technician	235	94%	14	6%
Dental nurse	554	1%	41,702	99%

Source: GDC headcount figures for England, June 2014

Figure 2 below shows the age range in October 2013 for the DCP workforce in the UK. The majority of dental therapists (74 per cent), orthodontic therapists (73 per cent) and dental nurses (62 per cent) are between 22 and 40 years old. Dental hygienists have high proportions of 31- to 50-year-olds (59 per cent). Dental technicians and clinical dental technicians have larger proportions of staff aged 61 and older than the other professions (10 per cent and 15 per cent respectively), and high proportions of 41- to 50-year-olds (31 per cent and 42 per cent respectively).

Figure 2: Workforce totals in UK by age



Source: GDC headcount figures for UK, as at October 2013

3. An outline of our workforce planning approach

3.1 Overview

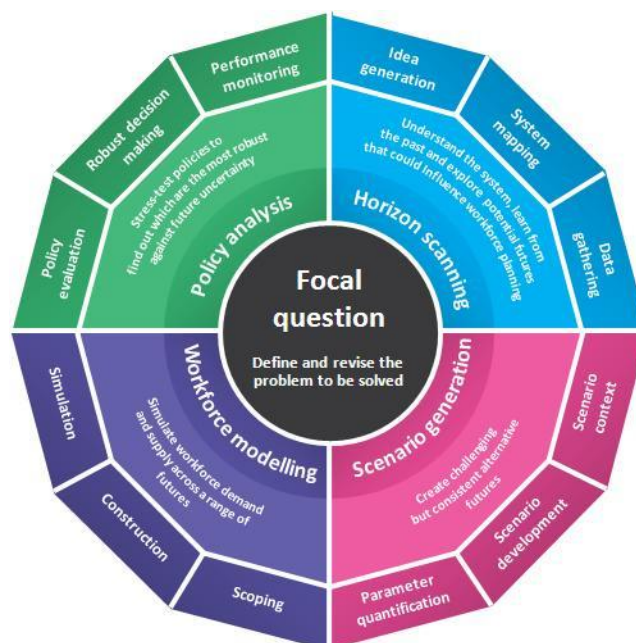
The CfWI robust workforce planning process (outlined in Figure 3 below) recognises the complexities of factors influencing demand and supply, and the intrinsic uncertainty of the future. The steps involved in this work include producing a baseline where ‘nothing changes’ and producing a ‘principal projection’ which is a forecast of expected demand and supply (informed by elicitation exercises, relevant empirical data and workforce modelling). Our modelling shows the likely impact of uncertain variables on both the demand and supply of the DCP workforce.

It must be noted that whereas normally our focus is on forecasting demand versus supply, for this review our key objective is to determine the appropriate skill mix for the future dental workforce (and the supply needed to achieve it), taking into account factors such as implementation of reformed contractual arrangements that no longer base remuneration on a measure of output by dentists only.

The key benefits of this work are to:

- support longer-term planning, up to 2025
- support more robust decision-making, taking into account the uncertainties of the future
- help decision-makers be more alert to emerging risks as the future unfolds.

Figure 3: The CfWI workforce planning approach



Source: CfWI

3.2 Stakeholder involvement

This work was completed in close partnership with representatives from all the dental care professions, and also from the HEE Dental Advisory Group. Advisory group members understand the dental system and the DCP workforce, and are committed to sustaining and improving the quality of dental services in the future.

Stakeholders from across the dental care workforce were involved throughout this project to improve the quality and robustness of the model. Their involvement can also help improve their own understanding of the intelligence gathered in the report, and may support future decision-making. The range of key stakeholders involved in this stocktake includes:

- professional bodies
- heads of dental schools and postgraduate deans
- dental practices.

For a full list of the stakeholders involved at each stage of this project, please refer to Appendix A.

Site visits

As part of this stocktake, we conducted interviews with dental practice owners and key stakeholders. The purpose of these was to gain insight into the barriers and enablers to delegation within the dental team at present. The knowledge gained has been fed into this report. We visited two general dental practices with contrasting contractual arrangements and different DCP staff structures. Please see Appendix D for a summary of the two site visits.

DCP job roles we looked at

Our commissioners asked us to forecast demand versus supply for the following DCP job roles:

- dental hygienists
- dental therapists
- orthodontic therapists
- dental nurses.

These roles were chosen as they are likely to be impacted by the NHS dental contract reform, and by the contextual factors discussed earlier in this report.

3.3 Overview

In order to forecast and analyse future demand versus supply for the DCP workforce between 2013 and 2025, the CfWI used its robust workforce planning approach.

The steps involved in this review include producing a baseline where ‘nothing changes’ and a ‘principal projection’ (an expected future forecast for demand and supply, informed by an elicitation panel exercise). Our modelling shows the likely impact of uncertain future variables on both the demand and supply of the DCP workforce.

Principal projection

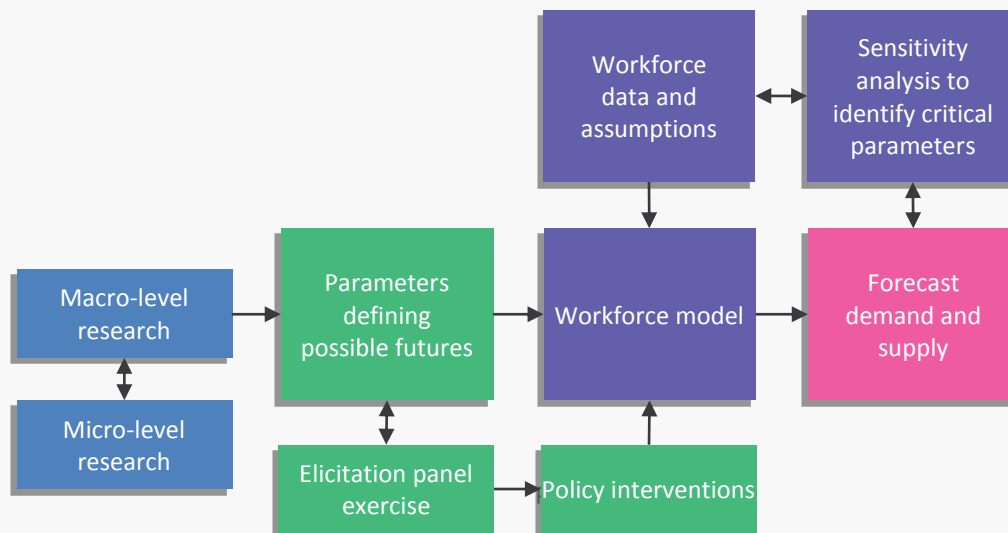
Our calculation of future demand is based on the population’s total need for dental care and on the estimates of the proportion of care that could be delivered by DCPs in future (i.e. the future skill mix).

The variables that have the greatest impact on workforce supply include training numbers, workforce attrition (including retirements) and participation rates (i.e. the extent to which people work part time and take career breaks).

Modelling workforce 'system dynamics'

A model was developed by the CfWI to provide demand and supply projections for DCPs. The model uses existing data sources and – where data is lacking – modelling assumptions (see Appendix C for details of modelling assumptions). The future projection should not be read as a prediction or forecast of the future, but rather a projection to inform debate and decision-making on policy options.

Figure 4: CfWI robust workforce planning approach to the DCP workforce



Source: CfWI robust workforce planning framework

Modelling assumptions

Assumptions were made, as appropriate, where data was lacking or of poor quality. A full list and more details of the data sources used can be found in Appendix C. In addition, we engaged a panel of stakeholders with expertise in dental care in an elicitation exercise to quantify key future uncertainties where these could not be derived from data/trends.

The elicitation method is a best-practice, systematic and interactive method of forecasting and quantifying unknowable variables. The elicitation process involves representing the knowledge of a group of experts concerning an uncertain quantity as a probability distribution. Advice was given by Professor Tony O'Hagan, an elicitation expert.

Elicitation workshops

The CfWI carried out two elicitation workshops in April and June 2014. Dental representatives were asked to quantify the proportion of dental care that is carried out by DCPs today and how this proportion might change by 2025.

The first workshop began by identifying factors that may impact on the whole DCP workforce by 2025, followed by elicitation exercises looking at DCPs as a whole (dental hygienists, dental hygienist/therapists, orthodontic therapists, dental technicians, clinical dental technicians and dental nurses).

The CfWI then agreed with commissioners to run a second elicitation workshop looking at four DCP job roles separately to gain demand and supply forecasts for the individual professions of dental hygienist, dental therapist, orthodontic therapist and dental nurse. These professions were chosen as they were considered likely to be impacted by factors such as reformed contractual arrangements. A full list of attendees is available in Appendix A, with key questions and responses available in Appendix B.

All the inputs for the workforce model were then defined and quantified as:

- **facts we knew** – baseline data to populate the model, for example current training and workforce numbers
- **assumptions we made** – predictable trends and assumptions needed where data was not available or of poor quality
- **assumptions derived from elicitation** – intrinsically uncertain variables for the expected future which were quantified using the elicitation panel exercise
- **parameters the system can control** – parameters that policymakers can use to adjust demand and supply so that they are in balance.

As it is not possible to predict the future with certainty, the CfWI uses a ‘principal projection’ or more likely future.

3.4 Workforce modelling

The purpose of the CfWI’s workforce modelling is typically to project demand and supply for a given profession or team for the expected future. CfWI demand modelling is broadly based on a framework from a Canadian research programme on health human resources (Birch, et al., 2011). The framework separates out four key elements of demand:

1. **population** – the size of the population being served, by age and gender
2. **level of clinical need** – the needs of the population given the distribution of health and illness, future risk factors and cosmetic dentistry
3. **capacity** – the ability of the workforce to deliver the necessary services, taking into account factors such as skill mix and technology.

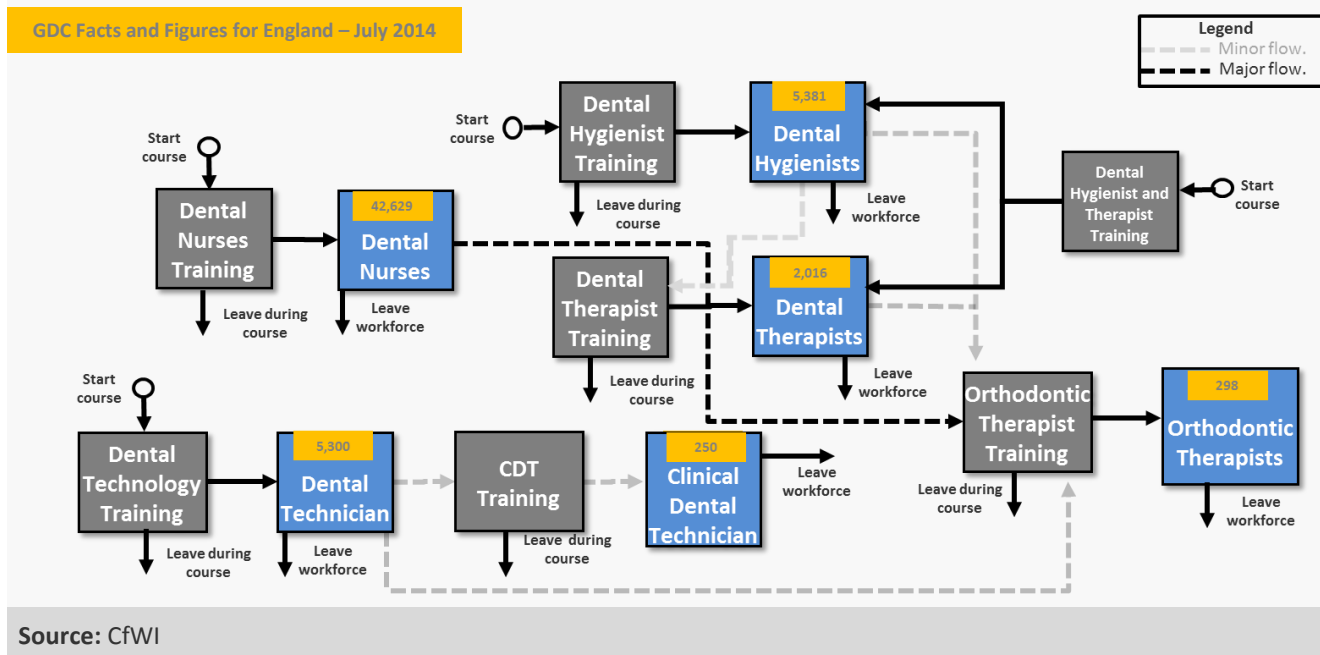
The data used to forecast future demand for DCPs due to demographic changes accounts for both the increased size of the population and also the changing age profile of the population (particularly a higher proportion of older people) to 2025.

These demographic factors were combined with demand assumptions for the ‘principal projection’ derived from our elicitation panel exercises. The CfWI uses this general approach because it provides a clear, logical separation of the key factors and supports the use of the elicitation panel exercise described above to help quantify them.

System dynamics modelling makes extensive use of simulation to understand how the behaviour of a system changes over time, which it represents by using the analogy of flows of stocks (people, money, materials) accumulating and depleting over time. In the CfWI models, ‘stocks’ of people can be segmented by age and gender, where data exists. Figure 5 shows the main stocks and flows of the DCP supply model.

The CfWI uses Vensim DSS® to model the complex flows of DCP training and workforce in order to forecast the future demand and supply of DCPs. The chosen software was able to handle the complexity of modelling supply, including the ageing of the workforce, and also offered sophisticated sensitivity and uncertainty analysis functionality, an important feature given the variable quality of data and assumptions available. The CfWI formally tested and validated the model to ensure reliability.

Figure 5: DCP workforce supply model stock and flow diagram



Data

The full list of data sources used in this project is outlined below.

- GDC data for DCPs (UK) October 2013
- GDC data for DCPs (England) – December 2013
- GDC data from KSS Deanery provided by our professional advisers
- Non-Medical Education and Training Budget (NMET) data
- Modelling the Dental Workforce Supply in England, University of Sheffield, 2010.

4. Dental care professional workforce projections

One aim of this review is to project and analyse the future demand for and supply of the DCP workforce looking ahead to 2025. The further into the future we project, the greater the uncertainty. However, it is important to take account of the impact certain interventions may have on future demand and supply. This section includes the demand and supply model outputs, analysis of these outputs and, importantly, options the DH and HEE may wish to consider.

4.1 Total DCP workforce projections

Principal projections were developed to illustrate the expected or most likely future for which the system needs to plan. It is important to focus on this 'expected' future demand and supply, as it provides a plausible insight into the balance of demand and supply.

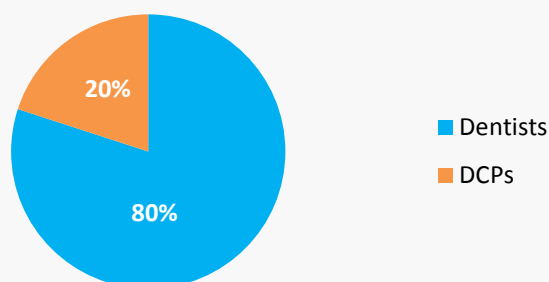
The modelling used to produce our future demand and supply projections required judgmental estimates to be made, and these are outlined in Appendix C. A full list of the variables and assumptions used in these forecasts is available in Appendix C. The central judgmental estimates were:

- all intakes, attrition rates and training 'delays' continue as at present
- all training posts are filled, with no delays in getting a job after qualification
- data on participation rate was informed by our panel of experts
- existing service levels meet the level of demand due to population and change in age balance by 2025, this includes a shift in level of need as forecast by our elicitation panel.

Elicitation workshop results and projections

To gather an understanding of the projections and how they sit within the overall proportions of the workforce, the judgments made by the panel in our elicitation workshop are shown below. Our panel judged that 80 per cent of direct patient care is currently carried out by dentists and the remaining 20 per cent by DCPs.

Figure 6: Total proportions of care carried out by the dentist and DCP workforce



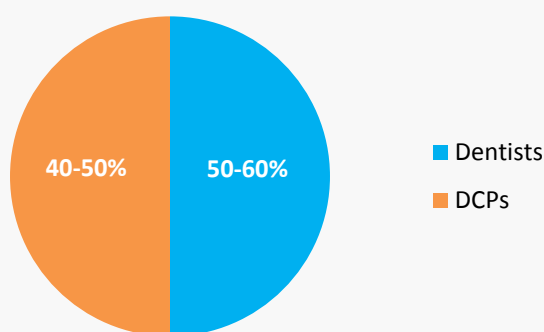
Source: CfWI panel judgements

The panel then made judgments on the most likely proportions of care delivered by each part of the workforce by the year 2025.

As shown in Figure 7 below, our panel believed that in the year 2025, between 50 and 60 per cent of dental care will be delivered by dentists (a decrease of between 20 and 30 per cent) and between 40 and 50 per cent by DCPs (an increase of between 20 and 30 per cent).

The view of our panel was therefore that DCPs can and should provide a greater proportion of dental care in the next 10 years, while dentists provide a smaller proportion of dental care. These percentages represent the system as a whole, and are not at the individual level. The findings from this workshop are supported by Evans and colleagues (2007), who showed that under current legislation, 35 per cent of patient visits and 43 per cent of clinical time is devoted to duties that could be undertaken by dental hygienists and therapists. They then went on to show that if diagnostic responsibilities were to be granted to dental therapists in the future, up to 70 per cent of visits and 58 per cent of clinical time could be delegated.

Figure 7: Total proportions of dental care which could be delivered by dentists and DCPs by 2025



Source: CfWI panel judgements

The following sections cover our individual projections for dental hygienists, dental therapists, orthodontic therapists and dental nurses. The charts below feature different net attrition rates and productivity growth assumptions. For more details on these, please see Appendix C.

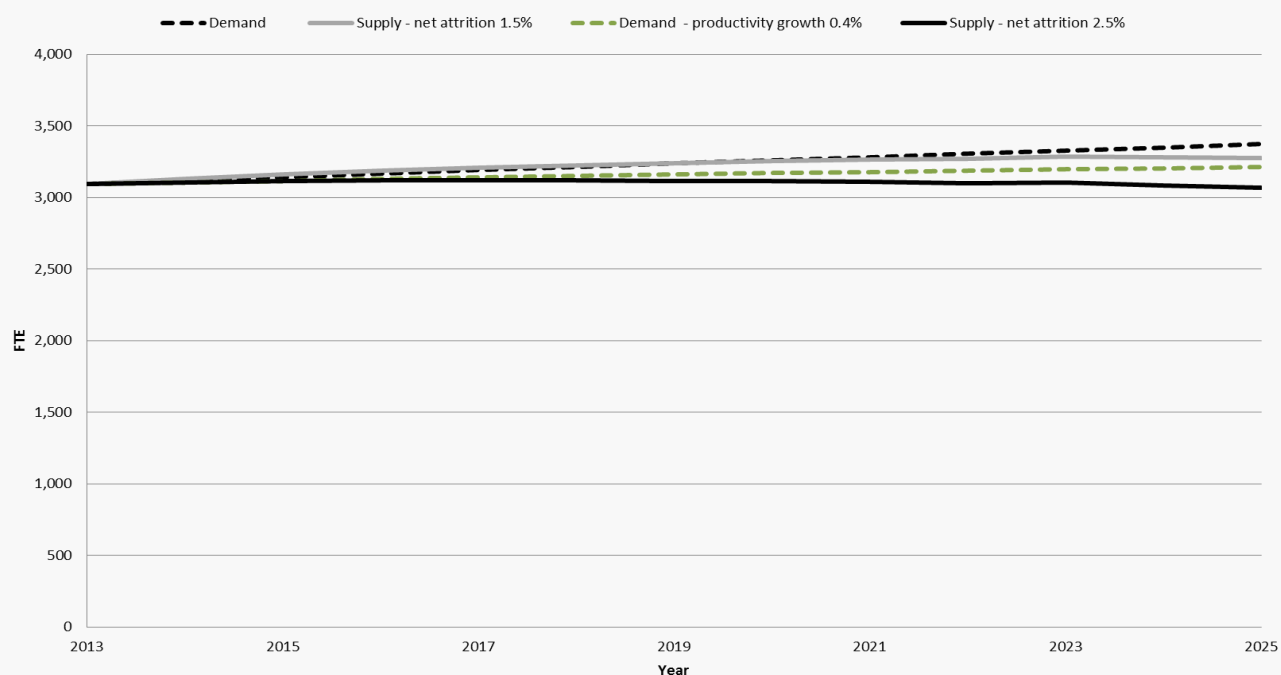
Dental hygienists

Figure 8 below shows the CfWI's baseline projection of demand and supply for dental hygienists up to 2025, while Figure 9 shows our principal projections. **The principal projection up to 2025 shows that demand for dental hygienists is expected to rise and significantly exceed supply.**

This assumption is based on a number of variables, including the early introduction of dental contract reform and a targeted approach to the dental care of older people. The principal supply projection does not rise significantly as the student intake and other supply variables do not change.

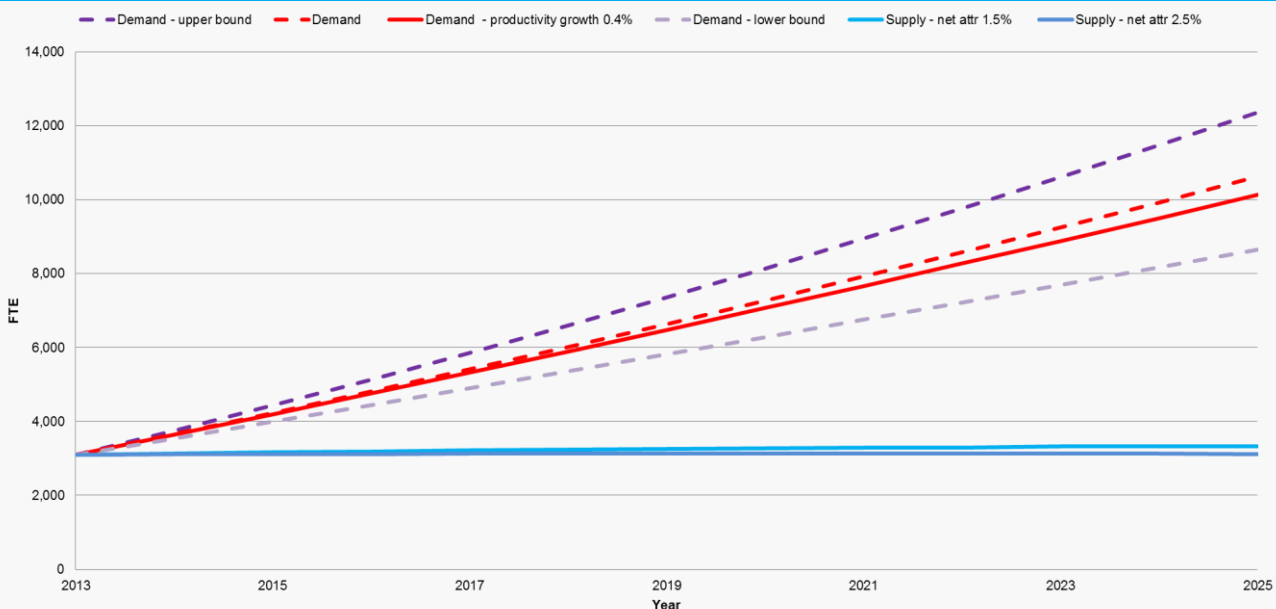
If, by 2025, dental hygienists and therapists were to carry out 18 per cent of all direct patient care as estimated by our expert panel, around 7,700 more dental hygienists would be needed.

Figure 8: Baseline projections: total demand and supply of dental hygienists



Source: CfWI system dynamics dental hygienist model for England

Figure 9: Principal projections: total demand and supply of dental hygienists showing demand above supply

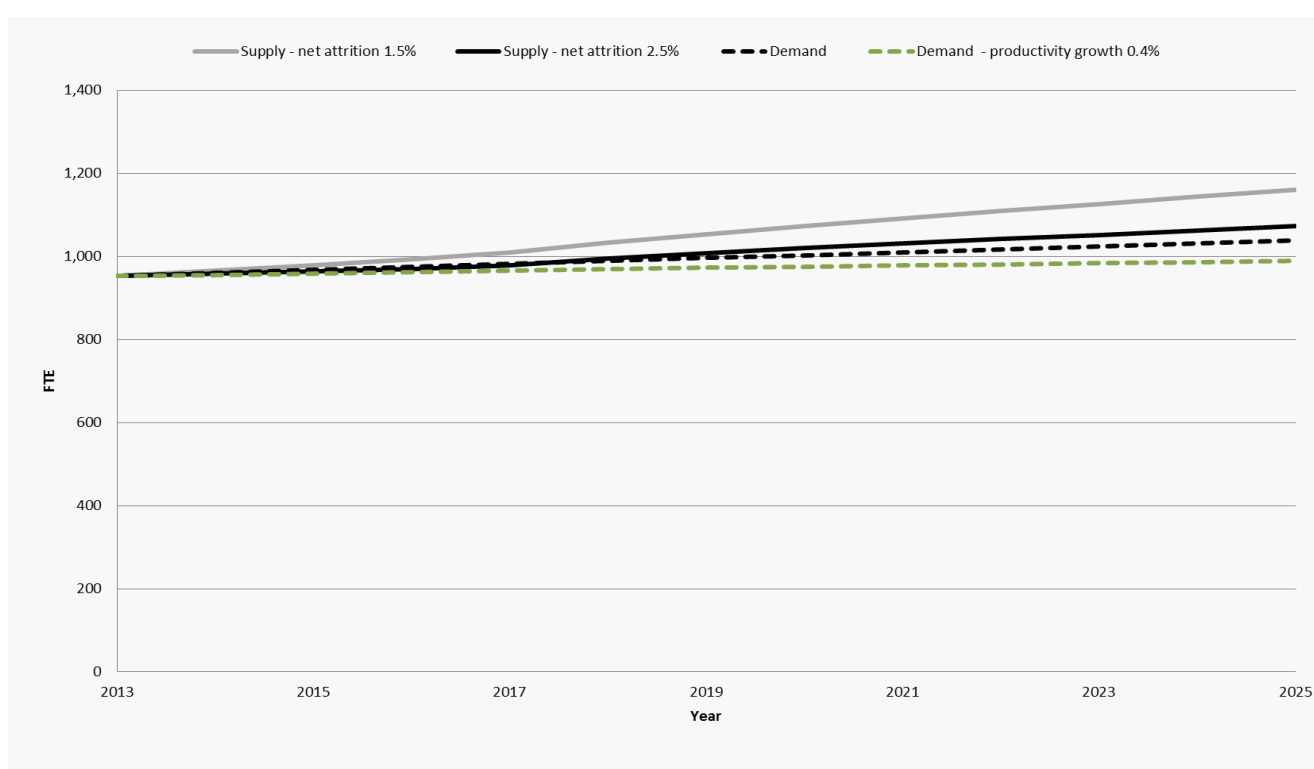


Source: CfWI system dynamics dental hygienist model for England

Dental therapists

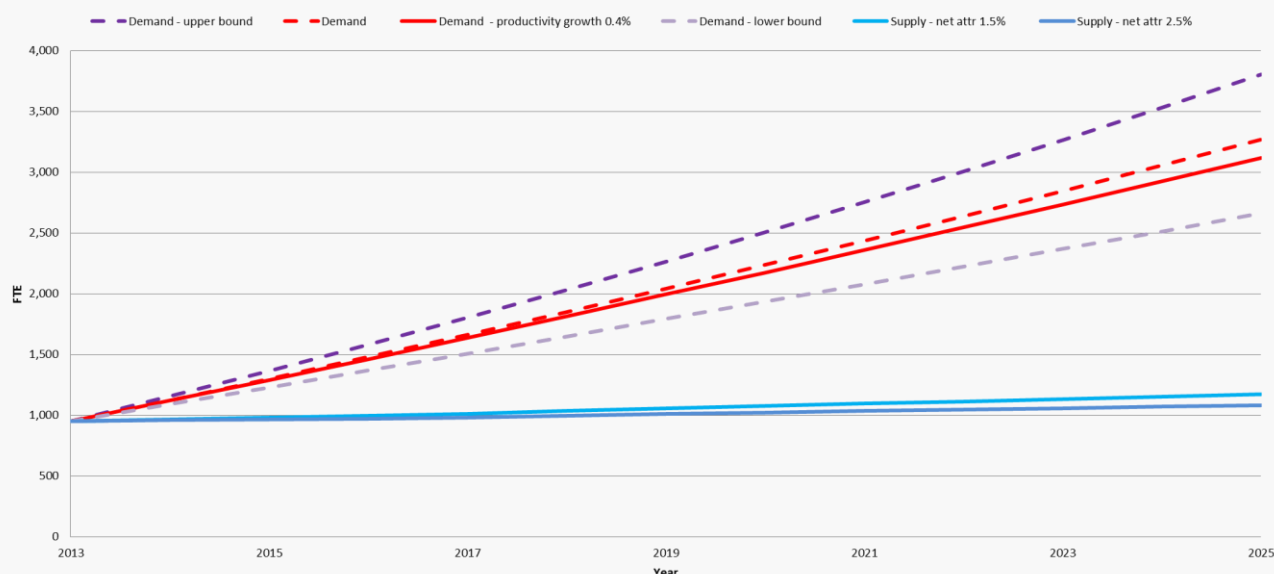
Figure 10 below shows the CfWI's baseline projection of demand and supply for dental therapists, while Figure 11 shows our principal projection. The principal projection up to 2025 shows that demand for dental therapists is expected to rise and significantly exceed supply. This assumption is based on a number of variables, including the early introduction of the proposed reformed dental contract and a targeted approach to the dental care of older people, but we do acknowledge that there are currently employment difficulties for dental therapists. The principal supply projection does not rise significantly as the student intake and other supply variables do not change. If, by 2025, dental hygienists and therapists were to carry out 18 per cent of all direct patient care as estimated by our expert panel, around 2,000 more dental therapists would be needed.

Figure 10: Baseline projections: total demand and supply of dental therapists



Source: CfWI system dynamics dental therapist model for England

Figure 11: Principal projections: total demand and supply of dental therapists showing demand above supply



Source: CfWI system dynamics dental therapist model for England

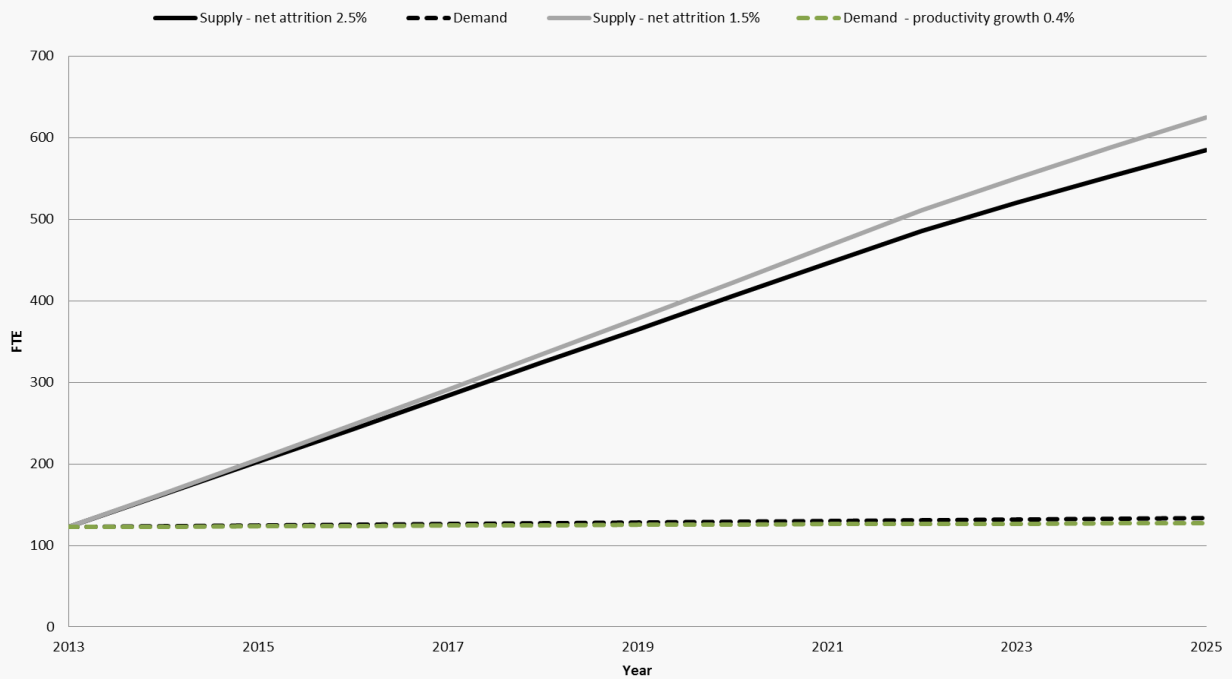
Orthodontic therapists

Figure 12 shows the baseline projection of demand and supply for orthodontic therapists, while Figure 13 shows the principal projection. At the current rate of expansion, and with the course duration being just one year, supply for orthodontic therapists has the potential to outweigh demand in the next 10 years (though demand is also rising).

If, by 2025, orthodontic therapists were to carry out 6 per cent of all direct patient care as estimated by our expert panel, around 200 fewer FTE orthodontic therapists would potentially be needed.

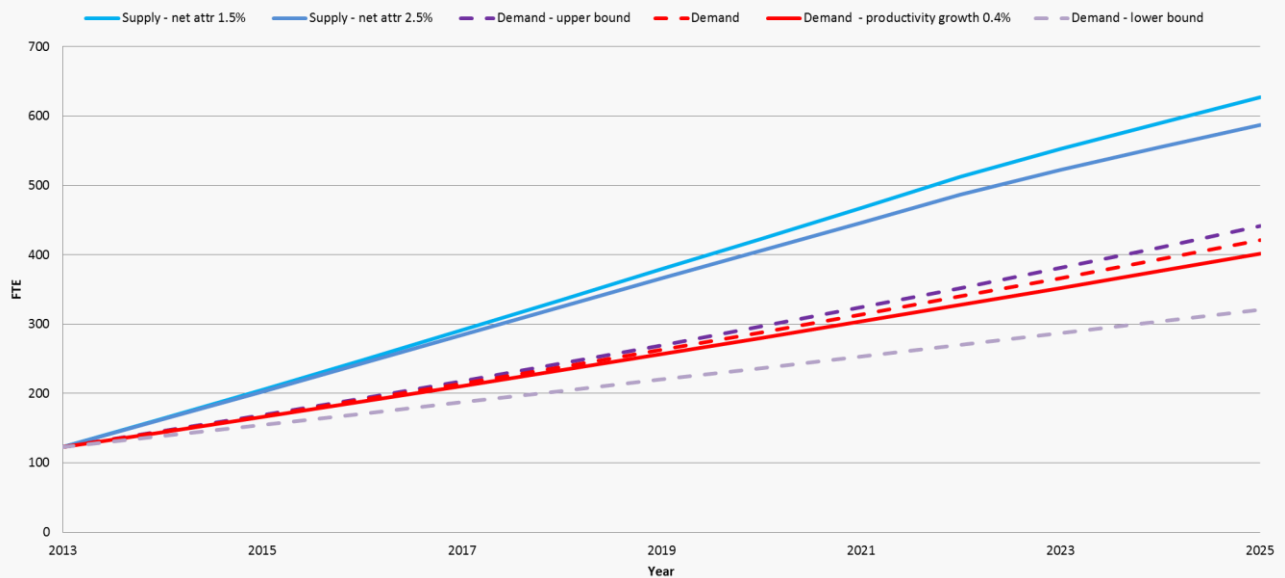
However, orthodontic therapy is a relatively new category and may need to be monitored on a more frequent basis than the other professions due to its shorter length of training (dental hygienists complete two years of training, while dental hygienist/therapists complete either 27 months or three years of training). It is worth noting that our stakeholders suggest orthodontic therapists are not currently being utilised to their full potential.

Figure 12: Baseline projections: total demand and supply of orthodontic therapists



Source: CfWI system dynamics orthodontic therapist model for England

Figure 13: Principal projections: total demand and supply of orthodontic therapists showing supply above demand



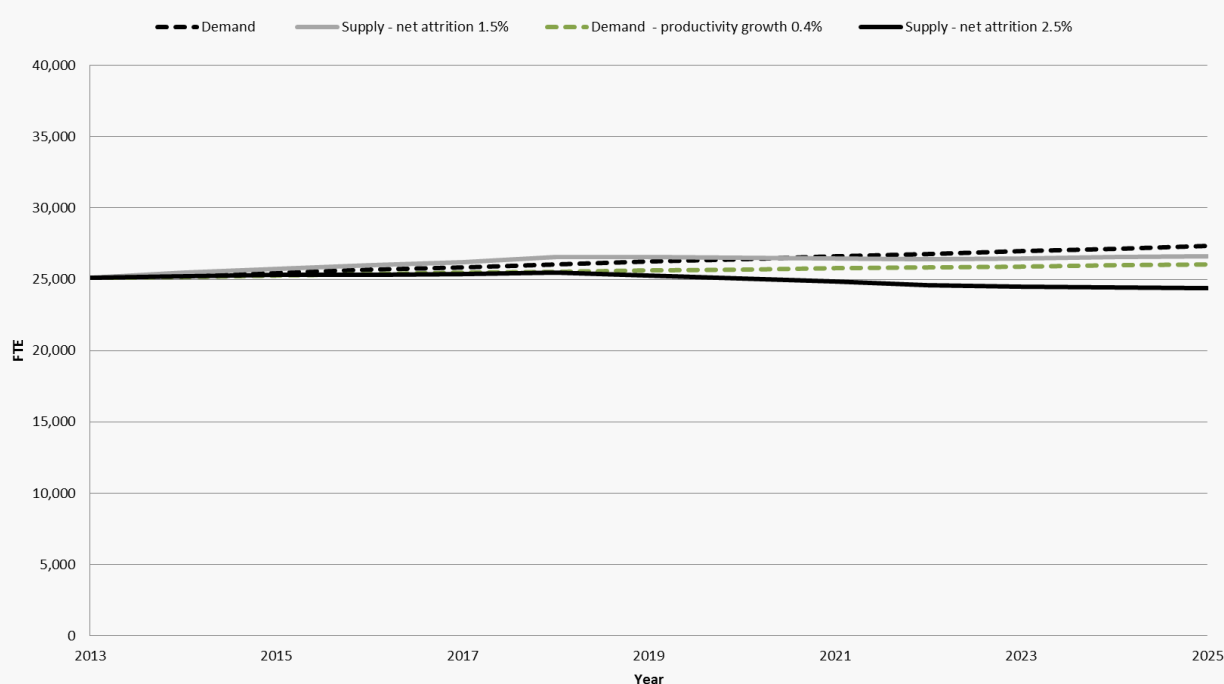
Source: CfWI system dynamics orthodontic therapist model for England

Dental nurses

Figure 14 below shows the CfWI's baseline projection of demand and supply for dental nurses, while Figure 15 shows our principal projection for the same workforce. The principal projection up to 2025 shows that demand for dental nurses is expected to rise and significantly exceed supply. The principal supply projection does not rise as the student intake and other supply variables do not change. If, by 2025, dental nurses were to carry out 25 per cent of all direct patient care as estimated by our expert panel (in addition to their current statutory role supporting dentists) up to 48,000 more dental nurses would be needed.

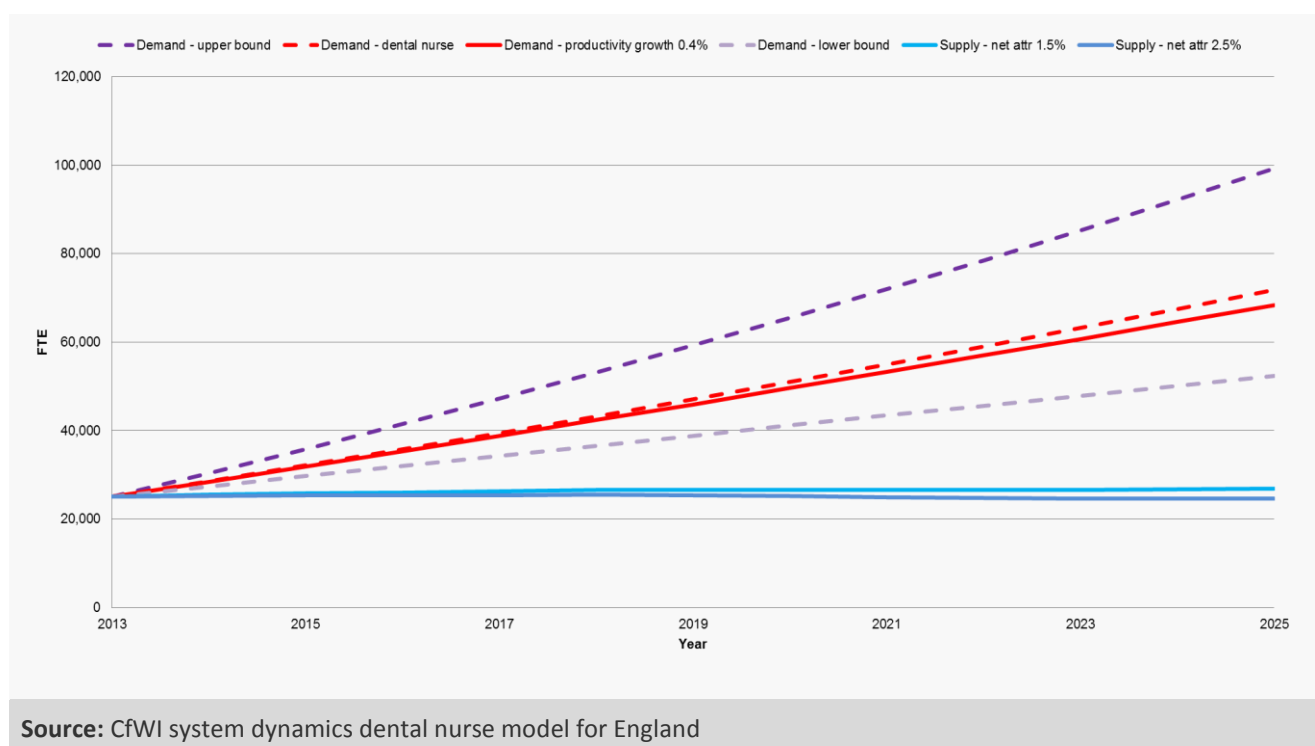
It is important to note that dental nurse education – though the biggest dental workforce group by headcount – is not nationally commissioned. In recent years there has been a strong demand for more dental nurses led by their registration with the GDC. This demand has been met by the training sector, which responded to this challenge in a positive way, resulting in training being made available through many different routes e.g. full time, part time, blended learning and correspondence courses. This resulted in no geographical limitations for students accessing training (which was previously a barrier). Supply is seen as sufficiently flexible to meet fluctuations in demand as it is driven by market forces, suggesting that gradual increases in demand could be met by workforce supply.

Figure 14: Baseline projections: total demand and supply of dental nurses



Source: CfWI system dynamics dental nurse model for England

Figure 15: Principal projections: total demand and supply of dental nurses showing demand above supply



Source: CfWI system dynamics dental nurse model for England

Considerations

How the DCP workforce may change up to 2025 cannot be considered without also considering the dentistry workforce. If there is expectation within the future workforce for DCPs to carry out a greater proportion of direct patient dental care, it is possible that there may need to be further adjustments to the dental school intake.

Given the above evidence for a risk of undersupply of dental hygienists, dental therapists and dental nurses and a small oversupply of orthodontic therapists (if this workforce were to continue to expand at the same rate), it would be prudent to keep the number of training places for both DCPs and dentists under review over the next 10 years.

However it must be noted that the potential changes within this stocktake highlight how the 'ideal' workforce could be created; and the likelihood of the workforce completely changing within the next 10 years is unlikely. The CfWI acknowledges that these changes involve large numbers, that any changes may need to take place over a period longer than 10 years and will rely on a concerted effort across the system. Changes should not begin to be implemented until the effects of reducing the dentistry student intake can start to be seen in 2017, as this reduction in intakes will be introduced in the 2014/15 academic year.

4.2 Suggestions to HEE

■ Ongoing monitoring and reviewing the dentistry workforce as a whole

Our projections for the future demand and supply of DCPs suggest it would be sensible to continue to monitor and review demand and supply, and any system changes that may affect their balance in the medium-to-long term. Even though there is a good geographical spread for roles such as dental hygienist-therapists, it is important that the training and local needs for the future are regularly reviewed to meet the needs of the population.

The CfWI believes it would be beneficial to review the dental workforce as a whole (dentists and DCPs together) every three years, taking into account any changes in the skill mix. The establishment of a dental workforce planning group within HEE may be a beneficial way of monitoring the changes in the structure and delivery of dental services, with implications for workforce planning.

- **A continued drive to improve DCP data**

To improve the quality and robustness of future modelling it would be beneficial to undertake a survey of the DCP workforce, using data from the GDC annual renewals of registration, in order to determine the activities of DCPs. This survey could look at variables such as participation rates, which have a significant impact on workforce supply.

Appendix A: Acknowledgements

The CfWI sought input from a wide range of dental professionals as part of this review. The following individuals made a significant contribution to the review, through the elicitation exercises, and/or through other consultation. We would like to thank them for their time and expertise.

- Jules Arnold (Health Education North West)
- Dr Priti Acharya (British Orthodontic Society)
- Hazel Beaudin (Smart Dental Care)
- Dr Paul Brocklehurst (The University of Manchester, School of Dentistry)
- Professor Paul Brunton (University of Leeds)
- Gemma Chapman (Dental therapist)
- Baldeesh Chana (British Association of Dental Therapists)
- Jacqueline Daunt (Barts and the London)
- Karen Elley (Health Education West Midlands)
- Fiona Ellwood (British Association of Dental Nurses)
- Helen Falcon (UK Committee of Postgraduate Dental Deans and Directors)
- Janet Goodwin (FGDP UK)
- Dr Ian Gordon (Alpha Dental)
- Sue Gregory (Public Health England)
- Tony Griffin (Dental Technicians Association)
- Fiona Grist (The Orthodontic National Group)
- Dr Philip Henderson (British Dental Association)
- Donna Hough (British Association of Dental Nurses)
- Andrea Johnson (Orthodontic Technicians Association)
- Dr Serbjit Kaur (Department of Health/Health Education England)
- Professor Stephen Lambert-Humble (Faculty of General Dental Practice)
- Ishrat Love-Chowdhury (Health Education England)
- Alison Lowe (British Society of Dental Hygiene and Therapy)
- Dr Jane Luker (Health Education South West)
- Robert McCormack (Kent, Surrey and Sussex Postgraduate Dental Department)
- Ulrike Matthesius (British Dental Association)
- Peter Otzen (Principal of practice)
- Jane Pierce (General Dental Council)
- Katherine Plumstead (Practice manager)
- Harjinder Purewal (Health Education West Midlands)
- Sarah Reed (Dental therapist)
- Professor Tara Renton (King's College London Dental Institute)
- Philippa Ann Riesley-Prichard (Principal of practice)
- Diane Rochford (British Society of Dental Hygiene and Therapy)
- Julie Rosse (British Society of Dental Hygiene and Therapy)
- Samit Shah (Specialist Registrar in Dental Public Health)
- Janet Stobbart (Practice manager)
- Melanie Taylor (Dental hygienist)
- Nicholas Taylor (North Western Deanery)
- Dr Steve Williams (Integrated Dental Holdings Group)

We would also like to thank our commissioners Barry Cockcroft (DH and HEE) and John Stock (HEE) and our professional advisers Jerry Read and Michael Wheeler for their advice throughout this stocktake.

Appendix B: Elicitation questions

An elicitation process was used to quantify variables for modelling the future demand and supply of dental care professionals. It is not possible to predict the future with certainty, which is why the CfWI uses a 'principal projection' to identify the plausible future conditions.

The focal question

Thinking up to the year 2025, what driving forces (both predetermined and uncertain) may influence:

- requirements of the future dental care professional (DCP) workforce
- DCP workforce numbers and proportions?

Factors derived from the cluster building workshop

- Team work
- Funding
- Incentives
- Workforce transformation
- Politicisation of the NHS
- Society
- Public health
- Technological advances

Elicitation questions

- What amount of dental care is currently delivered by [each workforce group](#) as a whole today?
- What is the maximum amount of dental care that could be delivered by [each workforce group](#) by 2025?
- What amount of dental care is likely to be delivered by [each workforce group](#) by 2025?
- What amount of time would [each workforce group](#) need to spend in 2025 to deliver the same level and intensity of dental care as today?

Where the term 'each workforce group' is used, this was substituted for the following professions for each round:

- all DCPs grouped together
- dental hygienists/therapists
- orthodontic therapists
- dental nurses
- and, as a sense-check, dentists

Table B1 shows the values obtained from the elicitation process.

Table B1: Values obtained from elicitation questions: demand

Question	Profession	Median	Highest value	Lowest value
What amount of dental care is delivered by each workforce group as a whole today?	Total for three roles	20%	18%	38%
	Dental nurse	10%	10%	10%
	Dental hygienist/therapist	6%	5%	10%
	Orthodontic therapist	2%	2%	2%
What is the maximum amount of dental care that could be delivered by each workforce group by 2025?	Total for three roles	55%	25%	68%
	Dental nurse	27%	15%	30%
	Dental hygienist/therapist	20%	18%	28%
	Orthodontic therapist	6%	4%	8%
What amount of dental care is likely to be delivered by each workforce group by 2025?	Total for three roles	50%	25%	60%
	Dental nurse	25%	15%	35%
	Dental hygienist/therapist	18%	15%	20%
	Orthodontic therapist	6%	4%	6%
What amount of time would each workforce group need to spend in 2025 to deliver the same level and intensity of dental care as today?	Total for three roles	35%	25%	50%
	Dental nurse	25%	-12%	7%
	Dental hygienist/therapist	0%	-3%	3%
	Orthodontic therapist	0%	-1%	0%

Appendix C: Data sources and modelling assumptions

Table C1. Definitions of data quality

Table C1: Definitions of data quality	
Level	Definition
Very high	Referenced dental data source; direct one-to-one mapping of data to input variable
High	Referenced dental data source, but not a direct one-to-one mapping to the variable
Medium	Based on a data source with assumptions to map to model structure (may be older/incomplete data)
Low	Referenced to a similar data/CfWI judgment
None	Value assigned but no confidence in the data value

Source: CfWI workforce planning framework

Table C2. Supply modelling assumptions

Model element/variable	Data confidence rating ⁴	Source of data/assumption	Validation	Data/assumption
Annual number of students starting DCP courses in England	M	<p>Dental nurse: calculations based on dental nurses registered with GDC in England from 2009.</p> <p>Dental hygienist, dental therapist and dental hygienist and therapist: deaneries data collection by profession. CfWI</p>	The available data and assumptions have been verified with the Chief Dental Officer.	<p>Dental nurse: 2009 2010 2011 2012 2013 1,400 1,400 1,508 2,242 2,242</p> <p>Dental hygienist: 2009 2010 2011 2012 2013 33 36 36 35 41</p> <p>Dental therapist: 2013 2014 2015 12 12 18</p> <p>Dental hygienist and therapist</p>

⁴ VH= very high; H=high; M=medium; L=low

Model element/variable	Data confidence rating ⁴	Source of data/assumption	Validation	Data/assumption
		professional adviser, January 2014. Orthodontic therapists: calculations based on orthodontic therapists registered with the GDC in England between January 2013 and the same period in 2014.		training: 2009 2010 2011 2012 2013 201 206 211 218 225 Orthodontic therapist: 65 from 2013
Annual age profile of students starting DCP courses in England	M	n/a	The available data and assumptions have been verified with the Chief Dental Officer.	No data available for making a reasonable assumption so workforce age profile data has been used here.
Time taken to complete DCP courses	M	Dental nurse: NEBDN data provided via email in February 2014. Dental hygienist: NA Dental therapist: NA Dental hygienist and therapist: NA Orthodontic therapist: NA	The available data and assumptions have been verified with the Chief Dental Officer.	Dental nurse: 1 year – 90% 2 years – 10% For the professions listed below, assumptions are based on the length of the course supposing that all the students will complete it on time. Dental hygienist: 2 years full time – 100% Dental therapist: 2 years part time: 2 days a week – 100% Dental hygienist and therapist: BSc course – 3 years – 100% Diploma – 27 months – 100% Orthodontic therapist: 1 year – 100%
Percentage of students that leave at some point during their course	H	Dental nurse: NA Dental hygienist: assumption based on CfWI – Workforce Risks and Opportunities: Dental Professions.	The available data and assumptions have been verified with the Chief Dental Officer.	0 to 5% is the range that is used in other non-medical reviews in the CfWI for attrition from training. In this range dental nurse seems to be the profession with the highest percentage while all the other

Model element/variable	Data confidence rating ⁴	Source of data/assumption	Validation	Data/assumption
		<p>September 2011</p> <p>Dental therapist: assumption based on CfWI – Workforce Risks and Opportunities: Dental Professions. September 2011</p> <p>Dental hygienist and therapist: assumption based on CfWI – Workforce Risks and Opportunities: Dental Professions. September 2011</p> <p>Orthodontic therapist: NA</p>		<p>professions have a relatively low attrition.</p> <p>Dental nurse: 5%</p> <p>Dental hygienist: 2%</p> <p>Dental therapist: 2%</p> <p>Dental hygienist and therapist: 2%</p> <p>Orthodontic therapist: 0%</p>
Percentage of leavers following successful completion of DCP courses	H	<p>Dental nurse: calculation based on: – City and Guilds Dental Nurse Qualifications – National Examination Board for Dental Nurses qualifications – GDC Dental Nurse Registrations from City and Guild /NEBDN qualified. Data provided via email on 13 February 2014.</p> <p>Dental hygienist: NA</p> <p>Dental therapist: NA</p> <p>Dental hygienist and therapist: NA</p> <p>Orthodontic therapist: NA</p>	<p>The available data and assumptions have been verified with the Chief Dental Officer.</p> <p>No data available for making a reasonable assumption for the other professions (dental hygienists, dental therapists and orthodontic therapists).</p>	<p>Dental nurse: 25%</p> <p>In 2013, 30% of dental nurses who started training with City and Guilds and NEBDN (two major training providers) didn't register with GDC. Assuming that each year 5% of students drop out of training therefore here it's been supposed that the remaining 25% will leave the system after achieving qualification.</p>
DCP trainees into workforces	M	<p>Assumptions based on latest GDC registration trends by profession and professional advisers' judgment.</p>	<p>The available data and assumptions have been verified with the Chief Dental Officer.</p>	<p>100% of dental nurses qualified who stay in the system join the dental nurse workforce.</p> <p>100% of dental hygienists qualified who stay in the system join the</p>

Model element/variable	Data confidence rating ⁴	Source of data/assumption	Validation	Data/assumption
				<p>dental hygienist workforce.</p> <p>70% of dental hygienists and therapists qualified who stay in the system join the dental hygienist workforce.</p> <p>30% of dental hygienists and therapists qualified who stay in the system join the dental therapist workforce.</p> <p>100% of dental therapists qualified who stay in the system join the dental therapist workforce.</p> <p>100% of orthodontic therapists qualified who stay in the system join the orthodontic therapist workforce.</p>
Current number of DCPs in the workforce	VH	GDC Facts and Figures by profession (England). June 2013	The available data and assumptions have been verified with the Chief Dental Officer.	<p>Dental nurse: 40,453 (men [1%], women [99%])</p> <p>Dental hygienist: 5,098 (men [4%], women [96%])</p> <p>Dental therapist: 1,773 (men [5%], women [95%])</p> <p>Orthodontic therapist: 221 (men [9%], women [91%])</p>
Current age profile of DCPs in the workforce	VH	GDC data for DCPs by profession for the UK workforce. October 2013	The available data and assumptions have been verified with the Chief Dental Officer.	<p>Age profile calculated in age bands of five years.</p> <p>Same age profile assigned to men and women. The workforce in fact is not being modelled by gender, given the current gender balance (see the above variable) and no clear indication of a change in the next 10 years.</p>
Annual number of DCPs entering the workforce from overseas	N	n/a	No data available, the effect of joiners is accounted for in the attrition value.	0

Model element/variable	Data confidence rating ⁴	Source of data/assumption	Validation	Data/assumption
Annual number of DCPs returning having previously left	N	n/a	No data available, the effect of joiners is accounted for in the attrition value.	0
Age-based attrition rate for DCP workforce	M	Sheffield data, 2010.	The CfWI continues past trends due to lack of specific evidence.	<p>Probability of leaving the workforce based on Sheffield data by profession for DCPs aged 56 years and over.</p> <p>It's been estimated a range between 1.5 and 2.5 per cent of DCPs below the age of 56 leave the workforce each year for reasons other than retirement – assumption based on similar considerations applied in other non-medical workforces reviewed by CfWI (pharmacists and speech and language therapists for example).</p> <p>Orthodontic therapist attrition rate – (assumption based on orthodontics data since orthodontic therapists were not sampled in the Sheffield survey)</p>
DCPs participation rate	VH	Sheffield data, 2010.	The available data and assumptions have been verified with the Chief Dental Officer.	<p>Dental nurse: 0.64</p> <p>Dental hygienist: 0.60</p> <p>Dental therapist: 0.53</p> <p>Orthodontic therapist: 0.74 (assumption based on orthodontics data since orthodontic therapists were not sampled in the Sheffield survey)</p>
Workforce going into training for another DCP role	M	Assumption based on deaneries data collection and professional advisers' judgment.	The available data and assumptions have been verified with the Chief Dental Officer.	<p>Dental therapist training:</p> <p>2013: 12</p> <p>2014: 12</p> <p>2015 onwards: 18</p> <p>100% are dental hygienists.</p> <p>Orthodontic therapist training: 65 from 2013</p> <p>97% are dental nurses</p> <p>1% dental therapists</p>

Model element/ variable	Data confidence rating ⁴	Source of data/assumption	Validation	Data/assumption	
				1% dental hygienists 1% dental technicians	
Demand source activity	VH	AGE BANDS: 3–15 Attendance rate estimated is 1.5. Assumption based on NICE guidelines (children should attend at least every 12 months). AGE BANDS: 16+ Dentist attendance rate per age band; data from 2009 Adult Dental Health Survey results.	The available data and assumptions have been verified with the Chief Dental Officer.	AGE BANDS	ATTENDANCE
				0–2	0
				3–15	11,640
				16–24	9,193
				25–34	8,642
				35–44	11,909
				45–54	12,403
				55+	23,873

Productivity growth assumption: Baseline and principal projection demand modelling assumption

The CfWI has applied a 0.4 per cent productivity growth to both the baseline and the principal projection demands. A modest growth assumption of around 0.4 per cent per annum in line with the ONS (2012) estimate of average historical health productivity growth is reasonable. The modelling of our baseline and principal projection demands presented in this report incorporate that assumption for the period 2013–25.

Table C3. Productivity growth assumption

Demand for DCPs	Source of data/assumption
Demand baseline	Productivity is assumed to increase by 0.4 per cent annually.
Demand principal projection	Office for National Statistics (ONS) (2012) <i>Public Service Productivity Estimates: Healthcare, 2010</i> .

Source: CfWI DCP workforce demand model for England

Dentistry Delphi variables

Values from Dentistry Delphi (July 2013) used in this work

The CfWI has reused some of the results from the recent Delphi exercise run in July 2013 for the purposes of the dentistry review, assuming that those values apply to the DCP workforce as well.

Table C4. Dentistry Delphi variables

Variable	Source of data/assumption	Value (median)
Change in average retirement age	CfWI's dentistry Delphi, 2013	+2 years
Change in the average need of the population	CfWI's dentistry Delphi, 2013	+ 5%

Source: CfWI Strategic Review of the Future Dentist Workforce

Appendix D: Summary of site visits

The information gained from these site visits is not the opinion of the CfWI and is solely the information gathered from our external site visits at two practices, where members of the dental teams were interviewed by the CfWI. Their responses to our questions and the information and knowledge they imparted are provided in detail below.

Site visit 1: Pilot practice

Features of the practice

It is a very busy practice established 18 years ago and is currently located at two sites in the centre of Devizes, Wiltshire, each with three surgeries.

Contractual arrangements

The practice was participating in the NHS dental pilot programme through which the Department of Health is trialling new contractual arrangements aimed at improving dental health and dental access for NHS patients. Under these arrangements the practice is remunerated by capitation, subject to an overall limit on list size, with payments weighted by severity of oral health need under the RAG (red amber green) system.

NHS commitment

The practice provides about 95 per cent of its services under the NHS. Where clinically indicated, scaling is provided under the NHS (the practice policy is not to polish teeth).

Staffing

The practice has seven dentists, including a foundation trainee. The work pattern of the dentists varies. The practice principal and another dentist work four days per week, but do long days that amount to a five-day working week. The other dentists work two or three days per week. The dental therapist works four days a week at this practice and the dental hygienist three days per week.

Duties of DCPs

The dental therapist spends about half her time working as a therapist: providing restorations to patients of all ages, and delivery of oral health promotion advice. In the remainder of her time she works as a dental hygienist: scaling, giving oral health promotion (OHP) advice and, where appropriate, the application of fluoride varnish. The hygienist works exclusively on these duties. The dental nurses provide chair-side support to the dentists, the dental therapist and the dental hygienist. Both the dental hygienist and therapist hold salaried positions.

Enhanced duties

None of the dentists were contracted to provide enhanced services. The practice considers that the dentists have enough complex work to fill the time freed up by delegation to the dental therapists and dental hygienists. The dental nurses here have not been trained to apply fluoride varnish.

Community OHP schemes

Neither the former primary care trust nor the current area team of NHS England has approached the practice about participating in a community-based OHP/fluoride varnish scheme.

Scope for further delegation

There was some scope for further delegation. Older dentists are not necessarily aware of the wider range of duties that dental therapists can now undertake, whilst some newly qualified dentists are reluctant to delegate because they wish to build up their experience of undertaking all types of dentistry. It was agreed that the application of fluoride varnish could be delegated to dental nurses if they received appropriate training.

It was also agreed that there would be a growing requirement for dental hygiene treatment as a result of older people, who are maintaining their dentition, having an increased risk of periodontal disease. The proportion of edentulous patients seen by the practice has fallen even faster than the national average.

Contractual implications for delegation

The former remuneration systems – pre 2006 item for service and subsequent UDAs – had not facilitated delegation but had not been an absolute impediment. They did not adopt the practice of requiring the dentists to pay for duties delegated to a therapist or hygienists from the UDA payment appropriate to the treatment. The current capitation payments offer more flexibility for funding delegation, but the most significant aspect of the contractual arrangements was the use of care plans. They enabled the dentist to indicate whether they wished to see the patient again at the end of the course of treatment (or whether the therapist or hygienist could ‘sign-off’ the course of treatment). Not only did this reduce the dentist’s workload but it empowered the therapist and hygienist to decide on the patient’s need for continuing care.

Impediments to delegation

With the dental therapist and dental hygienist currently fully occupied, further delegation would require new staff to be taken on. Given that the practice premises (at both sites) offered no scope for expansion, this could only be achieved by reducing the number of dentists to free up a chair. It was not felt that this was currently practicable but could be considered in the future. No source of funding was likely to emerge which could provide for new practice premises or significant alterations to expand the existing practice premises.

Discussion

The dental therapists had been among the first cohort to be trained by the University of Portsmouth School for Professionals Complementary to Dentistry, which opened in 2004. There was a general problem of therapists having to work as hygienists for a greater proportion of their time than they would wish. New graduates were also having difficulty in finding jobs (even as hygienists). There was agreement that jobs were difficult to find and there was no need to expand numbers in training until the scope for delegation under dental contract reform was clearer.

Site visit 2: Non-pilot practice

Features of the practice

This is a long-standing training practice in Cowley, Oxfordshire. The practice has nine surgeries and was rebuilt two years ago to the practice principal’s specifications.

Contractual arrangements

The practice is on a standard NHS contract. The associates’ remuneration is based on the UDA – they are paid a proportion of the UDA’s value for each course of treatment that they undertake after deduction of overheads for core costs – premises, equipment, consumables, etc. It is up to the associates to decide whether to refer a patient to the therapist. If so, the therapist’s salary costs are also deducted from the UDA value paid to the associate.

NHS commitment

Ninety-eight per cent of the practice’s patients are treated under the NHS. Where clinically indicated, scaling is carried out as part of a band 1 course of treatment. Band 2 is appropriate too for those patients who require periodontal care.

Staffing

The practice has a total of 35 staff (headcount) including:

- 9 associate dentists, including two dental foundation trainees (DF1s)
- 1 dental therapist undertaking vocational training (VT) for three days a week
- 11 dental nurses
- 14 other staff, including the practice manager, decontamination staff, reception and other administrative staff.

Duties of DCPs (dental therapist)

Generally the associates refer:

- all patients requiring routine dental hygiene treatment
- children requiring restorations and/or advice on prevention/oral hygiene
- selected adult patients requiring restorations, particularly those with a tendency to dental phobia
- the treatment of apprehensive children who require acclimatisation to treatment – this has prevented many referrals for general anaesthetics to secondary care.

In addition the practice principal ensures that the therapist gets the range of patients necessary to give her experience of all the treatments within the competence of a dental hygienist/therapist. This is much appreciated by the therapist, whose experience of other newly trained therapists suggests that newly qualified hygienists/therapists are having increasing difficulty in finding work as therapists. Too often they start in a dental hygienist's role, during which their therapist skills decline through lack of use.

Enhanced duties

None of the dentists were contracted to provide enhanced services. They consider that the dentists have enough complex work to fill the time freed up by delegation to the dental therapists and dental hygienist. One of the dental nurses has been trained to apply fluoride varnish. In addition, both the associates and the dental therapist will varnish teeth where it is clinically indicated as part of a patient's course of treatment.

Scope for further delegation

The members of the dental team interviewed agreed that there was some scope for further delegation.

Contractual implications for delegation

If the NHS contractual/remuneration arrangements were more supportive of delegation, the practice would consider substituting one of its associate posts for that of a full-time dental therapist.

Impediments to delegation

The practice staff suggested that, in their experience, most dentists are not necessarily aware of the wider range of duties that dental therapists can now undertake, whilst some newly qualified dentists are reluctant to delegate because they wish to build up their experience of undertaking all types of dentistry.

Open discussion on foundation training for dental therapists

- The review team were informed of two schemes – one in the West Midlands, the other in the area of the Thames Valley LETB. The foundation schemes are relevant to the problem newly qualified hygienists/therapists are having in finding work as therapists, which was reported to the review team at both visits, at an interview with a key stakeholder and reported by the British Society of Dental Hygiene and Therapy (BSDHT) (May 2014) .
- The review team were informed that the foundation scheme addresses this problem by ensuring the trainees get therapist's work, enables them to sharpen their skills, increase their speed, gain experience working as a member of the dental team and convey information on the role and scope of practice of therapists to patients, practice managers and, most importantly, dentists – particularly newly qualified dentists who may feel threatened by the increased use of therapists.
- The Thames Valley scheme was funded from a development bid to the then health authority. It was evaluated and deemed successful and has continued.
- The scheme has capacity for 12 places and an average of nine or 10 appointments each year, with the main constraint being finding sufficient numbers of interested practices with capacity and trainers who are interested in

training. There is strong interest from potential therapist trainees with 45 applications for 10 places for the year beginning September 2014.

- The practices are paid 50 per cent of therapist salary funding at Band 6 for three days per week, plus trainer grant and practice expenses. The total budget to run the programme is based on £20,000 per place for a part-time (three days) post including educational programmes and support.

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