# WELSH ASSEMBLY GOVERNMENT

## Task and Finish Report

## Orthodontic Sub-group

## September 2010

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## Terms of Reference

- To identify and discuss the key issues associated with orthodontic provision and the criteria for NHS orthodontic treatment in Wales. To make recommendations regarding significant issues which need to be addressed by the Welsh Assembly Government, Local Health Boards or the dental profession.
- To contribute where possible toward meeting the *One Wales* agenda on the provision of NHS dental services (Reviewing NHS reconfiguration, strengthening NHS finance and management, developing and improving Wales health services, ensuring access to health care, improving patients' experience, supporting social care).

Recommendations should:-

- be capable of being implemented with maximum efficiency and safeguards for the public purse.

Within the parameters above, the Group will wish to:

- consider implications from the commissioner, patient and provider perspective;
- consider the funding implications of implementing any recommendations and the on-going costs;
- share best practice from national and local implementation; and
- keep the Minister advised on progress.

## Executive Summary

- It is estimated that 40 percent of the 12-17 year old cohort are likely to need orthodontic treatment as assessed using the Index of Orthodontic Treatment Need (IOTN). Currently 27 percent (range within Health Boards 14 to 41%) of the 12-17 year old population receive active orthodontic treatment in Wales.

- The perceived/subjective need is likely to be lower because not all those in need will wish to enter treatment and some, due to factors such as poor oral hygiene, will not be suitable for treatment.

- In 2008 to 2009 £12.7 million was spent on orthodontics annually with the average Unit of Orthodontic Activity (UOA) value £62 (range £58-£74). There is no adjustment to the value of a UOA for economy of scale or quality of outcome. **The group believe that with effective commissioning that this sum of money would be capable of meeting the orthodontic needs of Welsh patients; however a small proportion of funding (7.5%) will need to be reinvested to facilitate modernisation, detailed management and support.**

- Orthodontic care is essentially provided for children by the General Dental Service (GDS)/Personal Dental Service (PDS) (82%), Hospital Dental Service (HDS) (15%) and the Community Dental Service (CDS) (4%). There are 8,991 treatments undertaken under GDS/PDS regulations in Wales and 68 percent are reported as completed. The completion of an activity report FP17OW form is mandatory. Eighty-nine percent of forms are submitted although 25 percent of forms are not returned relating to active care.

- There are inconsistencies in the length of orthodontic contracts between LHBs and orthodontic providers (3-7 years) and the contracts are not related to quality of care delivered.

- There is a high proportion of “Assess and review” activity being undertaken with little resulting treatment.

- There are a large number of early referrals below 9 years of age, which is not uniform across Wales or Local Health Board (LHB) areas but appears to be practitioner specific.

- There are 135 practitioners providing orthodontic care in Wales, 27 providing no active treatment and 3 practitioners providing over 400 treated cases per year.

- The orthodontic workforce is likely to be challenged due to retirements and changes in working practices but there is an opportunity to streamline the orthodontic services through contracts and retirements. There should be a commitment to training orthodontic specialists, dentists with a special interest (DwSI) in orthodontics and orthodontic therapists for Wales.

- The orthodontic workforce should be led by specialist orthodontists supported by orthodontic therapists, DwSIs, orthodontic nurses and orthodontic technicians.

- There appears to be little unnecessary treatment undertaken in Wales but the IOTN data is self reported and should be validated. The introduction of the IOTN appears to have helped to clarify referral criteria to orthodontic providers and helped standardised entry into orthodontic care. However, clinical governance is in its early stages and all practitioners need to demonstrate a high quality of orthodontic service is provided.

- Orthodontic activity is monitored closely in the GDS/PDS through the FP170W although similar activity data is not generally available for the HDS/CDS.

- There are some large waiting lists for treatment in all services and some interim funding may be required to clear this backlog of patients following waiting list validation.

- Currently, the system of provision and management of orthodontic services in Wales is largely inefficient and access to services is not uniform. Higher cost-efficiency can be achieved through better procurement, contract/service management and skill mix.

- Monitoring of treatment outcome is equally important from the patients' perspective and to ensure value for money.

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## 1. Introduction and background:-

This review was initiated as a result of reports of orthodontic capacity issues:

- Perceived increase in numbers of orthodontic referrals
- Perceived increase in inappropriate referrals
- Long waiting times for initial consultation
- Long waiting times for treatment
- Inability to access treatment

In April 2006 the Welsh Assembly Government introduced a new set of regulations for general dental services, personal dental services, the dental performers list, patients' charges and functions of 22 Local Health Boards (LHBs). These new regulations represented the biggest change in the delivery of NHS dental services since 1948 by introducing a commissioner (LHB) managed system. Following a further reorganisation of NHS Wales in October 2009, 7 LHBs were created:

- Abertawe Bro Morgannwg University
- Aneurin Bevan
- Betsi Cadwaladr University
- Cardiff and Vale University
- Cwm Taf
- Hywel Dda
- Powys Teaching

In the context of orthodontic provision capacity issues, introduction of a new contract and re-organisation of the LHBs it is timely to review orthodontic provision and its management.

There have been many reports suggesting the wide-ranging benefits of orthodontic treatment such as improvement in facial and dental aesthetics, dental health, function (masticatory/speech), self esteem, social and educational development, improved life-long earning potential and improved quality of life.[1-4] Some of these reported benefits are difficult to quantify and are continually being researched. In the absence of evidence of unequivocal causal links between deviant occlusal traits and morbidity, the Index of Orthodontic Treatment need (IOTN) was developed in the late 1980s. This scale orders the severity of deviant occlusal traits in to 5 grades (Grade 5 having the highest severity) depending on the long-term threat it imposes to the longevity of the dentition and surrounding stuctures.[5,6]

Orthodontic treatment is undertaken to correct the deviant occlusal traits and improve the alignment and fit of the teeth. In the UK orthodontic treatment is usually undertaken between 12 and 16 years of age once the canine and premolar teeth have erupted.[7] The patient is assessed by their own General Dental Practitioner (GDP) and should only be referred to a practitioner providing orthodontic treatment if the patient presents with good oral hygiene, has good dental status and the IOTN score is Dental Health Component (DHC) 4&5 or DHC 3 plus an Aesthetic Component (AC) ≥ 6 (Appendix 1). The referral criteria has standardised entry into NHS orthodontic care.

*Provision of orthodontic treatment*

In England and Wales orthodontic treatment can be delivered in the General Dental Services (GDS)/Personal Dental Services (PDS), Hospital Dental Services (HDS), Community Dental Services (CDS) and through private contract with practitioners. Several reports have suggested the vast majority of orthodontic care is provided by the GDS/PDS and there appears to have been a shift in the provision between1991 and 2005 with the GDS/PDS and CDS losing share and HDS gaining share (PDS/GDS 85%, 79%: CDS 10%, 3%: HDS 5%, 16%: other 2%).[8,9] However, the data collected from the salaried services are not as robust as the GDS/PDS data and it is difficult to obtain information from the private sector although the number of treatments in the 12-17 year old category with the NHS IOTN threshold criteria is likely to be low.

The current roles for the various services are outlined in Table 1.

Table 1 Role of the orthodontic services

| General/Personal Dental Services | Community Dental Services | Hospital Dental Services | Private |
|---|---|---|---|
| Provide orthodontic treatment DHC grades 4&5 and Grade 3 with an Aesthetic Component of 6 or more. | Provide orthodontic treatment DHC grades 4&5 and Grade 3 with an Aesthetic Component of 6 or more. | Provide complex treatments with a high treatment need (grades 4&5 DHC of IOTN). | Provide orthodontic care for any type of deviant occlusal anomaly which is paid for through a private contract. |
| Provide a range of orthodontic treatments mainly for children. | Provide treatment for a range of special care patients who have limited access to other, appropriate specialist treatment. | Provide advice to dental and medical colleagues and second opinions. | |
| Can provide inter-disciplinary treatments. | Inter-disciplinary treatments. Community Orthodontists work closely with consultants and other dental and medical specialists. | Provide inter disciplinary treatments<br>- Maxillo-facial<br>- Restorative<br>- Paediatric<br>- Other: feeding, strokes, sleep apnoea. | |
| | Provide a 'safety net' service in areas of the country not well served by specialist practice or hospital orthodontic providers. | Provide advice and support for treatments undertaken in primary care by GDPs, DwSis and community orthodontists. | |
| | Provide a much higher degree of flexibility in responding rapidly to demographic changes. | Provide an educational environment for all members of the dental profession. Liaise with postgraduate Dean and provide direct training for SpRs and FTTAs. | |
| | | Provide advice related to orthodontic provision (needs, demand, resources and contracting of services). | |
| | | Maintain communications and actively be involved in national bodies relating to orthodontic provision (best practice, evidenced based orthodontics, policy initiatives and implementation etc.) | |
| | | Research, innovations, health care improvement which will include audit. | |
| | | Develop and improve special clinical interests (e.g. sleep apnoea, strokes, feeding). | |
| | | Provide care for in-patients where appropriate e.g. breathing difficulties, advice post-operative surgical adjustments for trauma, planned surgical corrections for individuals with craniofacial disharmony. | |

Orthodontic treatment can be provided by i) the patients own GDP, ii) dental practitioners who have a specialist orthodontic interest (DwSI),[10, 11] iii) practitioners who have a specialist orthodontic qualification, and more recently by iv) orthodontic therapists under supervision of a qualified dental practitioner.[12] All these providers can work in any of the four services outlined in Table 1. Slightly different terminology is used under the new contractual arrangements with contract holders called 'providers' and those that perform dentistry called 'performers'. Table 2 provides a summary of the different possible arrangements. The arrangements refer to the way practitioners contract and perform their work under the new system. For example, LHBs hold contracts with providers to deliver an agreed level of dental service. A provider that sub-contracts all the dental activity to performers is classed as provider only. Alternatively, providers may also act as a performer (providing performer) and deliver dental services themselves. Performer only dentists do not hold contracts with the LHB directly to deliver services (i.e. they work for a provider only or providing-performer dentist).

| Table 2 Types of orthodontic providers | |
|---|---|
| Provider only | Under contract with LHB but not performing orthodontics. |
| Performer | A dentist named on a contract that will or might be carrying out the work agreed in the contract. |
| Providing-performer | Previously practice owner, non-associate or first-party associate. Under contract with LHB and also performing orthodontics. |
| Performer only | Previously second-party associate, assistant or locum. Working for practice owner, principal or body corporate. |

*Cost/Units of Orthodontic Activity*

The cost of the orthodontic activity is calculated using the Unit of Orthodontic Activity (UOA).[13] UOAs are awarded when the practitioner performs an orthodontic assessment (one UOA) and when a course of treatment is commenced (22 UOAs for patients aged 18 years or above, 20 UOAs for patients aged 10-17 years and 3 UOAs for patients under 10 years of age). Currently the average UOA in Wales 2008/2009 is £62 (England £61). The CDS and the HDS collect some activity data but not as comprehensively as the GDS/PDS.

*Monitoring the Orthodontic Activity*

To enable monitoring of activity practitioners are required to complete the FP17OW at the start and on completion of treatment. The form comprises eight parts; recording provider, patient details, exemptions and remissions, orthodontic data set (treatment proposed/provided, orthodontic assessment and start, orthodontic completion) and declaration (Appendix 2). These forms contain all the information necessary to monitor treatment activity. The National Health Service Business Services Authority Dental Services (NHS DS) collects the data and provides interim and annual reports. The robustness of the data depends on the forms being fully completed by all practitioners. It is a mandatory requirement for all practitioners to complete the FP17OW forms and inform changes in activity against contract within 60 days.[14]

**2. Objective assessment of orthodontic treatment need**

The Child Dental Health Survey is undertaken every 10 years and reports on the orthodontic status in children using the IOTN.[15] Child Dental Health survey reported that 56 percent of 12 year olds and 60 percent of the 15 year old children in Wales had no orthodontic treatment need. By15 years of age, 32 percent of the children had either received orthodontic treatment or were undergoing a course of treatment. These data suggest that 44 percent of the child population (12-15 years of age) need orthodontic treatment and 32 percent receive some form of orthodontic intervention. These findings should be treated with caution as the survey represents essentially two cross-sectional studies observing two different age groups. A true assessment of orthodontic treatment need would require an observational cohort study monitoring treatment need and treatment outcome from 12 to 17 years of age. Similar levels of treatment need at 12 and 15 years of age suggest little impact from the orthodontic treatment provided, a 4 percent difference may reflect the differing ages of treatment starts in the two different cross sectional samples and/or less than ideal treatment outcomes. It should be appreciated that the estimation of orthodontic treatment need in a cohort at the age of 12 years is likely to increase over time as a result of late pubertal growth, facial maturation and lower incisor uprighting/crowding.[16] Orthodontic treatment outcomes have been a matter of concern in the UK and a recent publication highlighted a wide discrepancy in the quality of completed treatments in Wales.[17, 18] Sophisticated statistical methods have enabled the formation of a robust cost-effectiveness league table to rank the orthodontic outcomes of orthodontic practitioners.[19]

Two excellent reports have been published on orthodontic treatment needs in Mid and West Wales and South and East Wales highlighting current difficulties and suggesting a way forward.[20,21] Some actions have already being undertaken as a result of the recommendations made by these reports.

The level of treatment need in a population at a particular age will depend on previous interventions (e.g. extractions), which may have resulted in a beneficial or adverse effect on the dentition and surrounding structures.

Table 3 provides an overview of the uptake and need for orthodontic treatment by postcode area in the 12 -17 year old population. Using mid-year population estimates and averaged for the 12 to17 year age groups (representing a one-year cohort) the predicted number of children requiring orthodontic treatment can be determined for each area (Table 3; columns 1 to 3).[22] Because there is considerable cross border activity the number of treatments was determined by the area in which it was provided and where the patient lives (column 4).

In 1,127 instances the postcode was not available and these patients were distributed proportionally across all areas (column 5). The HDS and CDS treat about 2,040 patients per year (columns 6&7). The overall treatment provided by all the services is 11,031 (column 8), representing 27 percent of the 12-year-old population (column 9) and the expected shortfall/excess in treatment numbers (column 10). The shortfall in treatment provision is 1,570 patients although Cardiff, Caerphilly, Vale of Glamorgan, Merthyr Tydfil, Neath Port Talbot, Rhondda Cynon Taf, Swansea and Torfaen show a surplus of treatments (32% to 41%) for their population need which could be used to facilitate equity of delivery across Wales. The assessment of treatment need and uptake in the population is an estimation and consequently subject to error, which may be in the order of +/- 10%.

It would be pragmatic to manage 50 percent of the shortfall of 1,570 patients as not all the individuals who have an objective need will demand orthodontic treatment.

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|---|
| The savings mentioned above reduces the overall shortage to 785 patients (column11). |

Other efficiency savings could be employed to further reduce the treatment shortage, which will be highlighted later. Where there are perceived capacity pressures consideration should be given to the number of patients being treated from other areas with sufficient capacity.

Referral patterns, uneven geographic orthodontic provision, social deprivation and the potential patients not meeting the entry criteria in terms of good oral hygiene and good dental status can explain the discrepancy in the different levels of orthodontic treatment uptake.

In addition the volume and type of treatments undertaken in the HDS and CDS will have an influence on the types of treatments undertaken in the GDS/PDS. For example in Morriston Hospital 85 percent of treatments are undertaken on adults. This taken in combination with the absence of consultant(s) working in Carmarthenshire can have a significant effect of the number of children seen and treated in the area/LHB. This has been reflected in the estimated number of patients seen (Table 2, columns 6-9). The workforce survey (Appendix III) suggests a recent appointment to provide an additional consultant to service Hywel Dda.

### 3. Overview of orthodontic activity 2008-2009

It is estimated that over 45,500 individual patients attend for some aspect of orthodontic care in Wales with approximately 44,000 being below the age of 18 years of age.

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| Therefore approximately 5,500 individuals more than the total 12 to17 year old cohort (38,464) is seen each year. These figures suggest some inefficiency in the orthodontic service in Wales. |

The proportion of completed NHS treatments in Wales for children (less than 18 years of age) is comprised of; GDS/PDS 8,991 (82%), HDS 1,620 (15%) and CDS 420 (4%) (Table 1). Including adults the proportion is 8,991 (76%), HDS 2,448 (21%) and CDS 429 (4%). The proportion attributed to the HDS and CDS is much higher than reported previously.[8, 9]

| Table 3 12-17 year old population estimates for treatment need/uptake of orthodontic treatment and actual treatment uptake by area and postcode 2008-9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | |
| | 12-17 yr old cohort population estimate | Estimated 30% uptake of treatment | Actual treatment uptake in area where patient is treated | Actual treatment uptake by patients postcode* | Unknown evenly distributed across areas | HDS treatment starts | CDS treatment starts | Total CDS/HDS/GDS | % treatment uptake CDS/GDS/PDS/HDS | Treatment difference actual-30% of 12 yr pop | Pragmatic approach to treatment uptake | Total Need and unmet need | Number of orthodontic contacts per practitioner | | | | | | | | | HDS workforce | CDS workforce | No of practitioners with some orthodontic activity | 100 cases per provider | 300 cases per provider | 150 cases all | 300 cases per provider all | |
| | | | | | | | | | | | | | 0 | 1 10 | 11 50 | 51-100 | 101-200 | 201-300 | 301-400 | 401-600 | >601 | | | | | | | | |
| Isle of Anglesey | 871 | 261 | 34 | 166 | 189 | 35 | 0 | 224 | 26 | -37 | -18 | 243 | | 1 | 1 | | | | | | | | | 2 | 2 | 1 | 2 | 1 | |
| Gwynedd | 1472 | 442 | 528 | 280 | 319 | 75 | 0 | 394 | 27 | -48 | -24 | 418 | 4 | 3 | 1 | 1 | 1 | 1 | | | | 1 | | 11 | 4 | 1 | 3 | 1 | |
| Conwy | 1412 | 424 | 180 | 123 | 140 | 47 | 81 | 268 | 19 | -156 | -78 | 346 | | 2 | 1 | | 1 | | | | | 1 | | 4 | 3 | 1 | 2 | 1 | |
| Denbighshire | 1245 | 374 | 88 | 135 | 154 | 58 | 90 | 302 | 24 | -72 | -36 | 338 | 2 | | 1 | 1 | | | | | | | 1 | 4 | 3 | 1 | 2 | 1 | |
| Flintshire | 1954 | 586 | 256 | 190 | 217 | 62 | 0 | 279 | 14 | -307 | -154 | 432 | 4 | 3 | 1 | 1 | 1 | | | | | | | 10 | 3 | 1 | 3 | 1 | |
| Wrexham | 1631 | 489 | 374 | 288 | 328 | 45 | 0 | 373 | 23 | -116 | -58 | 431 | 2 | | | | 1 | 1 | | | | 1 | | 4 | 4 | 1 | 3 | 1 | |
| Powys | 1766 | 530 | 193 | 184 | 210 | 125 | 0 | 335 | 19 | -195 | -98 | 432 | 2 | 3 | 1 | 1 | 1 | | | | | 1 | | 8 | 3 | 1 | 3 | 1 | |
| Ceredigion | 902 | 271 | 3 | 123 | 140 | 35 | 0 | 175 | 19 | -96 | -48 | 223 | 1 | 4 | | | | | | | | | | 5 | 2 | 1 | 1 | 1 | |
| Pembrokeshire | 1603 | 481 | 66 | 281 | 320 | 40 | 0 | 360 | 22 | -121 | -60 | 421 | 0 | 4 | 2 | | | | | | | | | 6 | 4 | 1 | 3 | 1 | |
| Carmarthenshire | 2361 | 708 | 812 | 561 | 640 | 16 | 0 | 656 | 28 | -52 | -26 | 682 | | 1 | 5 | | 2 | 1 | 1 | | | | | 10 | 7 | 2 | 5 | 2 | |
| Swansea | 2670 | 801 | 1588 | 818 | 933 | 41 | 0 | 974 | 36 | 173 | 0 | 974 | 3 | 1 | 4 | 2 | 5 | 3 | | | | 2 | | 18 | 10 | 3 | 6 | 3 | |
| Neath Port Talbot | 1769 | 531 | 143 | 504 | 575 | 1 | 0 | 576 | 33 | 45 | 0 | 576 | | | 1 | 2 | | | | | | | | 3 | 6 | 2 | 4 | 2 | |
| Bridgend | 1688 | 506 | 345 | 288 | 328 | 10 | 5 | 343 | 20 | -163 | -81 | 425 | | | 3 | | 2 | | | | | | | 5 | 3 | 1 | 3 | 1 | |
| Vale of Glamorgan | 1736 | 521 | 134 | 480 | 547 | 52 | 40 | 639 | 37 | 118 | 0 | 639 | 0 | 1 | 1 | | 1 | | | | | | | 3 | 6 | 2 | 4 | 2 | |
| Cardiff | 3902 | 1171 | 2786 | 1230 | 1428 | 178 | 0 | 1606 | 41 | 435 | 0 | 1606 | 2 | 1 | 2 | | 1 | | 1 | 1 | 2 | 4 | | 10 | 16 | 5 | 11 | 5 | |
| Rhondda, Cynon, Taf | 3010 | 903 | 100 | 637 | 726 | 211 | 120 | 1057 | 35 | 154 | 0 | 1057 | 7 | 3 | | 1 | | | | | | | 1 | 11 | 11 | 4 | 7 | 4 | |
| Merthyr Tydfil | 753 | 226 | 37 | 35 | 40 | 156 | 84 | 280 | 37 | 54 | 0 | 280 | | 2 | 1 | | | | | | | 1 | 1 | 3 | 3 | 1 | 2 | 1 | |
| Caerphilly | 2306 | 692 | 207 | 616 | 702 | 45 | 0 | 747 | 32 | 55 | 0 | 747 | | | 2 | 3 | | | | | | | | 5 | 7 | 2 | 5 | 2 | |
| Blaenau Gwent | 980 | 294 | 140 | 86 | 98 | 72 | 0 | 170 | 17 | -124 | -62 | 232 | | | | | 1 | | | | | | | 1 | 2 | 1 | 2 | 1 | |
| Torfaen | 1243 | 373 | 91 | 262 | 299 | 100 | 0 | 399 | 32 | 26 | 0 | 399 | | 2 | | 1 | | | | | | | | 3 | 4 | 1 | 3 | 1 | |
| Newport | 1948 | 584 | 689 | 387 | 441 | 112 | 0 | 553 | 28 | -31 | -15 | 569 | | 1 | 3 | | 2 | 1 | | | | 1 | | 7 | 6 | 2 | 4 | 2 | |
| Monmouthshire | 1242 | 373 | 197 | 190 | 217 | 104 | 0 | 321 | 26 | -52 | -26 | 347 | | | | 2 | | | | | | 1 | | 2 | 3 | 1 | 2 | 1 | |
| Wales | 38464 | 11541 | 8991 | 7864 | 8991 | 1620 | 420 | 11031 | 27 | -510 | -785 | 11816 | 27 | 32 | 30 | 15 | 19 | 7 | 2 | 1 | 2 | 13 | 3 | 135 | 110 | 37 | 79 | 39 | |

The various orthodontic activities provide useful information on how the orthodontic service is delivered in Wales (Table 4) and broken down by age (Figure 1).

Table 4 Orthodontic Activity for Wales 2008-2009

| FP17Os | 0 to 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 or over | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Assess and Accept | 247 | 395 | 1,072 | 1,932 | 1,996 | 1,511 | 957 | 532 | 273 | 76 | 8,991 |
| Assess and Review | 3,868 | 2,310 | 2,876 | 2,828 | 2,137 | 1,413 | 918 | 560 | 338 | 153 | 17,401 |
| Assess and Refuse | 60 | 72 | 197 | 365 | 458 | 397 | 346 | 225 | 176 | 45 | 2,341 |
| Treatment Completed | 127 | 124 | 258 | 612 | 1,071 | 1,273 | 1,116 | 758 | 386 | 345 | 6,070 |
| Treatment Abandoned | 4 | 13 | 24 | 50 | 65 | 62 | 59 | 67 | 40 | 33 | 417 |
| Treatment Discontinued | 5 | 6 | 10 | 34 | 38 | 34 | 31 | 35 | 15 | 7 | 215 |
| Repairs | 4 | 11 | 80 | 165 | 172 | 179 | 107 | 50 | 28 | 13 | 809 |
| Regulation 11 Appliances | 3 | 8 | 22 | 63 | 102 | 129 | 99 | 49 | 49 | 29 | 553 |
| Total | 4,318 | 2,939 | 4,539 | 6,049 | 6,039 | 4,998 | 3,633 | 2,276 | 1,305 | 701 | 36,797 |
| Units of Orthodontic Activity | 4,919 | 10,686 | 25,649 | 43,897 | 44,649 | 33,684 | 21,447 | 11,997 | 6,269 | 1,956 | 205,153 |
| Number of Patients identities | 3,999 | 2,784 | 4,275 | 5,640 | 5,654 | 4,730 | 3,427 | 2,181 | 1,249 | 689 | 34,628 |

There is a high proportion of “Assess and review” relative to the number of patients treated particularly below 11 years of age. This was investigated more closely and there were essentially 27 practitioners undertaking “Assess and review” only activity which could fund an additional 231 treatments across Wales. In addition there were a significant number of practitioners who were treating a small proportion of patients relative to the number of “Assess and review” and could fund an additional 103 treatments across Wales.

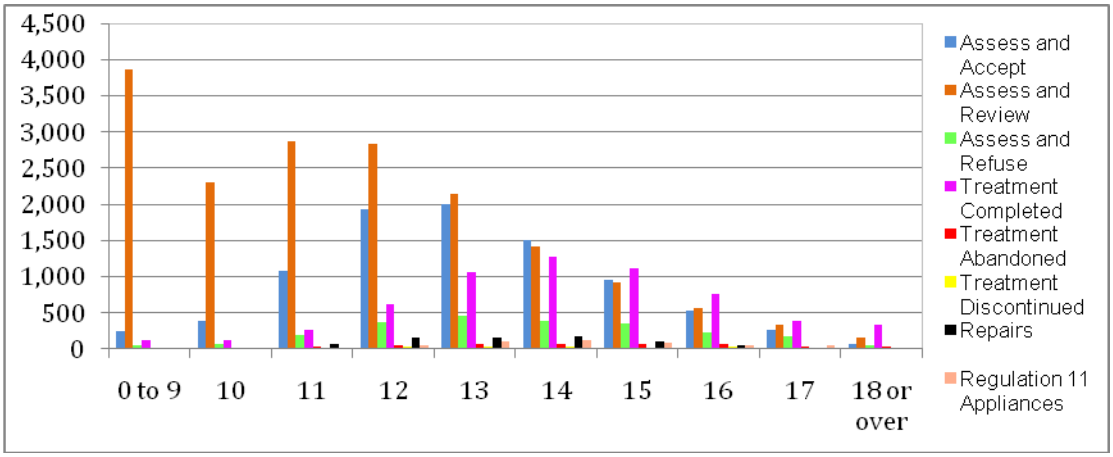


Figure 1 The prevalence of the different orthodontic activities are displayed for each age group

The average treatment to assessment ratio below 11 years of age is 9 percent compared with 39 percent for children aged 11 and over (for all ages the ratio is 31%). The ratio of referral to treatment ranges from 0-100 percent with some efficient practitioners and others with a high number of early referrals.

In the more efficient practices more than 50 percent of the assessments result in “Assess and treat”. In these practices fewer patients below the age of 9 years attended.

There is a large discrepancy between the number of patients taken on for treatment and the number reported as completed (2,282). This may be due to the practitioners not filling in the forms when the patient finishes treatment and there is no incentive to return the forms. However, the number of incomplete forms should be investigated as it is a mandatory requirement to complete the FP17OWs.[14] This will provide more accurate data for all providers and in particular the duration of orthodontic treatment.

The proportion of “Assessment and review” seems excessively high particularly below 11 years of age and is highlighted in Figure 1 and reported previously.[20,21]

It is unclear why so many “Assess and review” claims are made although it can result from GDPs claiming for an orthodontic assessment before a referral to an orthodontic provider which is inappropriate and should be investigated. In fact some of the UOAs were converted to UDAs 1UOA=3UDAs so this activity would cost more than the average UOA in Wales.

The Regulations are unclear about the number of assessments that can be undertaken for one individual although it would be appropriate that no more than one “assess and review” should be claimed for a particular patient within a two-year period unless there is a clear clinical need and this should be monitored using practitioner and patient postcode data.

The children are attending for assessment 12 months prior to being accepted for treatment and 12-18 months before treatment is completed. However there is considerable variation between practitioners.

*Number of treatments (Assess and accept)*

There are potentially 15,386 12 to 17 year olds who may present with an objective orthodontic treatment need (40 percent of the 12 to 17 year old cohort).

Therefore in the GDS/PDS 63 percent of individuals with an objective treatment need receive appliance therapy (including abandoned/discontinued treatments; Table 4) and 113 percent are “Assessed and reviewed”. The number of “Assess and reviews” seems excessive and warrants further investigation.

Six percent of all patients seen are refused treatment. If the 2,040 patients (13 percent of the objective treatment need group) are treated in the CDS/HDS then 76 percent of children with an objective treatment need could be treated.

Recent commitments to orthodontic treatment in Flintshire (2009 to 2010) should increase the number of patients being treated in Wales and equity in treatment provision needs to be improved across Wales.

*Early “Assess and review”*

The majority of orthodontic treatment (80 percent) is started in the 12 to 17 year old aged group, 19 percent below 12 years of age and 0.8 percent for 18 years and above. Of note, Gwynedd, Powys and Rhondda Cynon Taf are treating a small number of adult patients.

The largest amount of orthodontic treatment occurs in South Wales and generally matches the 12-17 year old population. Below 12 years of age Cardiff, Carmarthenshire, Newport and Swansea provide the most treatments (6.1%, 1.6%, 1.5% and 4.4% respectively (Table 7)).

The distribution of early assessment is not uniform across Wales but seems to be associated with individual practitioners (not generalised within or across areas) in Gwynedd, Powys, Pembrokeshire, Neath Port Talbot, Cardiff, Rhondda Cynon Taf and Torfaen (Figure 2).

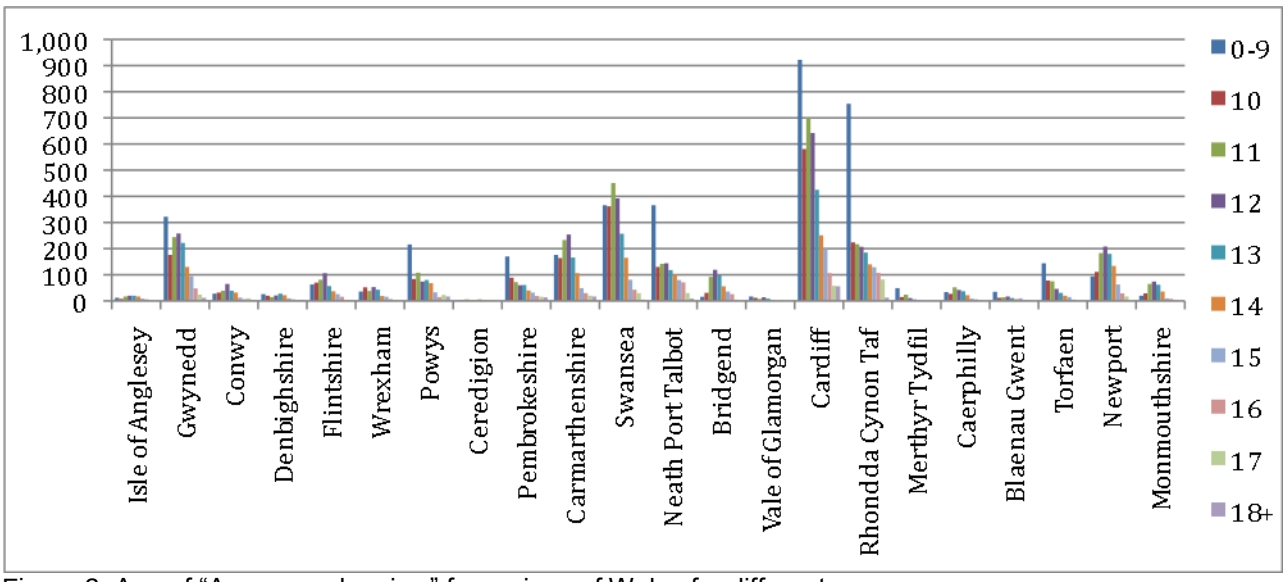

Figure 2 Age of "Assess and review" for regions of Wales for different age groups.

Many factors have been implicated in increased early referral rates. These include the impact of the referring dentists training and experience, and the length of current waiting lists. In addition, early referral occurs frequently with practitioners undertaking "Assess and review" activity only.

Analysis of early treatment trends in particular revealed (Table 5) that there is relatively very little active early treatment taking place (Cardiff n= 62 (0.7%), Carmarthenshire n=18 (0.2%), Newport n=21 (0.2%) and Swansea n=32 (0.4%). This is probably lower than expected given the prevalence of anterior cross-bites and other early childhood occlusal anomalies (2-4%). It may be the case that these patients may not be treated or are treated within the Community or Hospital Dental Services.

If the practitioners are not seeing and treating patients below 9 years of age there is no reason for the large number of referrals in this age group.

Table 5 Number of treatments undertaken in Wales by area and age 2008-2009

| | 0 to 11 years | | 12 to 17 years | | 18 years + | |
|---|---|---|---|---|---|---|
| Area | n | % | n | % | n | % |
| Isle of Anglesey | 1 | 0.0 | 32 | 0.4 | 1 | 0.0 |
| Gwynedd | 43 | 0.5 | 474 | 5.3 | 11 | 0.1 |
| Conwy | 25 | 0.3 | 154 | 1.7 | 1 | 0.0 |
| Denbighshire | 12 | 0.1 | 74 | 0.8 | 2 | 0.0 |
| Flintshire | 30 | 0.3 | 226 | 2.5 | 0 | 0.0 |
| Wrexham | 81 | 0.9 | 292 | 3.2 | 1 | 0.0 |
| Powys | 30 | 0.3 | 134 | 1.5 | 29 | 0.3 |
| Ceredigion | 3 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Pembrokeshire | 13 | 0.1 | 50 | 0.6 | 3 | 0.0 |
| Carmarthenshire | 145 | 1.6 | 663 | 7.4 | 4 | 0.0 |
| Swansea | 399 | 4.4 | 1186 | 13.2 | 3 | 0.0 |
| Neath Port Talbot | 42 | 0.5 | 99 | 1.1 | 2 | 0.0 |
| Bridgend | 23 | 0.3 | 321 | 3.6 | 1 | 0.0 |
| Vale of Glamorgan | 31 | 0.3 | 103 | 1.1 | 0 | 0.0 |
| Cardiff | 548 | 6.1 | 2235 | 24.9 | 3 | 0.0 |
| Rhondda, Cynon, Taf | 30 | 0.3 | 61 | 0.7 | 9 | 0.1 |
| Merthyr Tydfil | 14 | 0.2 | 22 | 0.2 | 1 | 0.0 |
| Caerphilly | 30 | 0.3 | 176 | 2.0 | 1 | 0.0 |
| Blaenau Gwent | 39 | 0.4 | 100 | 1.1 | 1 | 0.0 |
| Torfaen | 13 | 0.1 | 78 | 0.9 | 0 | 0.0 |
| Newport | 134 | 1.5 | 553 | 6.2 | 2 | 0.0 |
| Monmouthshire | 28 | 0.3 | 168 | 1.9 | 1 | 0.0 |
| Wales | 1714 | 19.1 | 7201 | 80.1 | 76 | 0.8 |

*Number of times a patients postcode appears as orthodontic activity*

The postcode provides information relating the area, district and street level location. Although some postcodes can relate to 100 houses, 15 houses is the typical number. Postcode data was available for 25,437 patients in 2007, 25,316 in 2008 and 5,942 for 2009.The number and distribution of postcodes is shown in Table 6 and Figure 3.

Table 6 Number of occasions a postcode occurs related to orthodontic activity.

| | 2007 | | 2008 | |
|---|---|---|---|---|
| | n | % | n | % |
| 1 | 19545 | 76.8 | 19495 | 77.0 |
| 2 | 4158 | 16.3 | 4151 | 16.4 |
| 3-4 | 1465 | 5.8 | 1360 | 5.4 |
| 5-10 | 246 | 1.0 | 275 | 1.1 |
| 10+ | 23 | 0.1 | 35 | 0.1 |
| Total | 25437 | 100.0 | 25316 | 100 |

For 2008 postcode data is available for 69 percent of the cases attracting orthodontic activity. The data is at the street level and several children can be treated per household within the same street. This is illustrated in Table 7 where samples of repeat postcodes occur. It is understandable when an adult and one or two children have been seen with the same postcode, however the recurrence of a postcode more than three occasions warrants further investigation particularly in areas where a high proportion of "Assessment and reviews" occur below 9 years of age (Figure 2).

Table 7 may also illustrate that a fee may be claimed for "Assessment and review" and then the patient referred to another practitioner. There may be also other activities of repeat assessments and treatments within the same year and following year. The unique patient identifier and/or house number will enable greater clarity regarding the patients experience.

Table 7 Examples of patients seen by postcode, UOA claimed by practitioners (anonymised postcode), GDS/PDS.

| Treatment Year to 31 March | Contract Health Body Name | Principal Practice & Correspondence Postcode (anonymised) | Patient Health Body Name | Patient Postcode | Patient Adult or Child | Number of Patients seen | Ortho Claim UOA |
|---|---|---|---|---|---|---|---|
| 2009 | Rhondda Cynon Taf LHB | CF4? | Rhondda Cynon Taf LHB | CF40 2ND | Child | 1 | 1 |
| 2008 | Rhondda Cynon Taf LHB | CF4? | Rhondda Cynon Taf LHB | CF40 2ND | Child | 15 | 15 |
| 2008 | Cardiff LHB | CF1? | Rhondda Cynon Taf LHB | CF40 2ND | Child | 1 | 1 |
| 2009 | Rhondda Cynon Taf LHB | CF4? | Rhondda Cynon Taf LHB | CF40 2PX | Child | 2 | 2 |
| 2008 | Rhondda Cynon Taf LHB | CF4? | Rhondda Cynon Taf LHB | CF40 2PX | Child | 14 | 14 |
| 2008 | Cardiff LHB | CF1? | Rhondda Cynon Taf LHB | CF40 2PX | Child | 2 | 0 |
| 2008 | Cardiff LHB | CF1? | Rhondda Cynon Taf LHB | CF40 1TD | Child | 1 | 0 |
| 2008 | Rhondda Cynon Taf LHB | CF4? | Rhondda Cynon Taf LHB | CF40 1TD | Child | 15 | 17 |
| 2007 | Cardiff LHB | CF1? | Rhondda Cynon Taf LHB | CF40 1TD | Child | 2 | 21 |
| 2007 | Rhondda Cynon Taf LHB | CF4? | Rhondda Cynon Taf LHB | CF40 1TD | Child | 9 | 10 |
| 2008 | Carmarthen LHB | SA1X? | Carmarthen LHB | SA15 4RR | Child | 7 | 3 |
| 2008 | Swansea LHB | SAX? | Carmarthen LHB | SA15 4RR | Child | 2 | 22 |
| 2007 | Carmarthen LHB | SA1X? | Carmarthen LHB | SA15 4RR | Adult | 1 | 0 |
| 2007 | Carmarthen LHB | SA1X? | Carmarthen LHB | SA15 4RR | Child | 9 | 69 |
| 2007 | Swansea LHB | SAX? | Carmarthen LHB | SA15 4RR | Child | 1 | 1 |
| 2009 | Swansea LHB | SAX? | Swansea LHB | SA4 3DT | Child | 3 | 23 |
| 2008 | Swansea LHB | SAX? | Swansea LHB | SA4 3DT | Child | 8 | 49 |
| 2007 | Swansea LHB | SAX? | Swansea LHB | SA4 3DT | Child | 9 | 28 |

The reoccurrence of postcodes have been mapped and colour coded for Wales (2007 and 2008) (Figure 3) and there are a number of postcodes for both patient and practitioner that are associated with higher numbers (early and repeat assessments) that reoccur in both 2007 and 2008. These should be investigated further.

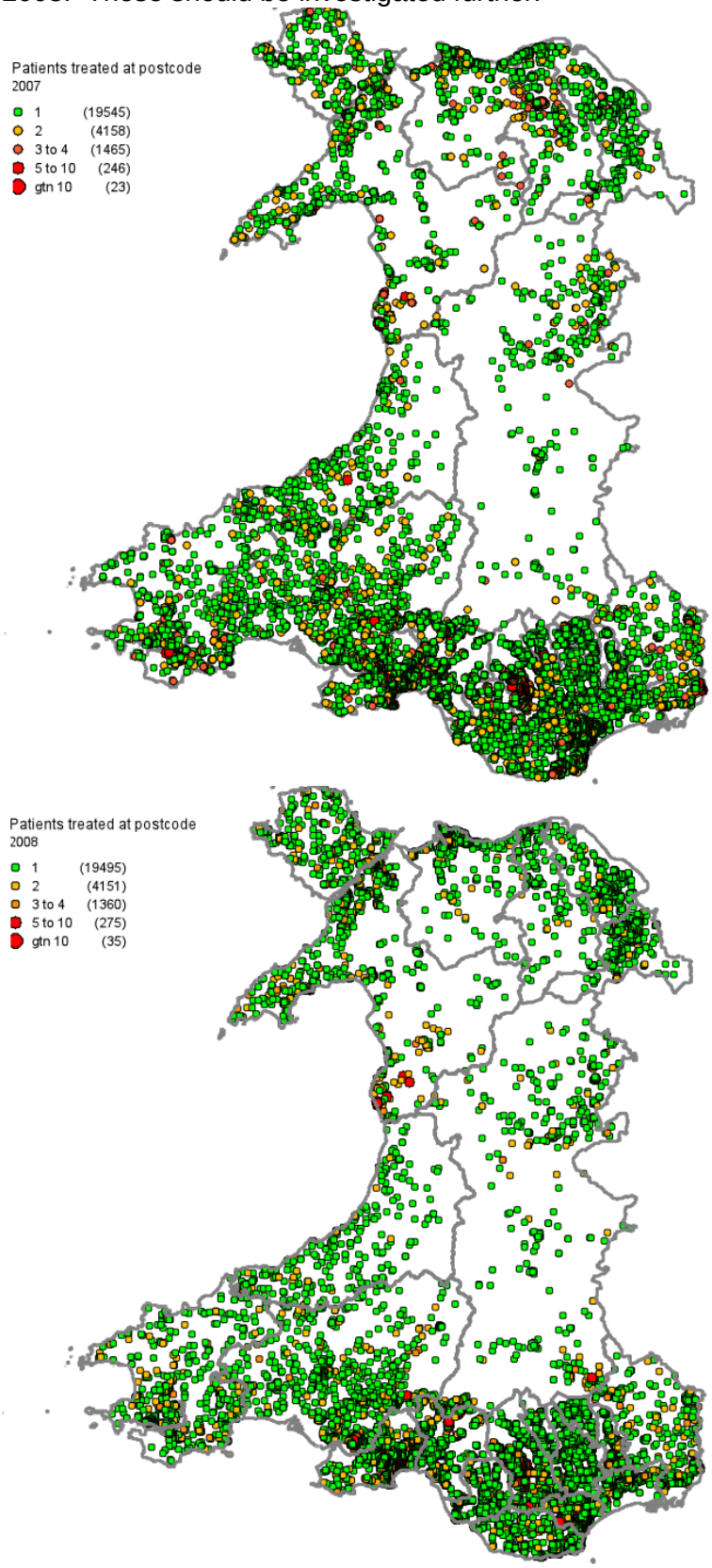


Figure 3 Number of times patients are seen by practitioners in the GDS/PDS - patients postcode shown (2007 top and 2008 bottom - insert shows coding). There are common locations identified in both 2007 and 2008 where a high number of patient postcodes reappear.

*Number of patients refused, abandoned and discontinued*

The number of refused, abandoned and discontinued cases varies widely between practitioners within areas and across Wales, 2,341 (8 percent of assessments), 417 (4 percent of treatments) and 215 (2 percent of treatments) respectively.

The considerable variation across Wales is highlighted by the refusal of treatment (Figure 4) ranging from 1 to 23 percent. It would be expected in areas of surplus provision (Caerphilly, Cardiff, Neath Port Talbot, Swansea, Vale of Glamorgan) there should be greater refusal of treatment but this pattern is not well defined and may reflect inefficiencies in the referral system.

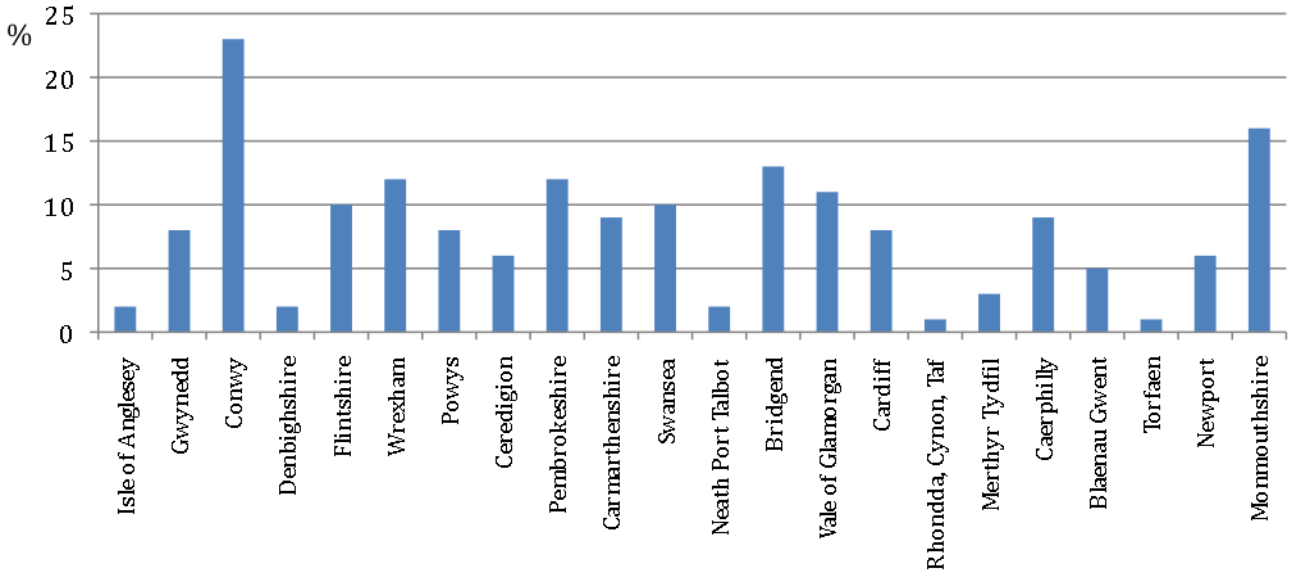


Figure 4 Percentage of patients refused treatment by area

| |
|---|
| Consideration should also be given to training the referrers and calibration of the providers in the use of IOTN to create a more efficient referral system. |

*Repairs and regulation 11 – replacement appliances*

When an appliance breaks it is usually repaired free of charge within the same practice/contract. A charge can be claimed (0.8 of an UOA) for a repair of an appliance for a patient who usually attends another practice. Regulation 11 relates to replacement appliances usually removable (active or retainer) and attracts a fee of £53.10 paid by the patient to the practitioner.

There were claims for 809 repairs and 553 replacement appliances across Wales (9% and 6% of all treatments). Interestingly, not all practitioners claim for repairs and replacement appliances.

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| The proportion of claims for repairs does not reflect the treatment activity with Carmarthenshire and Swansea claiming the highest proportion with some claims arising from the same premises (Gwynedd (3%), Cardiff (10%), Carmarthenshire (37%), and Swansea (47%)). This activity should be investigated further. |

*Cross border patient flows*

The provision of orthodontics delivered by area and according to the patients' postcode is outlined in Table 1. Five areas provide significant orthodontic care (>40%) to other localities outlined below:

| | |
|---|---|
| Gwynedd | – Isle of Anglesey, Conwy |
| Carmarthenshire | – Pembrokeshire and Ceredigion |
| Swansea | – Neath Port Talbot and Carmarthenshire |
| Cardiff | – Vale of Glamorgan, Rhondda Cynon Taf, Caerphilly |
| Newport | – Monmouthshire, Torfaen and Caerphilly |

With regards to treatment provided by LHBs to residents in English PCTs only 58 patients (0.6%) were documented and a further 1,072 patients (12%) were recorded as unknown or non-neighbouring which may arise from the FP17OW forms not being fully completed.

Considering that there are significant cross border flows across Wales it would seem appropriate that Managed Clinical Networks (MCNs),[23] taking account of NHS restructuring in Wales from 2009, should be developed on a regional basis to assist LHBs in the planning and management of orthodontic services.

*Unnecessary treatment*

On a sub-sample of "completed"FP17(O)W unnecessary treatment was recorded in 0.5 percent of all self-reported cases and this matches similar data from England (Table 8).

There are a relatively high number of incomplete FP17OW forms (18 percent for Wales, compared to England 2.8 percent). Ninety-one percent of incomplete forms are submitted by Cardiff practitioners.

The IOTN scores are self reported and not all the workforce have been trained to use the indices it would be appropriate to validate the scores reported. As mentioned previously it is mandatory that all forms should be completed prior to and on completion of threatment.[14]

Table 8 Distribution of treatment by LHB

| LHB name | Treatment starts (n) | DHC 1 & 2 & 3 (No need) | DHC 4 & 5/DHC 3 & AC ≥ 6 | IOTN no return |
|---|---|---|---|---|
| Monmouthshire | 147 | 0 | 143 | 4 |
| Gwynedd | 231 | 0 | 228 | 3 |
| Swansea | 187 | 0 | 185 | 2 |
| Cardiff | 1,720 | 9 | 1,070 | 641 |
| Rhondda Cynon Taf | 14 | 0 | 14 | 0 |
| Anglesey | 25 | 0 | 25 | 0 |
| Caerphilly | 124 | 4 | 113 | 7 |
| Bridgend | 265 | 0 | 262 | 3 |
| Wrexham | 0 | 0 | 0 | 0 |
| Flintshire | 175 | 0 | 171 | 4 |
| Vale of Glamorgan | 33 | 0 | 32 | 1 |
| Carmarthenshire | 546 | 1 | 523 | 22 |
| Newport | 387 | 6 | 367 | 14 |
| Blaenau Gwent | 54 | 0 | 54 | 0 |
| **TOTAL** | **3,908** | **20** | **3,187** | **701** |

## 4. Waiting lists (Salaried services)

The waiting list for orthodontic services provided in hospitals and the CDS were derived (Table 9). from the responses to a questionnaire that was distributed to all Hospital Consultants and Community Orthodontists (Appendix III) There are currently 1994 (range 20-816) patients waiting to be treated in the HDS and 450 (19-210) in the CDS.

Table 9 Waiting lists and patient starts per year for HDS and CDS

| | HDS | | CDS | | |
|---|---|---|---|---|---|
| | Patients on waiting list | Patient starts/ year | | Patients on waiting list | Patient starts/ year |
| Betsi Cadwaladr (Glan Clwyd) | 137 | 165 | Denbighshire (Rhyl) | 210 | 171 |
| Betsi Cadwaladr (Bangor) | 20 | 120 | Vale of Glamorgan (Barry) | 60 | 45 |
| Betsi Cadwaladr (Wrexham) | 78 | 145 | Cwm Taf (Aberdare) | 19 | 35 |
| Powys (Brecon) | 75 | 200 | Cwm Taf (Merthyr) | 49 | 85 |
| ABMUHB (Morriston) | 150 | 400 | Cwm Taf (Pontypridd) | 112 | 84 |
| Cwm Taf (Prince Charles) | 300 | 220 | Total | 450 | 420 |
| Cwm Taf (Royal Glamorgan) | 84 | 130 | | | |
| Cardiff and Vale (UDH) | 816 | 670 | | | |
| Aneurin Bevan (Royal Gwent) | 286 | 230 | | | |
| Aneurin Bevan (Nevill Hall) | 48 | 168 | | | |
| Total | 1994 | 2448 | | | |

It is difficult to be precise how long individuals will have to wait for treatment although the longest wait currently is 2 years 5 months at the University Dental Hospital (UDH) with the waiting list larger than the number of treatment starts per year. Waiting lists which are larger than treatment starts are also found at the Royal Gwent, Prince Charles, Rhyl and Ponytpridd. The treatment starts and consequently the waiting lists at the UDH, Royal Glamorgan and Methyr Tydfil are influenced by the postgraduate intake at the UDH which is 2 intakes in every 3 years. In the "fallow" year (2009-2010) patients accumulate because treatment capacity is reduced. This could be improved with an additional training number or a new Specialist registrar (SpR) which will enable the intake of 2 SpRs every year to provide a more constant service in these three hospitals. In addition the numbers on the waiting list accumulate prior to the intake of postgraduate students who start their studies in the first week in October and the waiting list reduces significantly in January-March as the postgraduates build their skills and increase their caseloads. A similar problem will be experienced in Glan Clywd.

The 816 individuals on the treatment waiting list at the UDH, Cardiff (471 children (45% male and 55% female) and 345 adults (23%male and 77% female)) provides the opportunity to investigate the profile of the individuals waiting for treatment. The distribution of both children and adult patients in the South Wales area is shown (Figure 5) and the distributions of patients by area have been entered in Table 3 (adjusted for a yearly quota).

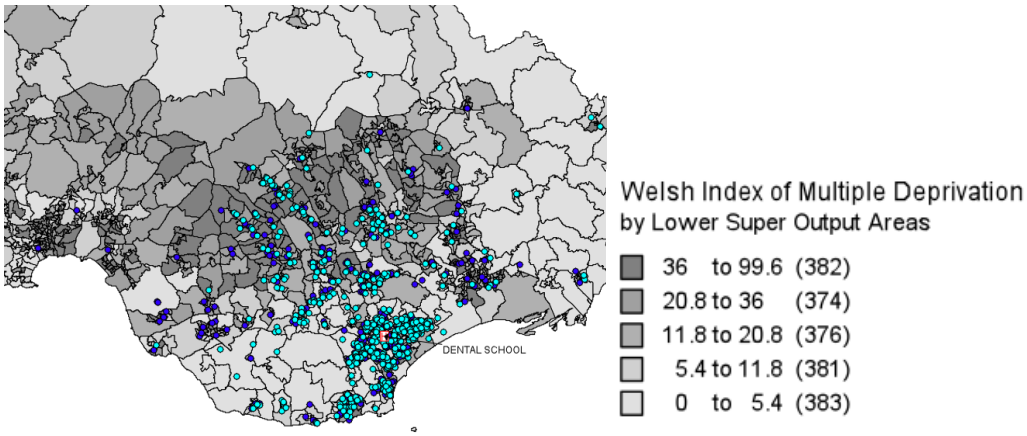


Figure 5 Distribution of patients on the treatment waiting list in Cardiff (Children – cyan; adults - blue) superimposed on a shaded map representing areas with differing Welsh Index of Multiple Deprivation (Excludes 3 patients from Carmarthenshire, Powys and Denbighshire).

There is a good representation of patients across the five categories of the Welsh Index of Multiple Deprivation, with the largest category “Most deprived” (31%) followed by the least deprived (25%) (Figure 6).

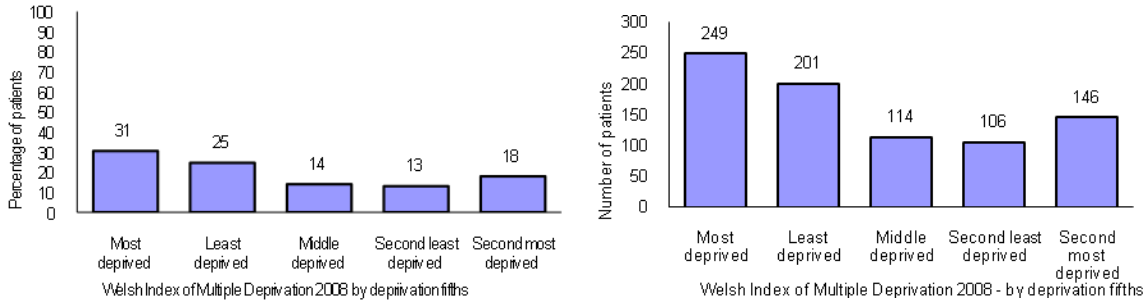


Figure 6 The distribution of patients (percentage and numbers) with respect to the Welsh Index of Multiple Deprivation.

The distribution across all the categories of the Welsh Index of Multiple Deprivation should be evaluated for all orthodontic providers, areas, LHBs and for Wales as a whole.

There are some large waiting lists reported in all services and the patients on these waiting lists should be crossed-checked for duplication amongst providers. Additional financial resources may be needed to clear a backlog of patients if the waiting list validation confirms list size (targeting patients aged 12 years and older). There is, however, reported spare capacity in the GDS/PDS which should be utilised.

## 5. Workforce

The questionnaire (Appendix III) identified the workforce in the HDS and CDS (Table 10). In addition to the HDS and CDS workforce there were additional vacancies (whole time equivalent - WTE) for 1 Consultant, 1 SpR/fixed term training appointment (FTTA), 1 specialist, 1 staff grade, 1 University teacher and 2 orthodontic therapists in Wales.

Table 10 The number of staff (WTE) reported to be working in the HDS and CDS in Wales

| | Hospital Dental Service | | | | | | Community Dental Service | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Staff employed (WTE) | Staff vacancies (WTE) | Average number of treatment starts per year | Average number of patients seen per clinic (treatment) | Average number of patients seen per clinic (new patient/ review) | Average number of treatment sessions per month | Staff employed (WTE) | Staff vacancies (WTE) | Average number of treatment starts per year | Average number of patients seen per clinic (treatment) | Average number of patients seen per clinic (new patient/ review) | Average number of treatment sessions per month |
| Consultant | 12.7 | 1.0 | 723 | 10 | 11 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| SpR/FTTA | 7.2 | 1.3 | 580 | 8 | 6 | 7 | 0 | 0 | 0 | 0 | 0 | 0 |
| DwSi | 2.7 | 0 | 110 | 7 | 6 | 5 | 0.6 | 0 | 60 | 8 | 0 | 15 |
| GDP | 0.5 | 0 | 30 | 5 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| Specialist | 1.2 | 0.2 | 60 | 9 | 14 | 16 | 2.8 | 0.5 | 74 | 9 | 10 | 15 |
| Staff grade | 0.9 | 0.5 | 90 | 8 | 8 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| Associate specialist | 0.4 | 0.4 | 65 | 6 | 6 | 16 | 0 | 0 | 0 | 0 | 0 | 0 |
| University teacher | 0.4 | 0.6 | 30 | 8 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Orthodontic therapist* | 2.0 | 2.0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Overseas postgraduates | 8 | 0 | 240 | 6 | 1 | 37 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other* | 0 | 0 | 520 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 35 | 6 | 2448 | 84 | 56 | 106 | 3.4 | 0.5 | 134 | 17 | 10 | 30 |

* One hospital unit expressed average number of treatment starts - not allocated to specific members of staff.

However information on the workforce in the GDS/PDS is not fully described. In the GDS/PDS there are 135 practitioners carrying out some form of orthodontic activity. Twenty-seven (20%) practitioners do not undertake any active orthodontic treatment, 32 (24%) undertake treatments 1-10 per year; 45 (33%) 11-100 and 31 (23 %) greater than 101 treatments per year. In all 8991 patients were treated in the year 2008-2009.

The larger volume of orthodontic treatment provided by 12 contracts (>200 treated cases/year) suggests a much larger workforce working within practices, which may involve Orthodontic therapists and dentists working under the supervision of the orthodontist but details of this workforce needs to be clarified.

| |
|---|
| The workforce levels and skill mix within each LHB and contracted practices should be monitored using Managed Clinical Networks to advise LHBs. |

However, to provide an orthodontic service in the GDS/PDS for 30 percent of the 12-year cohort (11,816) based on 100 patients per provider 110 providers will be required. A realistic estimate would be 300 patients per provider requiring 37 providers (some areas will allow low provision however in the larger conurbations larger numbers of patients per provider can be treated) (Table 3; columns 25 & 26). Considering all services (GDS/PDS/HDS/CDS) 79 providers would be required for treating 150 cases a year and 39 if 300 cases were treated per year (columns 27 &28). Certainly the smaller number of providers will facilitate improved management of the orthodontic services. It is imperative that these core providers demonstrate high quality outcomes.

The orthodontic service should be led by practitioners with a specialist orthodontic qualification and should comprise over two-thirds of the providers. All other workers; DwSIs, Orthodontic Therapists, Orthodontic Nurses and Orthodontic technicians should be accredited and registered. The use of higher volume providers will require restructuring of orthodontic provision in Wales and will take at least 5 years to implement and the opportunity should be seized through contract renewals and retirements. However, additional funding may be required to modernise and relocate practices to facilitate multi-chair facilities.

The British Orthodontic Society (BOS) indicates the following practitioners working in Wales (Table 11). There are likely to be a number of salaried orthodontists (Consultants and Community) working within GDS/PDS contracts. As the practitioner information is anonymous the BOS data cannot be compared with the contracted practitioners in Wales. It is likely that 22 out of the 59 practitioners will retire in the next 5 years.

Table 11 Practitioners undertaking orthodontic treatment in Wales

| | n | Predicted retirements in next 5 years |
|---|---|---|
| Specialist orthodontic practitioners | 21 | 7 |
| Consultants working in hospitals | 16 | 7 |
| Community | 3 | 2 |
| Practitioner group | 18 | 6 |
| Total | 59 | 22 |
| ** 9 practitioners indicate addresses outside Wales* | | |

Translating this workforce information into treatment provision indicates that there are insufficient practitioners in Wales if only 150 patients per practitioner were completed. However, if 300 patients per practitioner were treated only 39 practitioners would be required.

Difficulty in recruitment to Consultant orthodontist posts in the UK has been reported, with many posts remaining vacant. This will have implications for provision, support for DwSIs and training of orthodontic staff in Wales. If this trend continues alternative methods of provision and training should be sought without compromising the quality of care.

There are 14 orthodontic therapists (from all over the UK) trained per year in Wales. Out of the first trained cohort, four are working in Wales, 3 within the GDS/PDS and 1 in the Hospital service. There are other orthodontic therapist courses available in the UK. The number of Orthodontic therapists trained for the orthodontic services in Wales should be increased. The service provided by the orthodontic therapists should be monitored to ensure that they are trained to undertake a large volume of orthodontic treatment. Some experience should be sought in relation to maximising efficiency and auditing the therapists from established practices.

Currently there are 4 specialists and 4 consultant orthodontists being trained in Wales and they will qualify in the next 5 years. There is a potential shortfall of 6 specialists/consultants within 5 years. This could be offset by training two SpRs per year for the next six years.

| |
|---|
| Attempts should be made to fill all vacant posts and monitor staffing levels. |

## 6. Cost of the orthodontic service

Over the last decade the cost of orthodontic treatment in England and Wales has almost tripled from £87,560,728 in 2000 to £258,309,180 in 2009. Under the new contract in 2006 the fee-for-item system was replaced with an overall fee for orthodontic treatment (which also included quality assurance measures). The fee was set at £1200.[13]

*Patients, UOAs and cost*

A total of 34,628 patients attended the GDS/PDS for orthodontic care in the year 2008/2009. The 36,797 treatment activities attracted 205,153 UOAs with an average cost of £62 (range £58 to £74) for each UOA representing a total spend of £12,718,370 on orthodontics in Wales.
The UOA value is not related to contract size or activity (range of treatments 1 to 3,438) and the. UOA is relatively uniform across Wales.

Out of the 22 original LHB areas in Wales, Carmarthenshire generally attracted a higher UOA value compared to other areas (average £68; range £63-£74).

It would be expected that with large contracts there would be some economy of scale (e.g. 5-20% depending on the size of the contract). Corrective fee adjustments (up to 34%) have occurred in the Netherlands and Germany in recent years.[24]

The NHS DS has categorised provision of orthodontics into 3 groups by the type of contract (Table 12): i) Orthodontic contracts ii) General and Orthodontic contracts and iii) General contracts with orthodontic activity.

The data for the orthodontic contracts is well documented however the general contracts with orthodontic activity have been estimated using average UOA values where necessary. The number of patients seen within the three types of contract are significantly different with the mean number of patients being seen 501, 113 and 205 for the Orthodontic contracts, General and orthodontic contracts and General contracts with orthodontic activity respectively. The rationale is unclear why these three groups exist, as there are both large and small providers in each group with high numbers of treatments starts and some with none.

Table 12 Information related to practitioners providing orthodontic care in the three contract categories (Averages and ranges)

| | Orthodontic contracts (n=41) Ave (range) | General and Orthodontic contracts (n=9) Ave (range) | General contracts with orthodontic activity (n=80) Ave (range) |
|---|---|---|---|
| No of patients | 501 (16-3438) | 113 (2-395) | 205 (1-1122) |
| Treatment starts | 145 (0-931) | 71 (0-638) | 30 (90-241) |
| UOA | 3574 (236-21553) | 383 (3-1898) | 1147 (4-7866) |
| Contract value (£) | 211550 (13830-1330612) | 30977 (174-117664) | 71089 (248-487692) |

*Contracting*

Orthodontist's and general dentist's contract activity was calculated, using gross GDS earnings during the reference period October 2004 to September 2005. This was the baseline used to establish contract values for providers and set local budgets for LHBs. As in general dentistry, orthodontists were remunerated at the end of a course of treatment and so were paid in arrears. In general dentistry, this principle worked well as a means of establishing a contract value, because earnings over a year were a good reflection of activity. However, the British Orthodontic Society (BOS) argue that this principle did not apply well to orthodontics as many courses of treatment take two years. As a result, income received by an orthodontic practice under the GDS actually reflected its activity up to two years previously. The BOS also claim that the Department of Health effectively capped funding at the 2003 to 2004 level with small annual increases and this had an adverse effect on newly established and growing practices.[25]

There is no provision in the PDS regulations or the standard PDS agreement for a partnership to hold a PDS agreement. However, one option available is for the LHB to issue the contract to the partners as individuals, in line with the format used in the new PDS Plus agreement (http://www.pcc.nhs.uk/pds-plus-template-agreement).[26] The difference is that all of the partners would be named on the contract as individual contractors, but with joint and several liability. This means that the LHB could pursue either one of the partners for the whole of the liability under the contract. Partnerships will enable sharing of risks and can facilitate growth of the orthodontic business. It is surprising that there are not more partnerships delivering orthodontic care in Wales.

There seem to be inconsistencies in the length of orthodontic contracts between LHBs and providers in Wales. Contracts range from 3 to 7 years. However, the duration of a contract should be linked to verifiable quality outcome measures.

Because the financial return from an orthodontic practice is perceived to be satisfactory and relatively reliable, there has been a growing interest from corporate organisations looking to invest in this area of dentistry.[27] However the financial return is dependent on economic conditions and in particular international money exchange rates and this should be monitored on a regular basis to ensure practice viability.

*Missed appointments*

Missed appointments have a significant impact on the course of treatment (resulting in prolonged treatments and treatments going off-course) and the Welsh Assembly Government Task and Finish Group Review of the National Dental contract in Wales have recommended the introduction of a discretionary charge for patients who fail to attend appointments. The charges to be based on agreed criteria developed in conjunction with patient groups.[28]

*Cost of the Hospital and Community Dental Services*

Based on completion of a questionnaire (Appendix III) the estimated relative costs of orthodontic treatment were derived for each orthodontic provider (e.g. staff salaries – top of scale, plus materials) (Table 13). The average cost of orthodontic treatment in the PDS/GDS is £1,302 (21UOAs x £62). As the UOA value ranges from £58 to £74 the cost of appliance therapy will range from £1,218 to £1,554. No additional costs were applied to any of the services (CDS/HDS/GDS/PDS) as each service attracts subsidies and overheads which are difficult to quantify. Therefore the resources identified (Table 13) purely relates to the direct cost of orthodontic care.

Table 13 Estimated relative costs per treated case for HDS and CDS (±10%)

| | HDS | | | CDS | |
|---|---|---|---|---|---|
| | | Cost (£) | | | Cost (£) |
| 1 | Royal Glamorgan‡ | 2268 | 11 | Merthyr Tydfil | 1454 |
| 2 | Glan Clwyd‡ | 2518 | 12 | Aberdare | 1405 |
| 3 | University Dental Hospital*‡ | 2012 | 13 | Barry | 1467 |
| 4 | Nevill Hall | 1674 | 14 | Pontypridd | 1584 |
| 5 | Morriston**‡ | 2534 | 15 | Rhyl | 2133 |
| 6 | Prince Charles‡ | 2150 | | Average | 1609 |
| 7 | Bangor | 2883 | | | |
| 8 | Wrexham‡ | 2593 | | | |
| 9 | Royal Gwent‡ | 1596 | | | |
| 10 | Brecon*** | 972 | | | |
| | Average | 2120 | | | |

Assumes each WTE clinician has a WTE dental nurse, receptionist, 0.5 WTE technician: material/capital costs £400 each treatment.
* UDH estimated cost includes 12 WTE dental nurses, 3 WTE dental technicians and 2 WTE receptionists.
** 1.8 WTE technicians included.

*** Shared with Community service – 60% removable appliances.
‡ Training unit for SpRs and FTTAs

The relative cost estimates for the HDS and CDS are similar to a previous report of orthodontic costs in Wales.[17-19] The CDS has a lower cost base than the HDS but the HDS has a slightly different role outlined in Table 1. The cost of orthodontic treatment is dependent on the overall cost of the resource divided by the number of new treatment starts per year. The relative costs are influenced significantly by the training element particularly in the HDS and the different roles of the services. The costs in both services generally show differences related to the number of staff employed. Some of the costs are reported lower in the HDS particularly in the UDH and to a lesser extent in the Royal Gwent. This can be explained by the 8 overseas students providing a large service commitment utilising nursing and material costs but are not paid for this activity as it is a part of their training

Testing the utilisation of skill mix by these services is a priority as the efficiency of the salaried orthodontic services could be improved further. More accurate estimations would require detailed costing of all resources and the type of services provided (including case complexity, multidisciplinary activities and a detailed assessment of the outcome of treatment) in each unit.

## 7. Orthodontic educational development

Orthodontic education is provided through the undergraduate and postgraduate courses at the School of Dentistry University of Cardiff (MScD, PhD, Diploma for Dental Nursing, Diploma for Orthodontic Therapist). Approximately 80 undergraduates are trained each year. The undergraduates are trained regarding diagnosis, when and how to refer using IOTN, PAR, and use of removable and fixed appliances. The postgraduate MScD course in orthodontics provides advanced orthodontic training incorporating diagnosis and treatment planning, calibration in IOTN and PAR and critical appraisal of the treatment process and outcomes. Most successful candidates usually leave to pursue a career in the GDS/PDS and a small proportion stay on to be trained as Consultants in the NHS and/or University. Out of the last two completed MScD cohorts trained in Cardiff, 2 out of the 8 home/EU students have stayed in Wales to pursue further orthodontic FTTA consultant/Academic training and the others are working outside Wales within the European Union. Two out of the 6 overseas students are staying on for a further year of "complex orthodontic training" and one enrolled on a full-time PhD programme.

Twenty dental technicians are trained at UWIC (Foundation degree, BSc, MSc) per year and a small proportion will specialise in orthodontics. The role of the orthodontic technician has changed and will continue to change with the increased use of fixed appliances. The introduction of three-dimensional image capture at the chair side, will in time negate the need for the production of study models.

A self-funded one-year Orthodontic Therapist course is run in Wales and has capacity for 14 therapists each year.[12] There are no formal training programmes in Wales for practitioners who have or want to develop a special interest in orthodontics (DwSIs(O)) although a 3-year training programme is organised jointly by the British Orthodontic Society (BOS) and the Faculty of General Dental Practitioners (FGDP) (costing £16,500/year) is available and well subscribed.[11] There is an additional MSc course available in Warwick (£8,650/year).[29]

## 8. Clinical governance

One of the key elements in assessing the quality of orthodontic care is treatment outcome. It is important to quantify change and the outcome of a clinical intervention to determine how effective the intervention process has been. As part of the contract practitioners should record the start and finish Peer Assessment Rating (PAR) scores for a minimum 20 completed treatments or 2 percent of their total caseload.[13] The assessment of the quality measures should be undertaken through the MCNs.[23] There are several orthodontic MCNs already set-up in parts of Wales and these should be extended throughout the Principality and consideration should be given to enlarging MCNs where there is considerable cross border flow. The role of the MCNs is to liaise with the

LHB to establish appropriate clinical pathways and be responsible for appropriate standards of clinical care. Where there is an unmet need for orthodontic care, the LHBs, in conjunction with the local clinical network, should test the use of an appropriate skill mix to assess needs and priorities for care.

A formal process has been adopted by some LHBs to assess dental practitioners with a special interest in orthodontics (DwSIs), whereby applicants without formal qualifications present a portfolio listing their most recent 20 consecutively completed cases including before and after PAR scores and percentage improvement.[10] In addition, two cases will be selected by an appointed accreditation panel for in-depth assessment and discussion. The evaluation is usually carried out by a local accreditation panel which would normally include a consultant and/or specialist orthodontist, an FGDP(UK) member representative representing primary care dentistry, a Local Dental Committee representative, the local Consultant in Dental Public Health and a LHB representative.

Although some Managed Clinical Networks (MCNs) in England have begun to evaluate activity of orthodontists this has yet to gather pace in Wales. As part of the new contract, the quality of outcomes should be assessed for all orthodontic providers. At least 20 consecutively started treatments can be identified by the LHB for all the orthodontic providers in the area. All orthodontic providers should be calibrated in the use of IOTN and the PAR index. It would be good practice to arrange at least a half-day a year (registered for Continuous Professional Development CPD) for orthodontic practitioners to anonymously display their 20 cases, for one practitioner to score another practitioners cases or alternatively, all cases could be scored by an independent calibrated examiner (e.g. Orthodontic technician).

| However, it is important that all cases should be reviewed and the PAR score changes discussed. |
|---|

A member of the LHB could facilitate this. The relative outcomes should be discussed and if the average percentage PAR score is below 60% a further set 20 cases should be assessed and if persistent low quality is observed action should be taken which may involve further training/mentorship/counselling or finally (if all other routes are exhausted) withdrawal of the contract if persistent low levels of quality are observed. The PAR scores and the percentage reduction in PAR scores for each case should be collated by the LHB representative and sent to NHS DS as a record of outcome in the LHB which can them be used to assess outcomes across Wales. A good standard of treatment is represented by a PAR score reduction of 70 percent. In addition, less than 8 percent of the cases should be categorised a “Worse or no different”.[30] Specialist orthodontists are able to score their IOTN, PAR and Index of Complexity, Outcome and Need (ICON) scores on line (http://www.esas.nu/main/start.php?m=1)[31] to facilitate comparisons with other practitioners in Wales and other countries in Europe. There should be standardised and documented reports of orthodontic practice visits carried out by the Dental Reference Service.

*Cost-effectiveness*

The PAR index scores can be combined with treatment costs to create a simple measure of cost-effectiveness (Cost per PAR point reduction). These measures can be used to highlight cost-effective and cost-ineffective practitioners.[11, 17, 18, 30-32] Once the data sets are fully validated and outcome data is recorded it will be possible to construct robust cost-efficiency and cost-effectiveness tables with confidence intervals using boot-strapping techniques.[19]

## 9. The future of Orthodontics in Wales

*Normative treatment need and treatment uptake*

The traditional method to assess normative treatment need is to estimate need and demand determined from a cross sectional study across Wales at 12 and 15 years of age. To collect more accurate data a representative cohort should be followed from 12 to 18 years of age to determine orthodontic treatment need, demand and treatment success.

*Workforce*

The intention should be to build upon a well-trained and skilled orthodontic workforce in Wales matching the best in the world. Previous studies have shown that Wales has some excellent clinicians in all the dental services producing high quality outcomes that can compete with the best clinicians worldwide. However, the quality of work is variable throughout Wales. Accreditation of DwSIs and other orthodontic providers may have an impact on the workforce i.e. quality initiatives may reduce the overall number of providers leading to a core of excellent clinicians.

The practitioners providing high quality care should be acknowledged and rewarded. These high quality practitioners may be encouraged to increase their caseloads and take on mentorship roles. In addition there may be opportunities for these practitioners to participate in research/educational networks with Masters or Doctor of Dental Surgery (DDS) training being undertaken part-time within primary care.

*Education*

The School of Dentistry, Cardiff University will continue to train undergraduate and postgraduate students (MScD, DDS, PhD). As mentioned above orthodontic training in primary care should be seen as an opportunity and explored. The Orthodontist therapist course should be supported and evaluated to ensure the orthodontic therapist match the requirements of the modern orthodontic workforce in Wales.

The variation in population density, widespread geographical locations and social diversity in Wales offer their own challenges and will require different solutions. The large cities and towns attract orthodontists and patients and the orthodontist or DwSI generally provides orthodontic care. This is in contrast to the efficient orthodontic provision in the USA and in the Netherlands whereby the orthodontist is a team-leader directing and managing 4 orthodontist therapists who undertake most of the intra-oral work (i.e. bonding changing arch wires etc.). With this approach an orthodontist can see and treat a significant number of orthodontic patients a day. The practices tend to be well-designed to manage and audit a large throughput of patients with appropriate quality controls in place. These generally purpose built practices are ideal for large population locations attracting high volumes of patients. Examples of appropriate locations would be Cardiff, Carmarthenshire, Gywnedd, Newport and Swansea. The high volume of patients and the relatively low staff costs should reduce the average cost for a course of treatment by at least 15-20 percent but it is also important to reward high quality outputs that not only include dental alignment and occlusal fit but also patient satisfaction and other quality assurance features implemented by the practice.[34]

The introduction of these types of modern practices will negate the need for clusters of orthodontists working in one building and will encourage orthodontists to work in other locations where there are suitable facilities associated with a significant orthodontic patient base but operating on a smaller scale. Fortunately, all practitioners are different and some practitioners will relish the challenge of a large practice and others will be content working in smaller provider locations working with other orthodontists. Realignment of roles will take some time to develop and it may be timely to pilot these in one of the large conurbations in Wales.

The delivery of orthodontic care is more challenging in rural and socially less advantaged areas. If children meet the entry criteria to receive orthodontic treatment they should be able to access care. Where relatively small numbers of children require treatment, orthodontic care can be provided by an accredited DwSI or alternatively by peripatetic DwSI or orthodontist. However, local knowledge is important and it will be one of the responsibilities of the newly formed MCNs to provide local intelligence as part of the needs assessment process to ensure that appropriate care is provided.

There should be opportunities for DwSIs to extend their levels of competence through higher training courses (diploma or degree) through mentorship and training either by Consultants or accredited orthodontists demonstrating high level of proficiency and quality measures.

The introduction of three-dimensional technology, genotype/phenotype matching of facial features and other research initiatives will have a significant impact of the provision of orthodontics in terms of diagnosis, treatment planning and predictive outcomes. The Welsh workforce will need to be trained and encouraged to embrace these new innovations. These innovations will have an impact on all staff working in orthodontics.

*Clinical governance*

As with any healthcare provision it is important to assess the quality of health care provided. It has taken about 18 years to introduce the routine monitoring of orthodontic care using IOTN and the PAR index in England and Wales. Although the IOTN can be recorded intra-orally the PAR index is usually recorded on pre and post dental casts. Ideally it would be useful to record the IOTN and PAR scores when completing the FP17OW form acknowledging completion of treatment.

| |
|---|
| An alternative and better approach would be to use the Index of Complexity, Outcome and Need (ICON) which can be scored without the presence of dental casts and considered to be the best index to record orthodontic need and treatment outcomes.[35-37] |

The ICON index is being used extensively around the world (e.g. Africa, Americas, Europe & Asia). The advantage of the Index is that it can be recorded intra-orally in less than a minute facilitating the recording of the score directly on the FP17OW at the time the form is completed. The index has high levels of sensitivity and specificity compared to IOTN and PAR and has clear cut-offs for treatment need and outcome facilitating sophisticated cost-effectiveness analyses. In addition it is more stringent on final treatment outcomes.[38]

*Funding*

The funding for orthodontic provision in Wales should follow a robust cost/volume/quality model.

| |
|---|
| In 2008-2009 the orthodontic budget was approximately £12,718,370 and in 2009-2010 it is £13,119,486. |

With higher volumes there should be some economy of scale however the quality of outcome (>70% PAR) should also be rewarded. To ensure that public money is spent appropriately computerised systems monitoring activities should follow function. That is, the patient flow through a practice should be registered centrally so that all data is collected at the time care is delivered.

In addition indices of treatment need and outcome should be scored at the start and on completion of treatment with the core data sets.

Reducing early referrals, assessment only, assessments overall and repairs will save approximately 8% (less than £1m) of current spend for further treatments.

The biggest effect on the overall budget is the value of the UOA (Table 14). With a UOA value of £74, 25 percent of the 12-17 year old cohort could be treated. At £62 (current average), 30 percent of the cohort could be treated, and at £50 35% of the 12-17 year old cohort could be treated.

Table 14 The likely cost of orthodontic treatment based on different UOA values in order to treat 30% and 35% of the 12-17 year old population cohort (based on 50% treatment and 50% assessment). The orthodontic budget in 2009-2010 is £13,119.486.

| % of 12-17 yr old population that could be treated | Total number of 12-17 year old cohort | Total number of children to be treated in GDS/PDS (HDS & CDS excluded) | Total cost of treatment based on UOA at £74 | Total cost of treatment based on UOA at £62 | Total cost of treatment based on UOA at £60 | Total cost of treatment based on UOA at £55 | Total cost of treatment based on UOA at £50 |
|---|---|---|---|---|---|---|---|
| 25% | 9616 | 7576 | 12333728 | 10333664 | 10000320 | 9166960 | 8333600 |
| 27% | 10385 | 8345 | 13586116 | 11382962 | 11366271 | 10097789 | 8971176 |
| 30% | 11539 | 9499 | 15464698 | 12956909 | 12538944 | 11494032 | 10449120 |
| 35% | 13462 | 11422 | 18595667 | 15580154 | 15077568 | 13821104 | 12564640 |

Treatment is based on 21 UOAs in addition to an equal amount of "assessment and review" – this is likely to be an overestimate (300k to 500k), as 100% of the 12 to 17 year old population cohort will be assessed at least twice. An additional £440,000 will be needed for treatment of individuals below the age of 11 years of age.

There are two clear options;

1. ***To provide orthodontic treatment at the current level (£62 average) per UOA and treat 30 percent of the 12-17 year old population.***

This will require equity in treatment provision across Wales resulting in the reduction in treatment provision in Cardiff, Caerphilly, Vale of Glamorgan, Merthyr Tydfil, Neath Port Talbot, Rhondda Cynon Taf, Swansea and Torfaen in conjunction with increase in provision in areas in Wales where there is a shortfall in provision.

2. ***To introduce efficiency savings facilitating some degree of economy of scale, enabling 35 percent of the 12 to17 year old child population to received active orthodontic treatment.***

However, to achieve an efficient orthodontic service in Wales the service needs to be actively managed in detail and providers encouraged to develop flexible working patterns associated with moving patients between providers where necessary.

Table 15 illustrates the indicative sums needed to provide orthodontic care for each area in Wales with regard to these two scenarios. Using the information contained within the table it is possible to calculate what funding would be necessary if all the individuals who presented with an objective orthodontic need and demanded orthodontic treatment. In 2008/09 there would be a shortfall in funding of £238,539 (UOA values of £62) and a surplus of £153,730)(UOA values of £50) and in 2009/10 surpluses of £162,577 and £554,846 (UOA values of £62 and £50 respectively.

However it is highly unlikely that there will be a 100 percent demand for orthodontic treatment[15,39] and any potential savings should be reinvested in the orthodontic services. For example the integration of orthodontic therapists into primary dental care environment would require multi-chair facilities, which would require investment.

Table 15 Indicative orthodontic costs for localities and LHBs treating 30% and 35% of the population with a UOA value of £62 and £50 respectively (excludes HDS/CDS costs).

| | 12-17 year old population cohort | 30% provision of 12-17 year old population | 35% provision of 12-17 year old population | Total cost with 30% provision @£62 | Total cost with 35% provision @£50 |
|---|---|---|---|---|---|
| Isle of Anglesey | 871 | 261 | 305 | 356413 | 335335 |
| Gwynedd | 1472 | 442 | 515 | 602342 | 566720 |
| Conwy | 1412 | 424 | 494 | 577790 | 543620 |
| Denbighshire | 1245 | 374 | 436 | 509454 | 479325 |
| Flintshire | 1954 | 586 | 684 | 799577 | 752290 |
| Wrexham | 1631 | 489 | 571 | 667405 | 627935 |
| Betsi Cadwaladr | 8585 | 2576 | 3005 | 3512982 | 3305225 |
| Powys | 1766 | 530 | 618 | 722647 | 679910 |
| Ceredigion | 902 | 271 | 316 | 369098 | 347270 |
| Pembrokeshire | 1603 | 481 | 561 | 655948 | 617155 |
| Carmarthenshire | 2361 | 708 | 826 | 966121 | 908985 |
| Hywel Dda | 4866 | 1460 | 1703 | 1991167 | 1873410 |
| Swansea | 2670 | 801 | 935 | 1092564 | 1027950 |
| Neath Port Talbot | 1769 | 531 | 619 | 723875 | 681065 |
| Bridgend | 1688 | 506 | 591 | 690730 | 649880 |
| Abertawe Bro Morgannwg | 6127 | 1838 | 2144 | 2507168 | 2358895 |
| Vale of Glamorgan | 1736 | 521 | 608 | 710371 | 668360 |
| Cardiff | 3902 | 1171 | 1366 | 1596698 | 1502270 |
| Cardiff and Vale of Glamorgan | 5638 | 1691 | 1973 | 2307070 | 2170630 |
| Rhondda, Cynon, Taf | 3010 | 903 | 1054 | 1231692 | 1158850 |
| Merthyr Tydfil | 753 | 226 | 264 | 308128 | 289905 |
| Cwm Taf | 3763 | 1129 | 1317 | 1539820 | 1448755 |
| Caerphilly | 2306 | 692 | 807 | 943615 | 887810 |
| Blaenau Gwent | 980 | 294 | 343 | 401016 | 377300 |
| Torfaen | 1243 | 373 | 435 | 508636 | 478555 |
| Newport | 1948 | 584 | 682 | 797122 | 749980 |
| Monmouthshire | 1242 | 373 | 435 | 508226 | 478170 |
| Aneurin Bevan | 7719 | 2316 | 2702 | 3158615 | 2971815 |
| Wales | 38464 | 11539 | 13462 | 15739469 | 14808640 |
| Wales GDS/PDS only | 36424 | 9499 | 11422 | 12956909 | 12564640 |

UOA value of £62 represents average in Wales and should enable the treatment of 30% of 12-17 year olds.
With the economy of scale and introduction of orthodontic therapists 35% of 12-17 year olds could be treated. The cost efficiency saving needs to be reinvested to continually improve, modernize and manage the orthodontic service. An increase in provision will be seen in Hywel Dda with the reduction in UOA value to £62 and substantial increase in treatment numbers if the UOA value of £50 is achieved.

If the UOA value for practitioners working in Hywel Dda was set at £60 similar to the current levels in Abertawe Bro Morgannwg an additional 175 patients a year could receive appliance treatment (an increase from 797 to 972; 2008 to 2009 data).

*Impact on orthodontic provision*

Treatment profiles of a number of primary care practitioners were compared (Figure 7). Eighteen practitioners out of 25 did not claim for repairs. For one practitioner the numbers of repairs were greater than the number of treatment starts. Another practitioner undertook 582 reviews

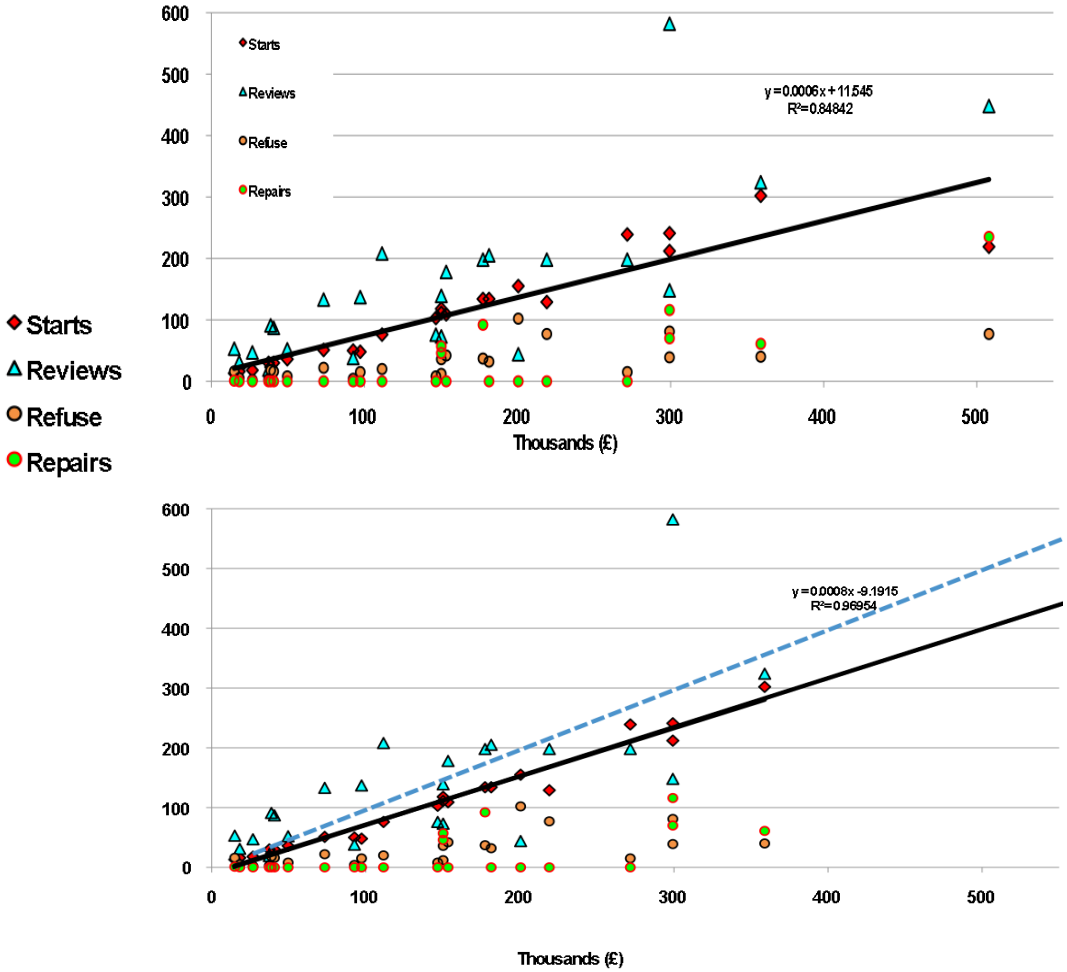


Figure 7 Two graphs (x-axis contract value; y-axis number of treatments) showing the profile of 25 practitioners (top) and excluding one expensive practitioner (bottom) changes the average cost per treated case. The blue dotted line (bottom) represents a UOA value of £50 and the black line a UOA value of £60 (Table 14). Ideally the number of reviews should be below this line.

Using the regression lines (black line: top and bottom) £500,000 should procure 312 treated cases (top) and bottom (UOA value of £60) 390 cases respectively as opposed to the actual number of 219 cases.

Evidence from the USA and Netherlands suggest that the introduction of orthodontic therapists and economies of scale should see greater numbers of cases treated (estimated at 20%).

With the overall reduction in practitioners providing orthodontic care in Wales there is an opportunity for practitioners to establish partnerships attract new and/or larger contracts enabling them to grow their businesses. It is important that an open tendering process is undertaken for new contracts.

It is possible to manage the orthodontic service for the children in Wales that need orthodontic treatment within the current level of funding, however a small proportion of funding (7.5%) will need to be reinvested to facilitate modernization, detailed management and support.

A two-phase efficiency programme is outlined in Table 16.

Table 16 Suggested measures to improve efficiency of orthodontic treatment in Wales arranged for two phases: Phase 1 to be undertaken immediately and Phase 2 to facilitate the introduction of orthodontic therapists and economy of scale.

| Efficiency measure | Efficiency effect | Comment |
|---|---|---|
| Phase 1 | | |
| Reduce the overall orthodontic workforce from over 130 to below 80 within 3 years. | Reduction of the workforce will make it easier to manage/monitor the orthodontic services and less expensive to run. | The reduction of the workforce will not affect treatment capacity but will focus on well-trained practitioners demonstrating high quality outputs (e.g. PAR and patient satisfaction). |
| The number of assessments should be reduced. Number of "Assess and accept" should equate to "Assess and review" plus "Assess and refuse". | There should be no more than one assessment claimed for an individual over a 2-year period by the same practitioner. | The more efficient practices are treating more than 50 percent of overall assessments. |
| Patients will only be generally allowed one course of fixed appliance orthodontic treatment. | This will reduce the number of assessments and re-treatments in the three services. | The one-treatment policy will need to be displayed in surgeries and discussed with patients. The patients should be informed that re-treatments can be provided through the private orthodontic service. |
| Practitioners should not claim for repairs which arise from practice colleagues. | Practitioners can claim for repairs from outside their practice area. | The majority of practitioners do not claim for repairs. |
| The aims and objectives need to be set for a 5-year period by the Welsh Orthodontic Strategy Board and implemented and monitored by the LHB orthodontic operational groups. | The strategy board will set 5-year targets and match performance against targets. The operational group will manage the day-to-day running and monitoring of the service. | As there are significant cross border flows across areas and LHBs the strategy board and operational groups should be combined for some LHBs. There should be an overarching Strategy Board for Wales, meeting annually. |
| Use MCNs to advise on the management of orthodontic services and share capacity between all services. | Will facilitate fluid management of services and reduction of treatment and patients waiting to be seen waiting lists. | |
| Managed Clinical Networks should be set up across Wales which are either coterminous with LHBs or groups of LHBs | Will inform local needs and local problem-solving. | The constitution of MCNs are available.[28] |
| Quality measures (PAR and patient satisfaction) should be introduced as soon as possible. | The introduction of quality measures is likely to exclude some orthodontic providers from the service. | Possible exclusions from the service will necessitate the reallocation of contracts. |
| All providers should be trained in the use of occlusal indices with the providing practitioners achieving calibration. | Should ensure consistency in referral, uptake and quality of treatment. | |
| The backlog of patients should be identified and addressed. Waiting lists should be cross-checked using postcode to identify duplication amongst providers | Will reduce duplication and enable to orthodontic service to move forward. | Will require additional funding to clear the backlog of patients. There is reported spare capacity within some GDS/PDS providers which should be utilised. |
| Phase 2 | | |
| Reduce cost base, improve efficiency at the same time as expanding the service. | The introduction of orthodontic therapists in all services should reduce the cost per case in combination with increasing treatment capacity. Thirty-nine providers treating 300 patients per year would be sufficient to provide orthodontic care for the children of Wales. The introduction of orthodontic therapists in the CDS will result in a cost-efficient service and when associated with high quality outcomes an extremely cost-effective service. | The introduction of therapists will require better patient management systems and some financial support to facilitate change. |
| Standardise price of UOA in combination with infrastructure changes which may require additional support. | With large volumes there should be some economy of scale. The UOA should be dependent on volume, quality and site of provision. Additional payments may be required to encourage practitioners to work in certain areas. Also there should be a clawback facility for treatments that are of poor quality. | Practitioners will be concerned as a perceived reduction in UOA value in association with an economy of scale. However, in combination with additional contracts which should become available (as a overall reduction of the workforce) There are opportunities for businesses to grow. Any cost-savings will need to be re-invested in the service to support modernization. |
| Promoting and monitoring change should be supported by an academic detailer.[40, 41] The process involves face-to-face education of prescribers of orthodontic care by trained health care professionals. | Face-to face interviews should help to support change in practice by highlighting differences in orthodontic activity and proposing more cost-efficient and cost-effective practices. | One academic detailer could be appointed for Wales with the aim to improving efficiency within 3 years. |

Although orthodontic therapists are being trained and incorporated in the orthodontic service in Wales there is currently no strategic or operational plan on how the service should be planned. It would be timely to engage all interested parties by supporting pilots across Wales which should address:

- Preserving viable practitioner expenses: earnings ratios in an modern working environment
- Evaluating economy of scale –matching orthodontic treatment volume with either a scaled UOA value or total cost of treatment.
- Consideration to incorporating orthodontic assessment (Review) within an overall cost for treatment.
- Integrating practice management and quality assurance into routine care.

## 10. Conclusions

This review was initiated as a result of reports in some areas of orthodontic capacity issues:

- Perceived increase in numbers of orthodontic referrals
- Perceived increase in inappropriate referrals
- Long waiting times for initial consultation
- Long waiting times for treatment
- Inability to access treatment

From the evidence presented to the subgroup there are certainly a large (not necessarily increased) number of assessments that are undertaken in the GDS/PDS and a high proportion of these assessments seem inappropriate, particularly below the age of 9 years of age considering the relative small number of active orthodontic treatments undertaken in this age group (which is less than expected).

There are long waiting times for treatment and initial consultation particularly in some GDS/PDS HDS and CDS units (some units with waiting lists greater than treatment starts per year). Four HDS units continue to be dependent on service support from orthodontic postgraduates and are consequently influenced by postgraduate intakes and their incremental increase in caseloads and accumulation of clinical skills.

Some interim funding may be required to make an impact on waiting lists which are reported to be two years by some providers.

Capacity issues in West Wales appears to be due to a small extent from a reduced child HDS service but mainly due to the high UOA value which procures significantly less orthodontic treatment in this region compared to the rest of Wales.

The findings of this review depended on the data collected. In the GDS/PDS excellent data were available on 7,864 of the 8,991 treatments (88 percent of the sample). Data from the HDS/CDS was collected by questionnaire. The data sets were combined to determine the percentage of the 12 to 17 year old cohort receiving orthodontic treatment (27%; range 14% to 41%).

Efficiency savings were identified in relation to reducing the number of assessments and repairs undertaken. However, to achieve an efficient orthodontic service for Wales it is necessary to reduce the cost base and increase treatment volumes by expanding the use of orthodontic therapists in all the services and also consider expanding the orthodontic CDS. The use of orthodontic therapists should facilitate increased treatment capacity and reduce overall costs. As there will be some economy of scale, reduced UOA values can be achieved with increased treatment volumes. The introduction of orthodontic therapists will require new approaches in financial planning and monitoring. Current funding may be sufficient to treat 35 percent of the 12-17 year old population with a skilled workforce of 39 providers (treating 300 cases per year). Due to the spread of the population in Wales there is often insufficient treatment capacity to support therapists however the number of practitioners providing orthodontics within the GDS/PDS could

be reduced substantially with 79 providers treating 150 patients per year or 39 providers treating 300 patients per year.

The report recommends that pilot studies should be undertaken to evaluate the best way to integrate orthodontic therapists in orthodontic provision in Wales.

The report recommends improved stability for orthodontic provision enabling the financial risks to be shared through partnerships, facilitating larger caseloads incorporating a lower cost-base (utilizing orthodontic therapists) with longer contract periods.

**It should be possible to manage the orthodontic service for the children in Wales that need orthodontic treatment within the current level of funding, however a small proportion (7.5%) will need to be reinvested to facilitate modernization, detailed management and support.**

In conjunction with achieving cost-efficiencies, the effectiveness of all providers should be validated within the next two years to achieve a well-managed cost-effective service in Wales, that can be acknowledged as one of the best in the world.

## 11. Recommendations

Welsh Assembly Government to:

1. consider the establishment of a strategic advisory forum on orthodontics (meeting annually) to re-affirm principles of orthodontic provision for all orthodontic services delivered in Wales. This forum should report to the Welsh Dental Committee. The forum should provide an annual report on the state of the orthodontic service considering issues relating to access to provision, costs and cost-effectiveness and advise on performance targets. In addition it is recommended that the forum review the type and volume of adult orthodontic treatments that are undertaken in Wales and develop draft national guidelines for the treatment of adults in Wales

2. develop an implementation process for this report, which will produce guidance for LHBs on the effective and efficient procurement of orthodontic services. This should include guidance on the facilitation of strategic, detailed operational management and modernisation of the orthodontic service. The guidance should contain information on best practice, including details of a pilot process to test the cost-effectivness of orthodontic therapists working within general dental services in Wales

3. consider amending the NHS PDS Agreements (Wales) Regulations to:
   - Incorporate a clause to clarify that PDS agreements can be established with partnerships.
   - Ensure the general principle of access to only one definitive course of fixed appliance treatment for children.
   - Include a contract penalty for the submission of incomplete FP17OWs.
   - Ensure providers are compelled to offer a free course of treatment to those patients whose treatment outcome (based on PAR) is worse than at the start of the treatment (excluding those patients who were not compliant with the treatment).

4. consider legislative changes required for the introduction of a discretionary charge for patients who fail to attend appointments.

5. work with LHBs and Public Health Wales to establish a website dedicated to orthodontics on an NHS Wales domain, and ensure that in the future all orthodontic providers have access to an NHS email address.

6. facilitate the development of an electronic referral system (which will allow records to be monitored centrally).

7. work with LHB colleagues to develop a comparable data collection systems (based on the FP17OW) for the Community and Hospital Dental Services.

8. working with colleagues in Postgraduate education, facilitate the development of the skill base of the orthodontic workforce e.g. all orthodontic practitioners should be calibrated in the use of occlusal indices, and all referrers should, as a minimum, understand when to refer.

9. investigate the effectiveness of employing academic detailers to support changes in working practices and detailing operational changes.

10. commission further research once the service is optimised and undertake a longitudinal cohort study (11 to17 years of age) to assess the orthodontic treatment need, uptake and overall success of the service.

Local Health Boards should:

11. improve the efficiency and effectiveness of orthodontic services delivery through effective procurement processes. LHBs should carry out a detailed scrutiny of an orthodontic practitioner's treatment profile, including scrutiny of treatment provided rather than just delivery of UOAs. As a result of the scrutiny, urgently consider negotiating and introducing specific contractual changes, including:

    - revision of contracts considering workforce and use economy of scale, with a view to reducing the number of providers across Wales.
    - classifying orthodontic contracts according to type of provider, e.g. specialist orthodontist or DwSI with a view to the development of specific orthodontic PDS agreements.
    - ensuring that contracts contain a clause regarding the "Assess and treat" - "Assess and review" to "Assess and refuse" ratio (should be at least 1:1).
    - renegotiation of contracts identified as delivering orthodontic assessments only or mainly assessments and very few treatments.
    - development of long term agreements (10 years) with the length of the agreements based on number of treatments provided per year, quality of services, orthodontic treatment outcome and value for money.
    - detailing the number of treatment starts and treatment completes per year in each contract.

12. support the rapid establishment of local Managed Clinical Networks (MCNs) in orthodontics with the view of improving patient care. The MCNs could:

    - lead the development of referral management processes with view of reducing early, multiple and inappropriate referrals.
    - facilitate close monitoring of treatment outcome through Peer Assessment Index (PAR). The network could establish a system where PAR score reductions are monitored independently on annual basis. The majority of cases should have a reduction of PAR score by 70% and less than 8% should be 'worse or no different'.
    - lead the introduction of a local accreditation scheme for Dentists with Special Interests (DwSI) in orthodontics.
    - ensure that all practitioners providing orthodontic care are calibrated in the use of occlusal indices.
    - monitor contractors compliance with Quality Assurance Self-assessment and Dental Reference Service processes.

13. further develop the monitoring of orthodontic services by:

    - ensuring providers complete data on FP17OW. All fields on this form are mandatory and should be completed.
    - ensuring HDS/CDS orthodontic service complements GDS/PDS and collects data useful for local planning purposes.
    - identifying the number of repairs per year - should be close to zero or minimal.
    - carrying out regular audits to check if contractors are applying IOTN criteria before starting treatment.
    - investigate the high volume of early referrals over the last 3 financial years, target practitioners who are referring patients early to change practice and setting a standard which reduce the number of early referral by 50 percent within one year.

Dental Profession to -

14. develop an active orthodontic providers group for Wales whereby all orthodontic practitioners participate to share experiences. This group would develop and agree a code of practice which includes participation in continuing professional development activities to improve/update knowledge and skills in orthodontics.

15. all practitioners providing orthodontic care should ensure that they are calibrated in the use of occlusal indices.

16. practitioners should not claim for a repeat assessment within a 2-year period unless it is clinically justified and further investigations other than simple examination such as radiographs, study casts etc are required.

17. ensure they meet the mandatory requirement to complete data on FP17OW.

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Welsh Consultant Orthodontic Group
Welsh Community Orthodontic Group
British Orthodontic Society

| | |
|---|---|
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| Steve Lucarotti | Senior Statistician NHS Dental Services |
| Maria Morgan | Lecturer in Dental Public Health. |
| Nigel Blewitt | Research Associate, Applied Clinical Research and Public Health, University Dental Hospital, Cardiff. |

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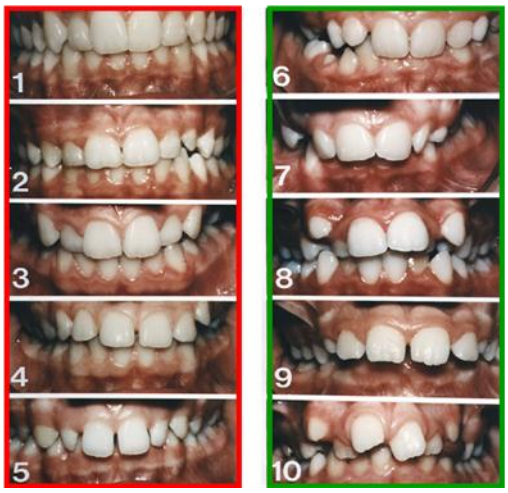
APPENDIX I
Index of Orthodontic Treatment Need (IOTN)

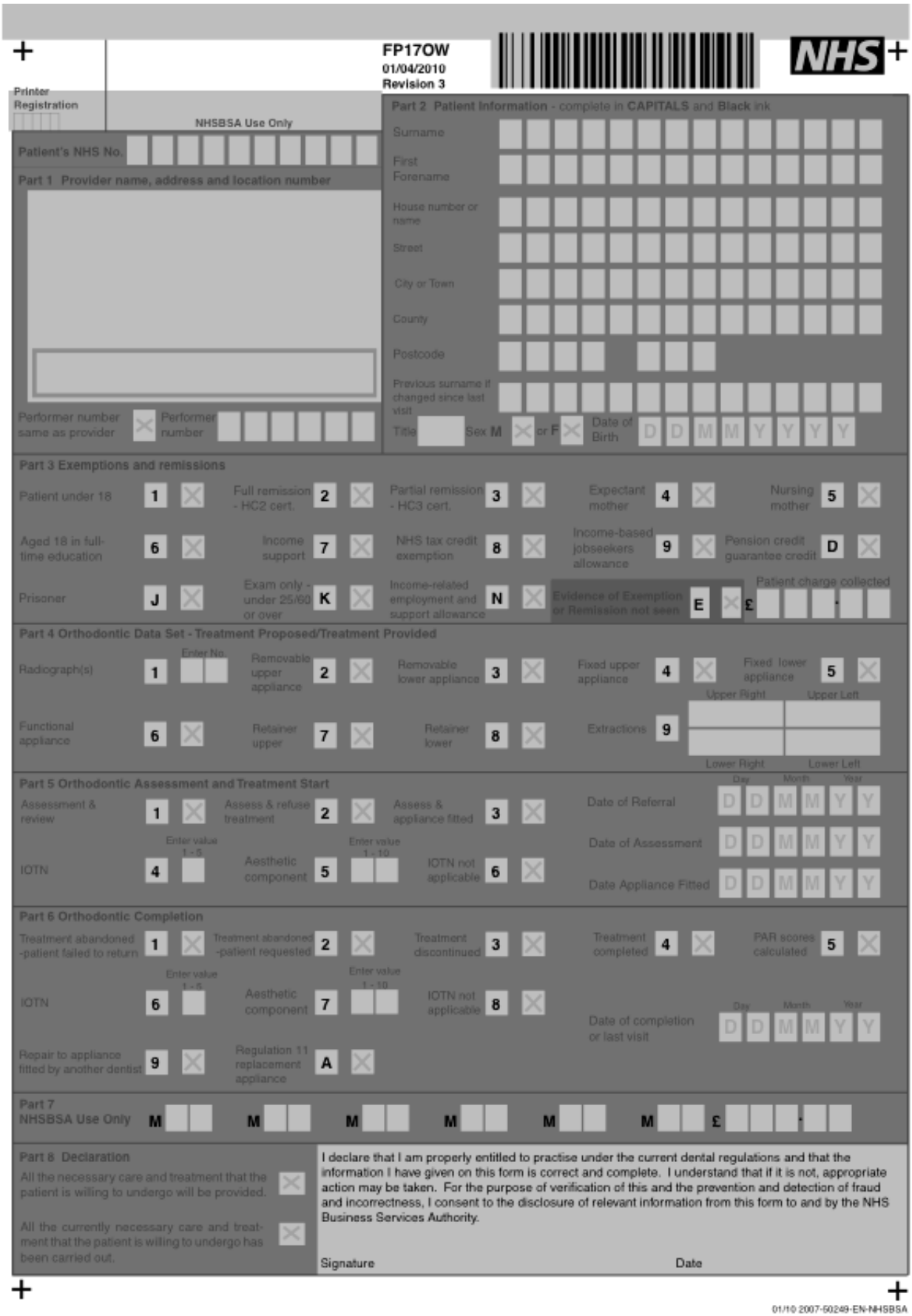
Aesthetic Component




Dental Health Component

| Dental Health Component of IOTN | |
|---|---|
| Grade 5 (very great) | a Increased overjet > 9 mm<br>h Extensive hypodontia with restorative implications (more than one tooth missing in any quadrant) requiring pre-restorative orthodontics<br>i Impeded eruption of teeth (with the exception of third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause<br>m Reverse overjet greater than 3.5 mm with reported masticatory and speech difficulties<br>p Defects of cleft lip and palate<br>s Submerged deciduous teeth |
| Grade 4 (great) | a Increased overjet > 6 mm but ≤ 9 mm<br>b Reverse overjet > 3.5 mm with no masticatory or speech difficulties<br>c Anterior or posterior crossbite with > 2 mm discrepancy between RCP and IP position<br>d Severe displacements of teeth > 4 mm<br>e Extreme lateral or anterior open bites > 4 mm<br>f Increased and complete overbite with labial or palatal trauma<br>h Less extensive hypodontia (one tooth missing per quadrant) requiring pre-restorative orthodontics or orthodontic space closure to obviate the need for a prosthesis<br>l Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments<br>m Reverse overjet greater than 1 mm but ≤ 3.5 mm with recorded masticatory and speech difficulties<br>t Partially erupted teeth, tipped and impacted against adjacent teeth.<br>x Supplemental teeth. |
| Grade 3 (moderate) | a Increased overjet > 3.5 mm but ≤ 6 mm with incompetent lips.<br>b Reverse overjet greater than 1 mm but ≤ 3.5 mm<br>c Anterior or posterior crossbite with > 1 mm but ≤ 2 mm discrepancy between RCP and IP.<br>d Displacement of teeth > 2 mm but to ≤ 4 mm.<br>e Lateral or anterior open bite greater than 2 mm but ≤ 4 mm.<br>f Increased and complete overbite without labial or palatal trauma. |
| Grade 2 (little) | a Increased overjet > 3.5 mm ≤ 6mm with competent lips.<br>b Reverse overjet > 0 mm but ≤ 1mm<br>c Anterior or posterior crossbite with ≤ 1 mm discrepancy between RCP and IP.<br>d Displacement of teeth >1 mm but ≤ 2 mm<br>e Anterior or posterior open bite > 1 mm but ≤ 2mm<br>f Increased overbite ≥ 3.5 mm without gingival contact<br>g Prenormal or postnormal occlusions with no other anomalies. Includes up to half a unit discrepancy |
| (None) | Extremely minor malocclusions including displacements <1 mm |

APPENDIX II


FP17OW
01/04/2010
Revision 3
NHS
Printer Registration
NHSBSA Use Only
Patient's NHS No.
Part 1 Provider name, address and location number
Performer number same as provider
Performer number
Part 2 Patient Information - complete in CAPITALS and Black ink
Surname
First Forename
House number or name
Street
City or Town
County
Postcode
Previous surname if changed since last visit
Title
Sex M or F
Date of Birth D D M M Y Y Y Y
Part 3 Exemptions and remissions
Patient under 18 1
Full remission - HC2 cert. 2
Partial remission - HC3 cert. 3
Expectant mother 4
Nursing mother 5
Aged 18 in full-time education 6
Income support 7
NHS tax credit exemption 8
Income-based jobseekers allowance 9
Pension credit guarantee credit D
Prisoner J
Exam only - under 25/60 or over K
Income-related employment and support allowance N
Evidence of Exemption or Remission not seen E
Patient charge collected £
Part 4 Orthodontic Data Set - Treatment Proposed/Treatment Provided
Radiograph(s) 1
Enter No.
Removable upper appliance 2
Removable lower appliance 3
Fixed upper appliance 4
Fixed lower appliance 5
Functional appliance 6
Retainer upper 7
Retainer lower 8
Extractions 9
Upper Right
Upper Left
Lower Right
Lower Left
Part 5 Orthodontic Assessment and Treatment Start
Assessment & review 1
Assess & refuse treatment 2
Assess & appliance fitted 3
Date of Referral
Day Month Year
IOTN 4
Enter value 1 - 5
Aesthetic component 5
Enter value 1 - 10
IOTN not applicable 6
Date of Assessment
Date Appliance Fitted
Part 6 Orthodontic Completion
Treatment abandoned -patient failed to return 1
Treatment abandoned -patient requested 2
Treatment discontinued 3
Treatment completed 4
PAR scores calculated 5
IOTN 6
Enter value 1 - 5
Aesthetic component 7
Enter value 1 - 10
IOTN not applicable 8
Date of completion or last visit
Repair to appliance fitted by another dentist 9
Regulation 11 replacement appliance A
Part 7 NHSBSA Use Only
M
£
Part 8 Declaration
All the necessary care and treatment that the patient is willing to undergo will be provided.
All the currently necessary care and treatment that the patient is willing to undergo has been carried out.
I declare that I am properly entitled to practise under the current dental regulations and that the information I have given on this form is correct and complete. I understand that if it is not, appropriate action may be taken. For the purpose of verification of this and the prevention and detection of fraud and incorrectness, I consent to the disclosure of relevant information from this form to and by the NHS Business Services Authority.
Signature
Date
01/10 2007-50249-EN-NHSBSA

APPENDIX III

## WELSH WORKFORCE ORTHODONTIC SURVEY

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. | Name of Consultant | | Hospital | | 6. | Number of patients currently on waiting list | | |
| 2. | LHB | | | | 7. | Ratio of adults to children on waiting list | | |
| 3. | Workforce* (see footnote) | | Number | Whole time equivalent WTE (based on 10 sessions per week) | 8. | Average number of patients seen per clinic (treatment) | | Number |
| | | Consultants | | | | | Consultants | |
| | | SpR/FTTA | | | | | SpR/FTTA | |
| | | DwSI | | | | | DwSI | |
| | | GDPs | | | | | GDPs | |
| | | Specialist | | | | | Specialist | |
| | | Staff grade | | | | | Staff grade | |
| | | Associate specialist | | | | | Associate specialist | |
| | | University teacher | | | | | University teacher | |
| | | Other (specify) | | | | | Other (specify) | |
| 4. | Number of vacancies* (see footnote) | | Number | | 9. | Number of patients seen per clinic (new patient review) | | Number |
| | | Consultants | | | | | Consultants | |
| | | SpR/FTTA | | | | | SpR/FTTA | |
| | | DwSI | | | | | DwSI | |
| | | GDPs | | | | | GDPs | |
| | | Specialist | | | | | Specialist | |
| | | Staff grade | | | | | Staff grade | |
| | | Associate specialist | | | | | Associate specialist | |
| | | University teacher | | | | | University teacher | |
| | | Other (specify) | | | | | Other (specify) | |
| 5. | Average number of treatment starts per year (Average over a 3 year period due to SpR turnover) | | Number | | 10. | Average number of treatment sessions per month | | Number |
| | | Consultants | | | | | Consultants | |
| | | SpR/FTTA | | | | | SpR/FTTA | |
| | | DwSI | | | | | DwSI | |
| | | GDPs | | | | | GDPs | |
| | | Specialist | | | | | Specialist | |
| | | Staff grade | | | | | Staff grade | |
| | | Associate specialist | | | | | Associate specialist | |
| | | University teacher | | | | | University teacher | |
| | | Other (specify) | | | | | Other (specify) | |
| Additional comments: | | | | | 11. | Average number of new patient clinics per month | | |
| | | | | | 12. | Average number joint clinics per month | | |

* Please enter the number of clinicians working in your unit. e.g. if there are 2 DwSis working 2 sessions each then enter 2 under "Number" and 4 under "WTE". Similar approach for vacancies.