NHS England

Assessment of Orthodontic treatment need and level of service provision for the resident population of Cheshire and Merseyside 2018

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1. Executive summary

The purpose of this orthodontic needs assessment is to systemically provide information to support efficient and effective use of resources to inform commissioning decisions that are beneficial to the oral health of the population.

Understanding need is not an exact science. Orthodontic treatment need can be categorised in a number of ways. The assessment is based upon estimating the need in the 12-year-old population, using a measure called Index of Orthodontic Treatment Need. For the purpose of this document the figures obtained by using the “third rule” are used in calculations of need. This ensures the document is consistent with the NHS England Orthodontic Commissioning Guide 2015.

The location and capacity of current providers is largely historic and there has been little active commissioning of orthodontic services since the advent of the new contract in 2006.

The data suggest that if primary care orthodontic activity continues to be commissioned at 2017 levels then there will not be sufficient orthodontic activity provided in primary care to meet the modelled need. However, this gap assumes that all activity is delivered in primary care, there also is a considerable amount of activity delivered in secondary care.

Secondary care data has limitations and ideally there should be further analysis of these data so that it can be determined whether the current level of commissioned activity is sufficient to address the need based upon current and future service delivery models.

Prior to the introduction of the e-referral system, waiting lists and times for primary care orthodontic treatment were not routinely collected or standardised. Self-reported data suggests a large variation in the waiting times, between the primary and secondary care providers.

Validation of historic waiting lists, in both primary and secondary care would provide further beneficial data, for future commissioning of services.

Patient flows for orthodontic care, is relatively stable, with inflows from neighbouring NHSE regions balancing outflow. The exception is cross boarder flow, where the proportion of inflow from Wales is much greater than outflow.

Data including local demographics, patient views and current service delivery need to be triangulated to provide a whole systems approach towards planning a future service, which provides efficient and effective service delivery.

2. Introduction

The 2013 Health and Social Care Act brought together the commissioning of all dental services into NHS England (NHSE). Prior to 2013, dental services across Cheshire and Merseyside (C&M) were commissioned by 8 Primary Care Trusts (PCTs). Historically each PCT had undertaken individual orthodontic needs assessments. This document represents the first such needs assessment for NHSE C&M area. The document has been work in progress since 2015, with data being reviewed and updated on an annual basis.

The needs assessment gives an overview of the current position of orthodontic commissioning in C&M. The current data described within the document is designed to inform commissioning, it outlines population need and orthodontic services currently commissioned, before identifying gaps in services and knowledge.

3. Glossary

Abbreviation / term	Definition
C&M	Cheshire & Merseyside
PCT	Primary Care Trust
LA	Local Authority
UOA	Units of Orthodontic Activity
NHSE	National Health Service England
PDS	Personal Dental Service
GDS	General Dental Service
IOTN	Index of Orthodontic Treatment Need
DMFT	Decayed , Missing, Filled Teeth
MCN	Managed Clinical Network
CCG	Clinical Commissioning Group
GDP	General Dental Practitioner
CDHS	Child Dental Health Survey
DHC	Dental Health Component
AC	Aesthetic Component
SUS	Secondary users service
LGA	Local Government Association
ONS	Office of National Statistics

4. Context

4.1. Orthodontics is the dental specialty concerned with facial growth, development of the dentition and occlusion, and the assessment, diagnosis, interception and treatment of facial irregularities and malocclusions.[1] General dental practitioners, dentists with enhanced skills and orthodontic specialists deliver primary care orthodontic services. They may be supported by orthodontic therapists.

4.2 Secondary care orthodontics is delivered by consultants and specialists assisted by orthodontic therapists and trainees. Secondary care orthodontists offer advice, training and treat the most complex cases.

4.3 Successful outcomes from orthodontic treatment may include improved appearance and improved function enabling an individual to eat, speak and socialise without, discomfort or embarrassment and which contributes to general well-being. In many cases the consequences of not providing orthodontic treatment for an individual are not easy to quantify. A small number of cases may give rise to oral health problems such as gingival trauma, increased risk of dental damage due to external trauma if not treated, however, the most commonly cited negative outcome for untreated malocclusion is 'psycho- social' a catch all description for the psychological or social disability consequent to having misaligned teeth.

4.4. The orthodontic provision in C&M were provided through a number of primary and secondary care contracts, which are historically derived from PCTS. The contracts are currently managed by NHS England (NHSE).

4.5. Across C&M primary care orthodontic services are provided through time-limited Personal Dental Services (PDS) contracts. In one area only (Halton), units of orthodontic activity (UOAs) are provided through a single open-ended General Dental Services (GDS) contract.

4.6. The majority of the current time-limited PDS contacts will expire on 31st March 2019.

4.7. The majority of secondary care orthodontic services are provided through NHSE directly commissioning with nine NHS Hospital Trusts.

4.8. Primary care orthodontic treatment provided within the NHS is funded in a currency called units of orthodontic activity (UOA). A full course of fixed orthodontic treatment will require 21 UOA [1]. It is assumed that some patients will require a separate orthodontic assessment. To allow for these slight

variations in the way patients are managed, NHSE have adopted a more liberal approach to measuring activity within a needs assessment. Thus local commissioners were informed in 2017, that each completed course of orthodontic treatment, for an individual patient, will be modelled using 22.5 UOA.

4.9. The policy for NHSE is to commission orthodontic treatment under the NHS for children 18 years and under at the more severe end of the spectrum of malocclusion present in the population. Treatment need can be clinically assessed using the Index of Orthodontic Treatment Need (IOTN). This index has two components. Firstly a measure of clinical need assessed on scale of 1- 5 where 5 is more severe. Secondly, an aesthetic assessment on a scale from 1-10 where 10 is least aesthetically acceptable. The current threshold for eligibility for treatment under NHS contract is IOTN 3 (AC 6-10) 4 and 5[1]

Children who are 12 years of age are the age group used to define orthodontic need, as treatment is usually carried out when all the permanent teeth have erupted. The National Child Dental Health Survey showed that 35% of 12 year old children in the UK had an index of treatment need (IOTN) score of 3.8 or above based on dental health and aesthetic grounds. It is estimated that 26% of 12 year old children will fall into IOTN 4 and 5. Although the number of children in IOTN 5 only has not been published, senior clinicians estimate this to be between 5-10%[2].

5. Data

In order to inform the needs assessment, data was used from a variety of sources; orthodontic service provision and access to NHS dental services was provided by the Business Service Authority. The Local Authority joint strategic needs assessment and the Local Government Association (LGA)[3] website, provided, population data for C&M. The NHS England area team for C&M provided information for the UOA contract values currently commissioned from all providers of orthodontics, the quality outcome data for the providers and electronic referral data.

6. Population demographics

6.1. Population demographics relating to each of the 9 Local Authorities (LAs) within the NHSE C&M boundary were reviewed using the LGA website, these data included: levels of deprivation, population density and total population projections for age.

6.2. Appendix 1 shows data by age, derived from the Office of National Statistics for the 12 years of age population estimates per Local Authority within C&M, for the years 2017-2027[4]. These estimates are based upon the 2014 census data. The data in appendix 1 has been used to produce the figures in Table 1, which are based upon an average of each LA 12 year old population estimates for the period 2017-2027.

6.3 The data suggest that there will be a projected 8 percent increase in 12 year old children within C&M, over the 10 year period 2017 and 2027.

6.4. There is a large variation in resident population sizes within the 9 local authorities across NHSE C&M, which is reflected in the size of the 12 years of age population. This ranges from 1,600 in Halton to over 5,000 in Liverpool.

Table 1
Projected average population of 12 year old children in C&M - 2014 base projections from ONS for years 2017 to 2027

Authority	Projected average number of 12 year olds between 2017-2027
Cheshire East	4,431
Cheshire West & Chester	3,842
Halton	1,649
Knowsley	1,816
Liverpool	5,076
Sefton	3,089
St. Helens	2,104
Warrington	2,646
Wirral	3,933
TOTAL	**28,585**

7. Dental Health and attendance

7.1 The oral health of 12 year old children was surveyed in 2008-09[2]. The survey was undertaken when PCTs commissioned dental services Table 2 shows that in the C&M area there was a wide variation across the various PCTs for 12 year olds who had experienced dental disease (DMFT>0), with a range from 29% to 56%.

Table 2 12-year-old Survey 2008/09 - Primary Care Trust Data[2]

PCT Name	12-year-old Population (Mid-2008)	Weighted Measures % D3MFT > 0
England	608,460	33.4%
Central and Eastern Cheshire	5,539	28.8%
Halton and St Helens	3,690	41.6%
Knowsley	1,993	56.1%
Liverpool	4,729	52.5%
Sefton	3,414	38.1%
Warrington	2,389	32.9%
Western Cheshire	2,744	30.6%
Wirral	3,829	36.0%

7.2. Under the current dental contractual arrangements (introduced in April 2006), patients do not have to be registered with a NHS dentist to receive NHS dental care. The closest equivalent measure to 'registration' is the number of patients receiving NHS dental services ('patients seen') over a 24-month period.

7.3 Table 3 shows the numbers of claims for children aged 12 years of age attending a dentist in C&M over the 24 month period, up to February 2018. If these figures are aligned with the population estimates for 12 year olds in table 1, it could be assumed that over 70% of 12 year olds will attend a dentist in C&M, each year.

Table 3

Number of patient claims in the last 24 months period for patients aged 12 at February 2018[5]:		**Number of claims for patients age 12, in 24 month period February**
Area Team	**Area Team Code**	**2018**
Cheshire, Warrington and Wirral	Q44	12,866
Merseyside	Q48	11,177
TOTAL		**24,043**

8. Quantifying the need for orthodontic treatment

8.1. In order to determine the amount of orthodontic service that should be commissioned, consideration needs to be given to the prevalence of disease in the population as determined by dental professionals. In addition one needs to regard factors which then modify this normative need – e.g. patient compliance, patient preference, and oral health status.

8.2. The prevalence of malocclusion in 12 year old children is the measure usually referenced when considering this issue. The prevalence of malocclusion at 12 years of age will underestimate estimates of treatment need in any one year, as there will be a small group of the population that will have a treatment need but won't be accounted for in the 12 year cohort. These groups include:

A proportion of young children who have "interceptive treatment" in attempt to reduce the need for complex treatment when they are older.

A group of older patient who may require orthodontic treatment in addition to complex surgery, they are usually referred to as orthognathic patients and the majority of their care will be undertaken in secondary/tertiary care.

9. How much orthodontic need is in Cheshire & Merseyside population of 12 year olds?

9.1 Orthodontic need can be categorised in a number of different ways:

1. Normative (clinical) need established by examination by trained clinician and commonly measured using the Index of Orthodontic Treatment Need.
2. Demand for treatment from children (or parents) who 'Want' orthodontic treatment to straighten teeth.

9.2 There are various methods of estimating need for orthodontic care, particularly in relation to normative need. No method of assessing need however, is precise.

9.3 It is important that any estimate of need in C&M be consider within the context of the system as a whole.

10. Estimate of normative need

There are various methods of assessing normative need, no method is precise, this report describes 3 methods:

10.1. Survey method

10.2. Stephen's formula method

10.3. The rule of 'a third' method

10.1. Survey method

Most orthodontic needs assessments utilise the Community Dental Health Survey (CDHS) 2003, 2013 data. The surveys assess need using a modified Index of Orthodontic. The survey does not recognise a child with an IOTN 3.6-3.7 as having a treatment need, whereas a child with this IOTN would be eligible for treatment on the NHS. This means that these figures will slightly underestimate the need for Orthodontic care according to NHS IOTN threshold.

Summary of level of treatment need as measured by consecutive Children's Dental Health Surveys, 2003 and 2013

Year	% in treatment	% treatment need	% total need
2003	8	35	43
2013	20	Not gathered	Not gathered

Using the 2003 survey, 35% of children had an IOTN Dental Health Component (DHC) of 4 or 5 or an Aesthetic Component (AC) of 8-10. This approach doesn't include those with an AC of 3.6 or 3.7. 8% of those surveyed were wearing orthodontic appliances. DPB data suggested that under the new contract regulations 2006, that some 14% fewer people would be eligible for NHS orthodontic treatment. If this is correct then one might suppose that 14% of those with orthodontic appliances wouldn't fall into the IOTN categories of DHC3 with an AC of 6 or higher, thus 86% of 8% may be eligible i.e. 6.9%[2].

Taking these two values there is an estimate that 35% + 6.9%=41.9% of

12 year old children had an IOTN Dental Health Component (DHC) of 4 or 5 or with an Aesthetic Component (AC) of 8-10.

Additional complex work can be undertaken to estimate the impact of the interceptive treatments and other factors, however, utilising either simple 35% or the adjusted 41.9% appears to be well accepted. However, it should be remembered that these figures assume 100% of 12 year olds will attend a dental practice. These data also make assumptions that all children who need orthodontic treatment will accept it. Numbers for acceptance of treatment have been estimated at between 25 - 50 % depending on the population and number of 12 year old children attending a dentist within a given year.

10.2. Stephen's formula method

Stephen's method is one of a number of formulaic methods of estimating normative need. This method defines a person with need as having an IOTN dental health component of (DHC) 4 or 5 (which again differs slightly from the NHS IOTN threshold).

The formula for Stephen's method of estimation of need

$$\frac{\text{12 year old population}}{3} \times 100 + \frac{\text{interceptive factor + adult factor}}{100}$$

(Where interceptive factor = 4 and adult factor = 9)

Stephen's formula is likely to provide an overestimate of need for treatment because it does not include demand[6].

10.3. The rule of 'a third' method

Evidence from national surveys and literature suggest that around 33% of 12-year olds have an objective need for orthodontic treatment (table 3). In a typical school population, one third of the children fall into IOTN categories 4 and 5. This method of estimation is supported by the NHS England commissioning guide for orthodontics[1].

Table 4
Illustrates the levels of normative need in 12 year old children in published international studies

Author	Date	Country	Sample size	Age of children (years)	Percent with definite treatment need*
Brooke and Shaw[7]	1989	England	333	11-12	32.7%
Holmes[8]	1992	England	996	12	32.0%
Wang et al[9]	1999	China	765	12	37.0%
Abdullah and Rock[10]	2001	Malaysia	5,112	12-13	30.0%
Abu Alhaij et al[11]	2004	Jordan	1,002	12-14	34.0%

10.4. To allow for the discrepancies in data, three differing data sets have been modelled. The modelling assumed that orthodontic treatment need will normally be distributed across those children who are currently accessing NHS dental services.

The three models are as follows:

Model 1
Table 5 takes a liberal view and assumes that 35% of 12 year olds need treatment, of whom all will attend a dentist, (although based upon figures in table 3, this does not appear to be the case), with a further assumption that 90% of those offered orthodontic care will accept it.

Model 2
Table 6 uses the assumption described in the 2015 Orthodontic Commissioning Guide[1], population need will be based on an estimate of a third (33%) of the 12 year old population, within the NHSE locality, will require treatment.

Model 3
Is the outcome for Stephen's formula[6].

Table 5

Estimation of the number of 12 year olds in C&M in need of orthodontic treatment, applying model 1

Local Authority	Number of 12 year olds in C &M ONS combined years average 2017-2021	Number needing treatment with 35% prevalence	90% of those with need expressing demand
Cheshire East	4,431	1,551	1,395
Cheshire West and Chester (includes Vale Royal)	3,842	1,345	1,210
Halton	1,649	577	519
Knowsley	1,816	636	572
Liverpool	5,076	1,777	1,599
Sefton	3,089	1,081	973
St Helens	2,104	736	663
Warrington	2,646	926	833
Wirral	3,933	1,377	1,239
TOTAL	**28,585**	**10,006**	**9,003**

Table 6

Estimation of the number of 12 year olds in C&M (combined years average 2017-2027) in need of orthodontic treatment, applying model 2

Local Authority	Number of 12 year olds in C &M ONS combined years average 2017-2021	Number needing treatment with 33% prevalence
Cheshire East	4,431	1,462
Cheshire West and Chester	3,842	1,267
Halton	1,649	544
Knowsley	1,816	599
Liverpool	5,076	1,675
Sefton	3,089	1,019
St Helens	2,104	694
Warrington	2,646	873
Wirral	3,933	1,297
TOTAL	**28,585**	**9,430**

Model 3

Stephen's formula calculation for C&M, using combined average data for 2017- 2027, 12 year old predicted data (table 1 section 5):

$$\frac{28.585}{3} \times \frac{100 + \text{interceptive factor (4)} + \text{adult factor(9)}}{100}$$

9,528 X 1.13= 10,767.01

Table 7

Summary of comparison of methods showing estimated orthodontic need in C&M:

Model	Predicted need based on 12 year age data
Model 1 Based on survey predictions	9,003
Model 2 Rule of a third	9,430
Model 3 Stephen's formula	10,767

10.5. Table 7 illustrates that there is no precise way of estimating need. These estimations are just that: it is therefore, crucial that these data are interpreted with other local population and service data. These data alone are an insufficient basis from which to commission services and must only be used in the context of understanding the strengths and weaknesses of the wider orthodontic system.

For the purposes of this needs assessment the figures obtained by using the third rule are used in calculations in this document. This is to ensure that this document is consistent with the NHS England orthodontic commissioning guide. This method also gives and estimation of need which represents the mid-range of the three methods.

11. Perceived need and demand

Perceived need varies between individuals, is inconsistent even at the same IOTN, and is difficult to predict with accuracy. Demand for orthodontic treatment has increased substantially and continues to increase[1]. Demand is likely to be greater in females and children from higher socio-economic groups[12]. It is therefore, not possible to predict demand by looking at levels of normative need alone. Children with a more extreme malocclusion are more likely to demand treatment than those without. That said, demand can be absent in children with a high need and present in others with no objective need. This means that there are groups in society who do not receive orthodontic care but who may benefit from it. Further, within the North west socio-economic gradients indicate inequity in orthodontic outcomes, with children from disadvantage communities having poorer treatment uptake and outcomes[13].

12. Current commissioning for orthodontic treatment in primary care

12.1. Using model 2 based on an estimate of a third of the 12 year old population needing orthodontic treatment Table 8 shows that there are variations across the C&M area for the proportion of treatment starts to the number of resident children. Commissioned UOAs are much greater in some areas than others. This is particularly noteworthy in Sefton, where there are low levels of commissioned service in respect to 12 year old population data.

Table 8
UOA commissioned in C&M by Local Authority areas in January 2018

Local Authority	Commissioned Number of UOAS Jan 2018	Provider Number of case starts (UOAs/22.5)	Required need case starts (based on 33% of projected 12 year olds populations 2017/21)
Cheshire East	35,592	1,581	1,462
Cheshire West and Chester (includes Vale Royal)	39,431	1,752	1,267
Halton	Undefined –GDS	0	544
Knowsley	717	31	599
Liverpool	32,334	1,437	1,675
Sefton	5,911	262	1,019
St Helens	7,720	343	694
Warrington	18,212	809	873
Wirral	30,098	1,338	1,297
TOTAL	**170,015**	**7,553**	**9,430**

12.2. Using the previously defined weighted needs assessment (and NHSE wishes to calculate treatment starts at 22.5 UOAs per case) it could appear that within primary care alone there is an under capacity of 2,206 case starts (courses of treatment), however, the figures do not take into account:

- Previous commissioning which based case start requirements on a figure of 21.5 UOAs per patient (table 9).
- All the activity which is provided in secondary care.
- Cross border patient flows, which may distort the overall figure.

These confounders are discussed further in the section 13, which describe patient flow and referral data.

Table 9
UOAs commissioned in C&M Local Authority areas

Local Authority	Number of UOAs	Provider number of case starts (UOAs / 21.5)	Required need case starts (based on 33% projected 12 year olds populations 2017/21)
Cheshire East	35,592	1,655	1,462
Cheshire West and Chester (includes Vale Royal)	39,431	1,837	1,267
Halton	Undefined-GDS	0	544
Knowsley	717	33	599
Liverpool	32,334	1,504	1,675
Sefton	5,911	275	1,019
St Helens	7,720	359	694
Warrington	18,212	847	873
Wirral	30,098	1,400	1,297
TOTAL	**170,015**	**7,910**	**9,430**

13. Current primary care service location

The map in appendix 2 depicts the location of orthodontic primary care service providers, within Local Authority boundaries and against the level of deprivation. If the map is laid over the individual local authority population density maps[3], it can be seen that services in some areas are provided from sites with a high level of population density, for example the areas of Wallasey and Birkenhead, for Wirral LA. In other areas of Wirral LA the population density is less, e.g. West Kirby. In addition, within some LAs a number of contracts operate from the same site (Liverpool, Wirral and Warrington).

Access to the primary care orthodontic services is via a General Dental Practice referral, using the NHSE commissioned and MCN developed e-referral service, which came into effect on 6th Feb 2017. Appendix 3 shows the location of General Dental Practices, across C&M, who will refer into the orthodontic services.

14. Patient flows for Cheshire & Merseyside

14.1. Data suggest that the majority of C&M residents receive orthodontic treatment in C&M. However, patients are prepared to travel further for specialist treatment and it is known that there is some cross boundary flow for orthodontic treatment in and out of C&M.

14.2. Table 10a/b and Table 11a/b show data in and out flows from BSA data set. These data are taken from the contract year 04/2015- 03/2016 and broken down into historic residential health areas of Merseyside and Cheshire. (The latter includes Cheshire, Warrington and Wirral.)

14.3 BSA data, determines patients' residence by the postcode recorded on the FP17 form. In addition the BSA data shown in the tables, relates to the historic NHSE team structure where there was separate commissioning for Cheshire and Merseyside respectively. Further the BSA data does not collect referral to secondary care.

Table 10a
Merseyside resident patient outflow for primary care orthodontic dental treatment during the period April 2015 to March 2016

Merseyside Area where patient resides and receives treatment	Number of patients treated
Merseyside	5,291
Lancashire	1,294
Cheshire, Warrington and Wirral	1,221
Greater Manchester	364
Betsi Cadwaladr University Health Board	1
Cumbria, Northumberland, Tyne and Wear	1
Kent and Medway	1
Total	**8,173**

BSA data Set [5]

Table 10b
Merseyside resident patient inflow for primary care orthodontic dental treatment during the period April 2015 to March 2016

Merseyside Area where patient resides and receives treatment	Number of patients treated
Merseyside	5,289
Unknown	334
Lancashire	152
Cheshire, Warrington and Wirral	51
Greater Manchester	28
Durham, Darlington and Tees	1
Shropshire and Staffordshire	1
Surrey And Sussex	1
Betsi Cadwaladr University Local Health Board	1
Total	**5,858**

BSA data Set [5]

14.4 BSA data in table 10a/b shows that in the contract year 2015-2016, Merseyside had 2,315 outflow of resident population for orthodontic treatment, the majority of residents received primary care orthodontic treatment in Lancashire.

Table 11a
Cheshire, Warrington and Wirral resident patient outflow for primary care orthodontic dental treatment during the period April 2015 to March 2016

Cheshire, Warrington, Wirral Area where patient resides and receives treatment	Number of patients treated
Cheshire, Warrington and Wirral	12,940
Greater Manchester	441
Shropshire and Staffordshire	62
Merseyside	51
Betsi Cadwaladr University Health Board	14
Lancashire	7
South Yorkshire and Bassetlaw	3
Durham, Darlington and Tees	1
Cumbria, Northumberland, Tyne and Wear	1
Derbyshire and Nottinghamshire	1
Hertfordshire and the South Midlands	1
North East London	1
Thames Valley	1
Total	**13,524**

BSA data Set [5]

Table 11b: Cheshire, Warrington, Wirral- resident patient inflow for primary care orthodontic dental treatment during the period April 2015 to March 2016

Cheshire , Warrington and Wirral Area where patient resides and receives treatment	Number of patients treated
Cheshire, Warrington and Wirral	12,940
Merseyside	1,220
Shropshire and Staffordshire	1,001
Betsi Cadwaladr University Local Health Board	491
Unknown	491
Greater Manchester	437
Derbyshire and Nottinghamshire	306
Lancashire	13
Other	10
Total	**16,909**

14.5 BSA data in table 11a/b, shows that in the contract year 2015-2016, Cheshire Warrington and Wirral had 3,385 inflow, of patients for primary care orthodontic treatment, the majority of whom were residents from Merseyside, Shropshire.

14.6 E-referral data (described further in section 15) provides a more accurate picture than the BSA data. The e-referral data is based upon the current NHSE C&M area and includes both primary and secondary referrals. Table 12 is used to depict the Local Authority areas in which patients reside, and who were managed through the e-referral system, during 2017-2018.

Table 12

E-referral data showing resident Cheshire & Merseyside Local Authority for patients inflow primary and secondary care orthodontic treatment in C&M period Feb 2017 to January 2018

Resident Local Authority	Numbers Referred
Central and Eastern Cheshire	2,425
Liverpool	2,748
Wirral	2,392
Halton	780
Cheshire West and Chester	2,364
Warrington	1,348
Sefton	1,041
Knowsley	792
St Helens	1,079
Other LAs in England	1,103
Welsh Local Health Boards	234
Total	**14,969**

NHSE C&M e-referral data

14.7. Further e-referral data is provided in Appendix 4. It depicts patient flows via the CCG area, from which the referred patient resides, and the legacy PCT area.

14.8. The data show that C&M receive referrals for patients residing within its own area, across NHSE boundaries e.g. Greater Manchester, Shropshire and across boarders from North Wales.

14.9 These data need to be considered, during reviews of patient flows for service planning. It should be accepted, that not all patients will be referred for or receive care in the area related to their CCG or LA boundaries.

15. Referral management system to underpin the commissioning approach

15.1. In February 2017 C&M developed an electronic referral management system. It covers the entire population of C&M (almost three million) and 350 + dental practices.

15.2. The e-referral system undertakes a validation of all orthodontic referrals using a secure, web-based system. The orthodontic MCN have developed a proforma that requires GDPs to confirm a patient being referred, needs, wants and is suitable for orthodontic treatment. They are guided through the process to describe the orthodontic need and can add an IOTN as well. Again, this does not replace a full orthodontic assessment by a specialist – it seeks to filter those referrals requiring assessment for complexity and urgency, prior to directing patients to a specialist orthodontist for a case assessment. There are upwards of 1500-2000 orthodontic referrals received each month in C&M. and a total of 16,306 were referred in the period January 2017-January 2018.

15.3. The data sets from e-referral can further be analysed at level for gender /age of referral, social economic status against referral postcodes. For the purpose of this document, the data have are described currently against referral numbers and providers only.

15.4 Table 13 shows the e-referral system data for total number of referrals, 17,363, for orthodontic provision in C&M for the period February 2017- 2018. In addition the numbers of referrals forwarded to providers of orthodontic care, together with the numbers of primary care referrals waiting to be sent to be accepted by primary care providers.

Table 13
Numbers of referrals sent to primary and secondary care from validate e-referral system for the period: 01 Feb 2017 and 28 Feb 2018

Care Type	Number of referral
Primary care	9006
Secondary care	2262
Primary care (Priority)	323
Tertiary care	50
Waiting for onward	5722
Total	**17,363**

16. Referral numbers and patients waiting for orthodontic treatment

16.1 The e-referral data report that at Feb 28th 2018, 5,722 patients were awaiting to be accepted for assessment, the majority of these were awaiting to enter primary care services.

16.1. In January 2018, the MCN undertook a waiting list exercise with all providers, requesting details of numbers of patients waiting for assessment and those assessed waiting for treatment, pre introduction of the e-referral system. Table 14 shows the results of the MCN self-reported number of patients waiting for an initial assessment at January 2018.

Table 14
MCN self- reported numbers of children waiting for orthodontic assessment and treatment in C&M up to January 2018

Local Authority	Self-reported number of patients assessed on review for future treatment Jan 2018	Self-reported number of patients waiting for initial assessment Jan 2018
Wirral	872	34
Warrington	466	1,102
Cheshire East	860	184
Cheshire West and Chester (includes Vale Royal)	1,232	53
Liverpool	639	5,304
St Helens	441	1,647
Knowsley	-	-
Halton	GDS	
Sefton	-	0
Cheshire and Merseyside TOTAL	**4,570**	**8,324**

16.2 The MCN audit reported an excess of 8,000 invalidated referrals sitting on practice waiting lists which are unevenly distributed across specialist providers.

16.3. The waiting list for orthodontic treatment vary between the orthodontic providers, with Liverpool having the largest self- reported waiting lists.

16.4. It is accepted that within these self -reported waiting lists, there is a possibility of multiple referrals for the same patient further there is also the issue of historical overhangs in the system, patient cohorts from times prior to the establishment of sufficient capacity to meet population needs.

16.5. The MCN audit and the patients waiting to be accepted into primary care via the e-referral system suggest an inequity of access to services for patients and a possible inefficient use of resources across C&M.

17. What orthodontic treatment is provided in primary care?

17.1. Orthodontic needs assessment and reviewing existing service provision to meet the need is part of the process and, as a minimum, should also include: a review of current providers and their service and contract delivery performance. Table 15 provides details of contact sizes currently held by providers commissioned by NHSE within C&M.

Table 15
Current commissioned capacity and the number of providers at January 2018

Providers ranked at current commissioning of 22.5 UOAs per case start	*number of providers
1. >601 case starts (>13,501 UOAS)	**1**
2. 401-600 case (9,001-13,500)	**7**
3. 301-400 case starts (6,501-9,000 UOAs)	**5**
4. 201-300 case starts (4,522-6,500 UOAs)	**4**
5. 101-200 case starts (2,273-4,521 UOAs)	**5**
6. <100 case starts (2,272 UOAs)	**2**
Total	**24**

***The providers may hold more than one contract and a number of providers work in the same building.

17.2. In 2015-2016, NHSE held one to one engagement meetings with all providers and discussed a number of the variables found in the BSA quality data dashboards. In-particular these included variation in delivery of assess and accept by contract address and variation in the proportion of courses of treatment that are abandoned or discontinued.

17.3. The engagement meetings and contract reviews held by NHSE reported that some of these contracts do not operate efficiently, with orthodontic activity being used for assessments of patients, sometimes on more than one occasion, without any provision of treatment.

17.4 Appendix 5 shows the quality dashboards for all orthodontic contract holders within C&M for the years 2015-16 and 2016-17. These data are submitted by practices to the BSA. Data are not independently verified.

17.5 The data show there is a range in the quality reporting for the various primary care providers. This is most evident in the domain for "% of all assessment that were assess and fit", range in 2016-17 was 19.1-80.4%. There was an overall percentage of 61% in Merseyside and 63.1% in Cheshire .These total percentages for all providers within NSHE C&M, is however, better than the English average of 58%

17.6. The local variations in quality outcome data have been further analysed at a Northwest level.by Price et al[13] They found evidence of inefficiencies in the NHS orthodontic service, with 7.6% and 5.2% of NHS primary care orthodontic treatments in North West England ending in discontinuation and residual need, respectively. In addition, 38.3% of treatments had missing outcome data, highlighting the need to improve the outcome monitoring systems.

17.7. It should be noted that in order to provide a reasonable and acceptable standard of care to 21st century quality assurance measures, clinicians who are not on a specialist list in orthodontics would, for a proportion of their cases, have to secure advice and support from individuals who are on the specialist list in orthodontics. In addition the specialist should complete 50 or more cases per year, which is the level suggested as the minimum need to maintain an appropriate level of skill [1].

18. Secondary / tertiary care provision

18.1. The hospital services provide complementary services to specialists who are providing the majority of the treatment. They will, however, provide a significant number of specialist type cases for training purposes as they have an intake of specialist orthodontic trainees every 3 years and each one of these will require a couple of hundred cases each in order to complete training. Additionally they will provide care for individuals with complex orthodontic needs, often requiring a multi-disciplinary approach. These cases are particularly resource-intensive but will form part of the third of the population who need and demand orthodontic treatment.

18.2. Secondary care data is challenging to access. It is also difficult to interpret as each trust records the orthodontic activity in a different way. It was possible however, to access Secondary User Service (SUS) data on spend by provider for 2015/16 and 2016/17. The SUS data obtained does not contain information on types of treatment but focusses on financial reporting.

Tables 16 and 17
Demonstrates the number of first appointments and follow ups from each major acute provider, with associated costs for the financial years 2015/16 and 2016/17:

Table 16
2015/16: SUS data for acute trusts providing the majority of Orthodontic Care for C&M residents

Provider	Numbers of patients seen	Tariff revenue under PBR
Alder Hey Children's NHS Foundation Trust	141	£36,742.89
Countess of Chester Hospital NHS Foundation Trust	2058	£956,507.04
East Cheshire NHS Trust	243	£ 87,298.91
Royal Liverpool and Broadgreen University Hospital NHS Trust	2340	£ 1,361,298.60
St Helens and Knowsley Hospital NHS Trust	374	£ 239,914.22
Warrington and Halton Hospitals NHS Foundation Trust	1332	£ 603,196.23
Wirral University Teaching Hospitals NHS Foundation Trust	765	£ 440,455.48
Southport and Ormskirk Hospital NHS Trust	872	£ 355,824.78
Total	**8125**	**£4,081,238.14**

Table 17
2016/17: SUS data for acute trusts providing the majority of Orthodontic Care for C&M residents

Provider	Numbers of patients seen	Total cost
Aintree University Hospital NHS Foundation Trust	264	£112, 413
Alder Hey Children's NHS Foundation Trust	142	£37,102
Countess of Chester Hospital NHS Foundation Trust	1960	£735,894
East Cheshire NHS Trust	163	£ 38,173
Royal Liverpool and Broadgreen University Hospital NHS Trust	2123	£ 1,230,050
Southport and Ormskirk Hospital NHS Trust	541	£ 191,172
St Helens and Knowsley Hospital NHS Trust	319	£ 207,599
Warrington and Halton Hospitals NHS Foundation Trust	636	£ 619,200
Wirral University Teaching Hospitals NHS Foundation Trust	1252	£ 367,339
Total	**7400**	**£3,539,032**

18.3. Table 16 and 17 show that there are changes in both secondary care providers, within the 2 year period from 2015-2017. Further, there would appear to be a difference in the treatment cost per patient. The data for secondary care, requires further clarification before conclusions are made.

18.4 An attempt was made to source specific data, in relation to orthognathic cases currently this was not possible, due to the complexities of how activity is recorded in these cases.

19. Secondary vs. primary care provision

19.1. In many cases secondary care is the appropriate setting for orthodontic treatment, especially for those who will need surgical intervention to secure treatment eg orthognathic cases.

19.2. There is a need to ensure that only those cases especially suited to secondary care are referred to those providers. The development of the e-referral management system will facilitate the process to enable patients to be seen in the most appropriate settings.

19.3. Secondary care data in particular requires additional context, prior to the patient data being included in the overall commissioned activity.

20. Stakeholder feedback and engagement

20.1. Stakeholder feedback has been sought at both a local and national level.

20.2. NHSE C&M have undertaken a pilot patient engagement questionnaire to inform the draft service specification, with 5 specific questions. A wider survey to a representative sample of Cheshire & Merseyside patients (over 3800) is due for completion (end of March 18). The results of which will be used in conjunction with this needs assessment to further define the requirements of the service specification and inform the final commissioning intentions.

20.3. As part of developing the national commissioning guide for orthodontics, NHS England ran a combination of digital engagement and face-to-face focus groups involving children, young people and their parents/carers in a dialogue about Orthodontics[1].

21. Knowledge gaps

There are a number of areas where it has not been possible to obtain data or information to inform this needs assessment, these include:

- Professional stakeholder views (LDC and full orthodontic MCN members views, were not obtained in relation to the descriptors used within the individual Chapters of this document).
- Uptake of NHS primary care orthodontics treatment by socio-economic status.
- Validation of waiting lists, acquired prior to the implementation of the e-referral system.
- Secondary care data.
    - Standardised data collection for all acute trusts.
    - Workforce data.
    - Orthognathic data.

22. Key Issues

22.1. Orthodontic need is commonly assessed by estimating the need in the 12-year-old population. The location and capacity of current providers is largely historic and there has been little active commissioning of orthodontic services since the advent of the new contract in 2006.

22.2. Children of 12 years old, population estimates figures, are derived from Office of national Statistics projections from the census in 2014. They are not forecasts of the future population and do not attempt to predict the impact of changes in government policy, economic circumstances and other factors which may impact on demographic behaviour.

22.3. It is important to note that the number of UOAs needed is used as a proxy for need across the system. UOAs are not the currency used in secondary care and this must be taken into account when planning services otherwise there is a risk that the budget is spent on primary care UOAs only and orthodontic services may be over-commissioned

22.4. The data show that there are some areas where services are limited and some areas where capacity is greater than need.

22.5. Numbers waiting for either assessment or treatment in primary care are variable.

22.6. Since February 2017 referrals are submitted electronically, as recommended in national guidance. There are agreed referral criteria, and the e-referral form is used to triage referrals.

22.7. Validation of historic waiting lists, in both primary and secondary care would provide further beneficial data, for future commissioning of services

22.8 Reduction of historic e.g. pre-e referral, waiting lists will require a non-recurring increase in contact volumes or change in service delivery models.

22.9. Future commissioning should ensure the location and capacity of service commissioned meets the local need and takes into account natural patient flows.

22.10. To maximise NHS resources, there should be a strategy in place to monitor and maximise the proportion of assessments leading to treatments. In particular the high level of “concluded” cases where treatment has been “abandoned” or “discontinued” should be minimised.

22.11. Work with HEE, LDN and MCN to support further dentists when referring patients for orthodontic treatment.

22.12. Work towards agreeing service specifications for secondary care services including minimum data set.

22.13. Reach consistent agreement, under which circumstances over 18s receive orthodontic treatment in secondary care.

22.14. Ensure commissioning of orthodontic treatment planning to support services treating:

- Special care patients
- Extractions under GA

23. Needs assessment summary

23.1. Any paper based needs assessment will make a number of assumptions, accepting that there are inherent inaccuracies within estimates.

23.2. This paper reviews the epidemiological and service activity data for orthodontic treatment in C&M area. No attempt is made to assess the relative efficiency of the current providers or whether alternative commissioning arrangements could deliver improved value for money or quality of service.

23.3. In this paper we have tended to adopt a more liberal view of need from a primary care context. It is important to note that UOAs are not the currency used in secondary care and this must be taken into account when planning services otherwise there is a risk that the budget is spent on primary care UOAs only and orthodontic services may be over-commissioned.

23.4. It is accepted that there is always a risk that further increased demand will develop over the next 3-10 years leading to pressure on the system.

24. References

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13. Price J, Whittaker W, Birch S, Brocklehurst P, Tickle M. Socioeconomic disparities in orthodontic treatment outcomes and expenditure on orthodontics in England's state-funded National Health Service: a retrospective observational study. Bio Med Central Oral Health. 2017; 17:123

Appendix 1

Projected population of 12 year old children in C&M - 2014 base projections from ONS for years 2017 to 2027[4]:

Estimated Number of 12 year olds

	2017	***2018***	***2019***	***2020***	***2021***	***2022***	***2023***	***2024***	***2025***	***2026***	***2027***
Local Authority	No. Per	No. Per	No. Per	No. Per	No. Per	No. Per	No. Per	No. Per	No. Per	No. Per	No. Per
Cheshire East	4196	4353	4382	4562	4448	4327	4572	4664	4482	4422	4329
Cheshire West & Chester	3656	3722	3817	3918	3721	3810	3919	4044	3994	3866	3792
Halton	1557	1711	1597	1715	1644	1721	1684	1681	1667	1602	1561
Knowsley	1708	1783	1766	1785	1774	2668	2780	2828	2696	2682	2639
Liverpool	4442	4679	4958	5012	5100	1822	1934	1914	1854	1821	1811
Sefton	2769	2959	3058	3074	3040	5006	5242	5605	5287	5305	5199
St. Helens	1930	2027	1986	2151	2120	2178	2139	2271	2123	2118	2091
Warrington	2427	2478	2587	2634	2692	3180	3242	3205	3183	3204	3069
Wirral	3644	3825	3894	3939	3887	3938	4001	4329	3999	3958	3846
TOTAL	**26329**	**27537**	**28045**	**28790**	**28426**	**28650**	**29513**	**30541**	**29285**	**28978**	**28337**

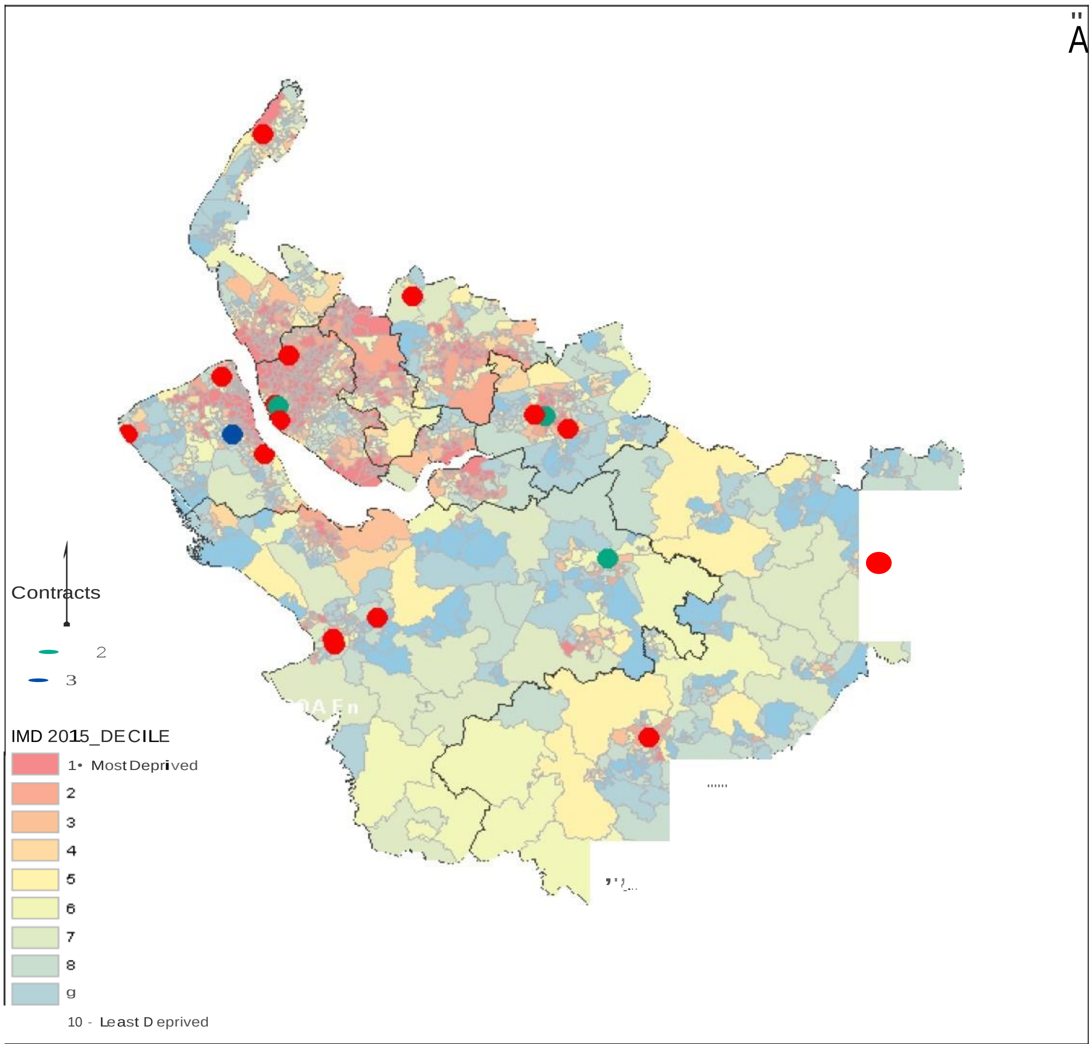
Appendix 2

Location of orthodontic dental practices, in Cheshire & Merseyside

Public Health England

Location of dental practices and number of contracts held

By local authority and LSOA IMD 2015 deciles



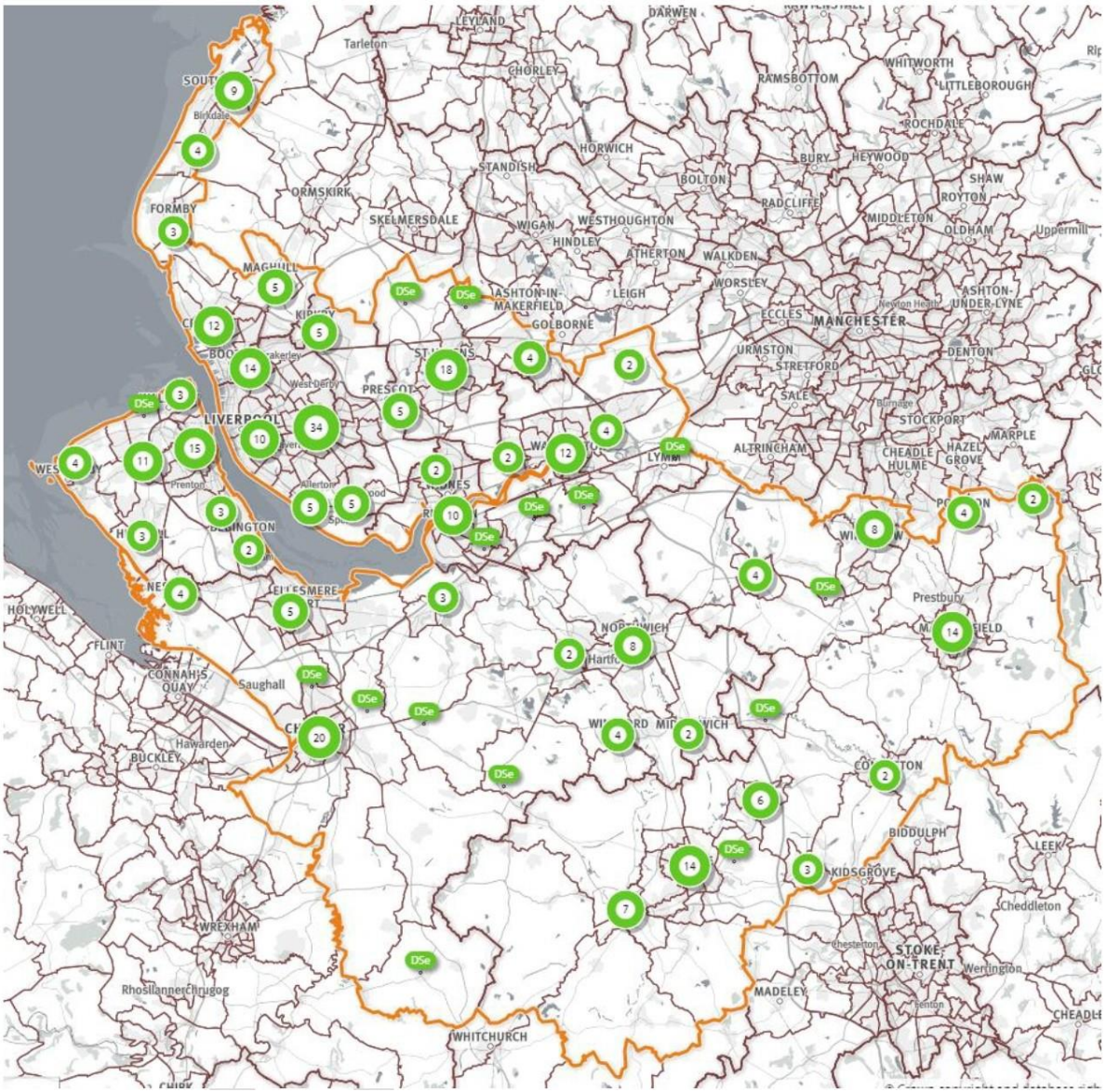
1:510,825

Public Health England - LKIS HW
Cunard Building
Liverpool

Map Created: 11/10/2016 at 11:38
Created by: Caoimhe.McKerr

Appendix 3

Location of Primary Care Dental Practices in Cheshire and Merseyside:



Appendix 4

Cheshire & Merseyside orthodontic patient inflow by CCG and legacy PCT, period Feb 2017- Feb 2018:

Figure 1
Patient inflow against legacy PCT for the period Jan 17-18:

Figure 2
Patient inflow against CCG for the period Jan 17-18:

Figure 1 Patient inflow against legacy PCT for the period Jan 17-18:

Patient's Legacy PCT	Numbers
Central and Eastern Cheshire	3148
Liverpool	2748
Wirral	2392
Halton and St Helens	1859
Western Cheshire	1641
Warrington	1348
Sefton	1041
Knowsley	792
North Staffordshire	388
Derbyshire County	173
Stockport	153
Betsi Cadwaladr University Health Board	120
Central Lancashire	116
Betsi Cadwaladr University	114
Ashton, Leigh and Wigan	67
Stoke on Trent	42
Shropshire County	36
Trafford	33
Manchester Teaching	17
Salford	12
Other	30

Figure 2 Patient inflow against CCG for the period Jan 17-18:

NHS Liverpool	2748
NHS Wirral	2392
NHS West Cheshire	1564
NHS Warrington	1348
NHS South Cheshire	1221
NHS Eastern Cheshire	1204
NHS St Helens	1079
NHS Vale Royal	800
NHS Knowsley	792
NHS Halton	780
NHS South Sefton	542
NHS Southport and Formby	499
NHS North Staffordshire	388
NHS North Derbyshire	173
NHS Stockport	153
Betsi Cadwaladr University Health Board	120
Betsi Cadwaladr University	114
NHS West Lancashire	104
NHS Wigan Borough	67
NHS Stoke on Trent	42
NHS Shropshire	36
NHS Trafford	33
NHS Salford	12
Greater Preston	11
Other	42

Appendix 5

Vital signs for orthodontic contracts in Cheshire & Merseyside:

Figure 1
Q44 & Q48 - Vital Signs Orthodontic At a Glance Contract Report for Cheshire & Merseyside - April- December 2017.

Figure 2
Q44 & Q48 - Vital Signs Orthodontic At a Glance Contract Report for Cheshire & Merseyside – comparison of September 2016 – September 2017.

Figure 3
Vital Signs Orthodontic At a Glance Contract Report for Cheshire & Merseyside - September 2016-2017.

Figure 4
Vital Signs Orthodontic At a Glance Contract Report for Cheshire & Merseyside - September 2015-2016.

Figure 1:

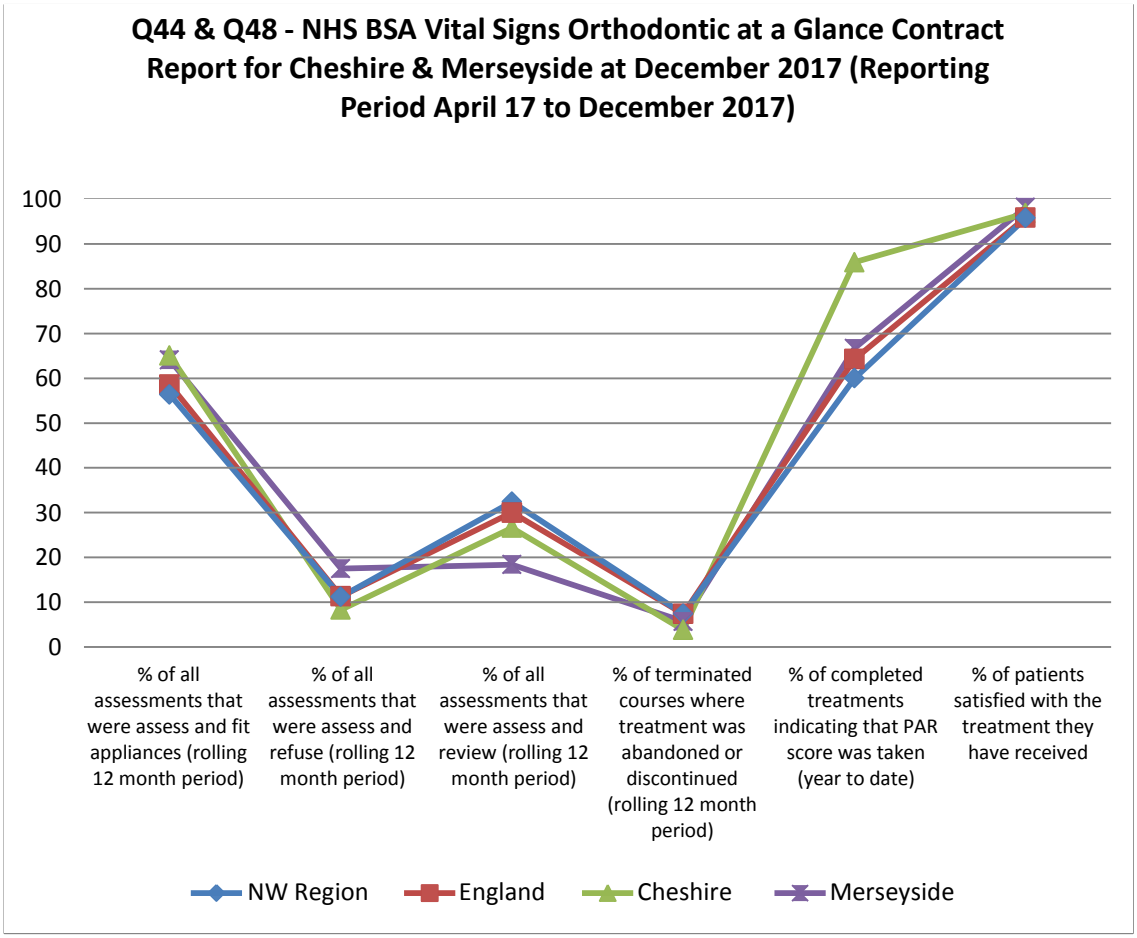

Q44 & Q48 - NHS BSA Vital Signs Orthodontic at a Glance Contract Report for Cheshire & Merseyside at December 2017 (Reporting Period April 17 to December 2017)
100
90
80
70
60
50
40
30
20
10
0
% of all assessments that were assess and fit appliances (rolling 12 month period)
% of all assessments that were assess and refuse (rolling 12 month period)
% of all assessments that were assess and review (rolling 12 month period)
% of terminated courses where treatment was abandoned or discontinued (rolling 12 month period)
% of completed treatments indicating that PAR score was taken (year to date)
% of patients satisfied with the treatment they have received
NW Region
England
Cheshire
Merseyside

Figure 2:

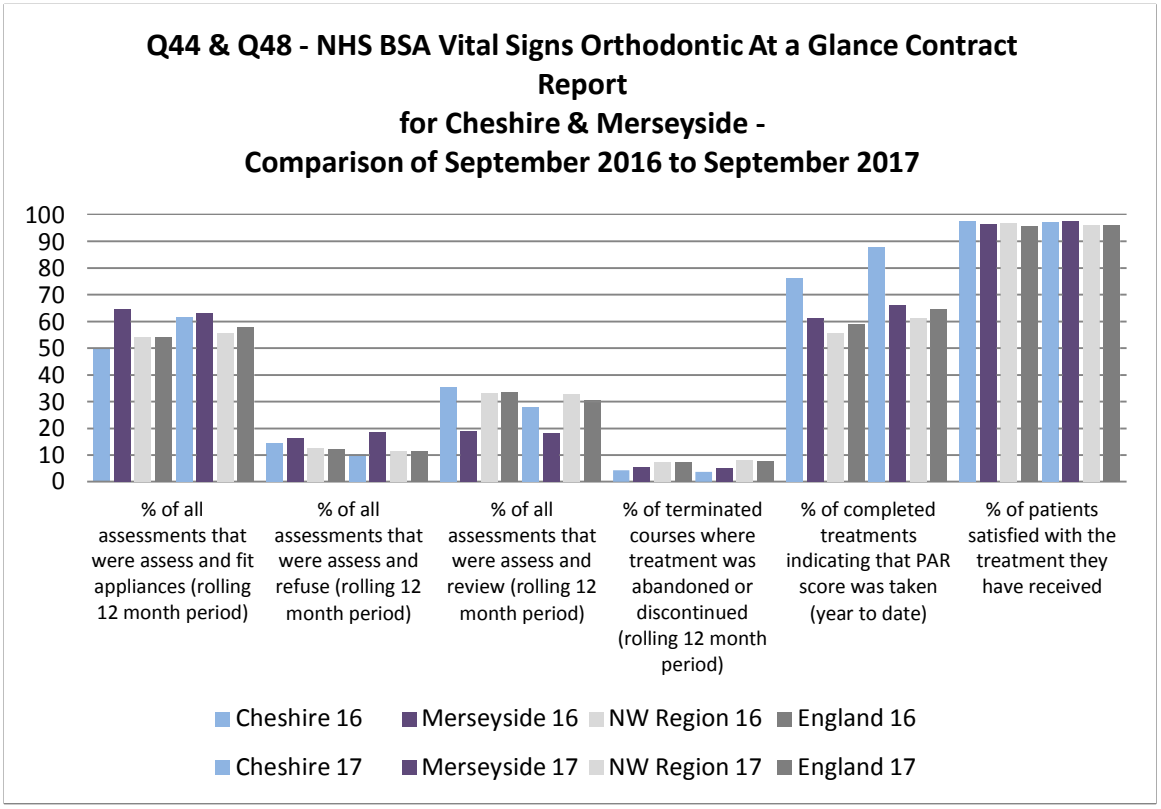

Q44 & Q48 - NHS BSA Vital Signs Orthodontic At a Glance Contract Report
for Cheshire & Merseyside -
Comparison of September 2016 to September 2017
100
90
80
70
60
50
40
30
20
10
0
% of all assessments that were assess and fit appliances (rolling 12 month period)
% of all assessments that were assess and refuse (rolling 12 month period)
% of all assessments that were assess and review (rolling 12 month period)
% of terminated courses where treatment was abandoned or discontinued (rolling 12 month period)
% of completed treatments indicating that PAR score was taken (year to date)
% of patients satisfied with the treatment they have received
Cheshire 16
Merseyside 16
NW Region 16
England 16
Cheshire 17
Merseyside 17
NW Region 17
England 17

Figure 3 Vital Signs Orthodontic At a Glance Contract Report for Cheshire & Merseyside, September 2016-2017:.

	Cheshire	Merseyside	Range in C&M	NW Region	England
	%				
% of all assessments that were assess and fit appliances (rolling 12 month period)	61.5	63.1	19.1 - 80.4	55.8	58
% of all assessments that were assess and refuse (rolling 12 month period)	10.4	18.6	4.4 - 26.8	11.6	11.4
% of all assessments that were assess and review (rolling 12 month period)	28.1	18.2	0 - 66.2	32.7	30.6
% of terminated courses where treatment was abandoned or discontinued (rolling 12 month period)	3.6	5	0.3 - 28.6	8	7.8
% of completed treatments indicating that PAR score was taken (year to date)	88	66.2	0 - 100	61.3	64.6
% of patients satisfied with the treatment they have received	97.2	97.6	0 - 100	96.1	96

Figure 4 Vital Signs
September 2015-16

	Cheshire	Merseyside	Range in C&M	NW Region	England
	%				
% of all assessments that were assess and fit appliances (rolling 12 month period)	50.1	64.6	33.7 - 85.2	54.2	54.1
% of all assessments that were assess and refuse (rolling 12 month period)	14.5	16.4	4.3 - 22.2	12.5	12.4
% of all assessments that were assess and review (rolling 12 month period)	35.4	19	0 - 56.8	33.3	33.5
% of terminated courses where treatment was abandoned or discontinued (rolling 12 month period)	4.3	5.3	0.9 - 12.7	7.4	7.2
% of completed treatments indicating that PAR score was taken (year to date)	76.1	61.3	5.5 - 100	55.7	58.9
% of patients satisfied with the treatment they have received	97.6	96.6	0 - 100	96.7	95.7