Who needs orthodontic treatment? Who gets it? And who wants it?

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OPINION

IN BRIEF

- Summarises the use of the Index of Treatment Need (IOTN) and the background of its introduction to the NHS.
- Discusses the role and responsibility of GDPs in referring patients for orthodontic treatment appropriately.
- Highlights that understanding the risk and benefits of orthodontic treatment, as well as valid consent, is essential to orthodontic practice.

As the health and expectations of the UK population improve, demand for orthodontic treatment is increasing. This article will examine who actually needs orthodontic treatment and who is currently receiving it, while also providing an opinion on the the risks *versus* benefits in providing demand-led treatment.

INTRODUCTION

Demand for orthodontic treatment is rising as the health and expectations of our population improve. Awareness improves with an increase in both dentist-to-population and specialist-to-population ratios. However, whilst many in the population may want treatment, which of them actually need it? This paper will look at who needs orthodontic treatment and who receives it. In addition, we will discuss the rise in demand-led orthodontic treatment and the risks *versus* benefits in providing it.

ASSESSING THE NEED FOR ORTHODONTIC TREATMENT

Three principle reasons have been highlighted for carrying out orthodontic treatment:[1]

- To improve the dento-facial appearance
- To correct occlusal relationship
- To eliminate malocclusions that could damage the long-term health of the teeth and periodontium.

Improving the dento-facial appearance

A person's dental appearance can have a significant effect on how they may feel about themselves[2] and orthodontic treatment can provide a significant psychosocial benefit to patients, often resulting in improved self-esteem.[3] An improved dento-facial appearance can also contribute to one's overall quality of life.[4] Studies have also shown that when children were teased this was more frequently about their teeth rather than anything else, and as well as the negative effect on their self-esteem such teasing could result in these children being unsure of themselves in social interactions.[3] In addition, children with an increased overjet or spaces between their front teeth have more significant social and emotional issues than children with well-aligned teeth. Both of these occlusal traits having a negative impact on the quality of life of their parents and other family members.[5]

Correction of occlusal relationship

If teeth do not occlude properly masticatory function can be impaired, with patients reporting difficulty in biting through food or poor chewing ability, which in turn can lead to social embarrassment.[1,6]

Elimination of malocclusions detrimental to dental health

Damage to the long-term health of the teeth and periodontium can include risk of trauma to the maxillary incisors where the overjet is increased. It is well known that the more prominent the upper incisors the more prone they are to trauma.[7] Studies have shown that overjets over 3 mm have twice the risk of trauma to anterior teeth compared with those less than 3 mm.[8] Trauma can result in a range of injuries from enamel fracture to avulsion of a front tooth. Thus in those cases where there is an increased overjet, orthodontic treatment may provide a preventive role, strongly indicating a need for orthodontic treatment.

Traumatic deep overbite or anterior crossbite with mandibular displacement can be associated with periodontal breakdown indicating a need for treatment[9] and impacted teeth can cause damage to the root surface of adjacent teeth causing root resorption.[6,10] Supernumerary teeth may also cause damage to adjacent teeth or prevent the normal eruption of a permanent tooth.

ROLE AND RESPONSIBILITY OF THE GDP

A survey carried out within the UK and USA demonstrated that it is usually the patient's own general dental practitioner (GDP) who initiates the request for orthodontic treatment.[11] The General Dental Council's (GDC) document, *Preparing for practice – Dental team learning outcomes for registration*, highlights the required outcomes for registration with the profession's regulatory body. Outcome 1.13 in this document clearly states that a GDP should be competent in carrying out an orthodontic assessment, including an indication for treatment need and timely interceptive orthodontic treatment with appropriate timely referrals.

The GDP frequently has the main responsibility as the gatekeeper for identifying and referring those patients who would require and benefit from orthodontic treatment in a timely manner to prevent damage to teeth, whether it is due to trauma, tooth wear caused by a traumatic bite or resorption of roots adjacent to impacted teeth. In addition, the need for orthognathic surgery can be reduced by growth modification with the use of functional appliances in Class II division 1 malocclusions or protraction headgear with Class III malocclusions and this too requires appropriate management and referral from the GDP. However, it has been noted from epidemiological surveys that there is a wide variation in the judgment of need for treatment, and different thresholds for orthodontic referrals appear to be present

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Table 1 Dental health component (DHC) – occlusal trait severity

Grade	Level of orthodontic treatment need
5	Very great
4	Great
3	Moderate
2	Little
1	No need

Table 2 Suffix letters denoting qualifying occlusal characteristics

Letter	Occlusal trait
a	Overjet – recorded to the most prominent part of the most prominent incisor
b	Reverse overjet with no masticatory or speech problems
c	Crossbite
d	Displacement of contact points where teeth deviate from the line of the arch, worst displacement recorded, spacing inline of the arch not included
e	Open bite
f	Deep bite
g	Good occlusion
h	Hypodontia
i	Impacted due to lack of space ≤4 mm
l	Posterior lingual crossbite
m	Reverse overjet with masticatory or speech problems
p	Defects of the cleft lip and palate
s	Submerged deciduous teeth
t	Partially erupted teeth, tipped and impacted against adjacent teeth
x	Presence of supernumerary teeth

within the general dental service.[12,13] These differences can reflect training, diagnostic acuity or experience, and might, for some patients, reduce their opportunity to receive timely intervention. The use of an index of treatment need by general dentists as part of the routine evaluation of patients might go some way towards improving identification of potential orthodontic patients.[13]

INDEX OF TREATMENT NEED (IOTN)

In the mid 1980s concerns were raised that patients were receiving poor or unnecessary orthodontic treatment. This led to a report into unnecessary dental treatment commissioned by the then Minister of Health, known later as the 'Schanschieff report'. The findings of the Schanschieff report[14] reinforced these concerns, suggesting that patients were being treated in high volume caseloads linked to poor or unnecessary treatment.

In the aftermath of the Schanschieff report and subsequent evaluation of the profession, the Index of Orthodontic Treatment Need (IOTN) was developed at the University of Manchester by Brook and Shaw and was based on the index of treatment priority used by the Swedish Dental Board.[15]

The IOTN assesses the need for orthodontic treatment according to the highest potential risk to the integrity of the teeth or supporting structures from the malocclusion. The Schanschieff report resulted in the development of the IOTN which was adopted in the hospital service by 1990[16,17] and from 2006 the IOTN defined which patients would receive NHS treatment in primary care. Initially, the IOTN was used to avoid unnecessary treatment of mild cases but since 2006 it has been used as a helpful sieve in allocating treatment services where resources are limited in a fair and transparent way. The introduction of the IOTN allows orthodontists to standardise their approach to evaluating orthodontic treatment need. In addition, consultants in dental public health perceive the IOTN as a useful tool for planning orthodontic provision.[18]

The IOTN has two categories, the dental health component (DHC) and the aesthetic component (AC). The DHC is determined by considering the potential harm that a particular occlusal trait could have on the longevity of the dentition and was developed to ensure validity and consistency in reporting orthodontic treatment need within and between dentists and orthodontists.

The DHC categorises the detrimental effects of various deviant occlusal traits in order of severity. The severity is categorised into five grades 1–5 based on the relative effect of various deviant occlusal traits on the longevity of the dentition (Table 1). Along with a number grade a letter has been assigned to identify and record specific deviant occlusal anomalies (Table 2).

The acronym MOCDO (Missing teeth; Overjets; Crossbites; Displacement of contact points; Overbites) guides the observer to the single worst deviant occlusal trait of the malocclusion (Table 3).

Aesthetic component

The AC was developed in Cardiff by Evans and Shaw in 1987 and was adapted from the Standardised Continuum of Aesthetic Need (SCAN) index.[19] One thousand orthodontic photographs of varying attractiveness were shown to six non-dental personnel who rated them on a linear scale of attractiveness. The AC consists of ten photographs showing different levels of dental attractiveness on a scale of 1–10 (Table 4) with '1' being the most attractive and '10' being the least attractive arrangement of teeth (Fig. 1). The relative need for treatment can be determined once the permanent dentition has erupted. The score reflects the aesthetic impairment and guides the practitioner to treatment need.

The anterior teeth should be graded on their dental attractiveness as it is presented. No attempt should be made to predict the future appearance of the dentition. Also stained restorations, chipped teeth, poor gingival condition should be ignored.

The AC can be a useful tool to explain to patients the severity of their malocclusion when compared to others. Whilst the AC is an invaluable tool for patient counselling with respect to treatment need, it is NOT correct for the patient to award the grade.[20] An appropriately trained dental professional must do this.

WHO GETS ORTHODONTIC TREATMENT?

The use of the IOTN is now a contractual requirement of orthodontic providers in the National Health Service (NHS) in England and Wales in an attempt to provide uniform objective prescribing of orthodontic treatment. The use of the IOTN allows NHS providers to decide which cases are severe enough to warrant treatment in children less than 18 years of age. Patients who are eligible for NHS orthodontic treatment must meet the requirements of IOTN-DHC 5, 4 or DHC 3 (but the latter also needs an AC of 6 or above). Patients should be less than 18 years

Table 3 DHC component, using the MOCDO acronym

IOTN Dental health component	5	4	3	2	1
Missing teeth	5h = extensive hypodontia + restorative implications >1 tooth missing per quadrant requiring pre-restorative orthodontic treatment 5s = submerging primary teeth 5i = impeded eruption/impaction	4h = less extensive hypodontia requiring orthodontic treatment for pre-restorative or space closure			
Overjet	5a = OJ >9 mm 5m = ROJ >3.5 mm+ masticatory and speech difficulties	4a = OJ 6.1-9 mm 4b = ROJ >3.5 mm with no masticatory and speech difficulties	3a = OJ 3.6-6 mm + incompetent lips 3b = ROJ 1.1-3.5 mm	2a = OJ 3.6-6 mm + competent lips 2b = ROJ 0.1-1 mm	
Crossbite		4c = x-bites + >2 mm discrepancy between RCP and ICP 4l = posterior lingual x-bite	3c = x-bite + 1.1-2 mm discrepancy between RCP and ICP	2c = x-bite with up to 1 mm discrepancy between ICP and RCP	
Displacement of contact point		4d = contact point displacement >4 mm 4t = partially erupted teeth, tipped and impacted against adjacent teeth 4x = supplemental teeth	3d = contact point displacement 2.1-4 mm	2d = contact point displacement 1.1-2 mm	Minor irregularity
Overbite (including open bite)		4e = lateral or anterior open bite >4 mm 4f = increased + complete OB + gingival or palatal trauma	3e = lateral or anterior open bite 2.1-4 mm 3f = increased + complete OB with no gingival trauma	2e = lateral or anterior open bite 1.1-2 mm 2f = increased OB >3.5 mm and no gingival contact	

of age on the date of referral. NHS orthodontic care may be approved for adults on a case-by-case basis if there is a severe dental health issue or complex multi-disciplinary needs.

This index is based on the patient's individual need and is a perceived objective and reliable way for specialists to select those children who will benefit most from treatment in a fair way to prioritise limited NHS resources.[18] Unfortunately, in most areas there is insufficient contracted treatment to meet need and demand which then limits availability, leading to long waiting lists.[21] The introduction of the 18-week wait for consultant-led services in secondary care in 2008 has also compounded pressure on primary care orthodontic services. In response to reported high levels of inappropriate referrals,[22,23] which have contributed further to increasing long waiting lists for orthodontic treatment, the British Orthodontic Society produced the document *Guidelines for referrals for orthodontic treatment* for GDPs.[24] Ideally these guidelines should now be used as a basis for setting local NHS area team guidance for referrals for orthodontic treatment.

Studies have shown for referral guidelines to be acceptable and effective, they need to be developed locally with the input of the GDPs who will be using them,[22,25] along with education and support for referring practitioners. They should be monitored by regular audit.[24]

Table 4 Aesthetic component: levels of dental attractiveness on a scale of 1–10

Score	Need for treatment
1/2	No need
3/4	Slight need
5/6/7	Moderate need
8/9/10	Definite need

Referrals can be made to specialist orthodontic practices, dentists with a special interest in orthodontics and the hospital orthodontic service. Primary care providers tend to accept patients who require more routine orthodontic treatment including crowding; increased overjet and overbite; posterior and anterior crossbites; and mild hypodontia.[24] The hospital service tends to accept:

- Patients who require interdisciplinary orthognathic, restorative, and surgical treatment
- Patients with cleft lip and palate or other craniofacial abnormalities
- Children with physical or mental handicap
- Any cases including routine cases if required for teaching purposes.

Fig. 1 The aesthetic component of the IOTN developed by Evans and Shaw 1987[19]

The referring practitioner, often the GDP, should then be able to refer to the most

appropriate provider.

WHO WANTS ORTHODONTIC TREATMENT?

It has been suggested that the uptake of orthodontic treatment may be influenced by consumer factors such as perceived need, socio-demographic characteristics and dental attendance patterns, and also by provider factors such as availability of specialist orthodontic care and of general dental services.[26]

Studies have shown that some referred patients refuse orthodontics for perceived handicapping malocclusions, while others are keen to undergo treatment for minor deviations.[27] It has been suggested that the demarcation between acceptable and unacceptable occlusion is largely dependent on idiosyncratic judgement.[28] The patient may perceive factors other than function and occlusion to be equally important to initiate treatment.[29]

The number of adults seeking orthodontic treatment has increased considerably in the last 20 years. They fall into two different groups:

1. Younger adults often in their twenties and thirties who desired, but did not receive, orthodontic treatment during adolescence
2. Another group typically in their forties and fifties, who have other dental problems and could benefit from orthodontics as part of a larger treatment plan.

The major finding in adult patients is that they are more concerned about improving their appearance and social acceptance than function. It has been proved that orthodontic treatment, besides improving dental aesthetics, also has a significant impact on the psychosocial aspect of the patient's life.[30]

Orthodontics has played an increasing role in dentistry over recent years and this trend is likely to continue in the future. The perceived need for treatment is influenced by both social and cultural factors, and currently the demand for treatment greatly exceeds the resources available. There has been a marked increase in demand from both children and adults seeking treatment since the 1980s as a result of more dental awareness by the public in conjunction with an increased social acceptance of fixed braces.[24] The number of adults undertaking fixed orthodontic treatment has grown significantly in recent years. Improved appliance aesthetics, treatment mechanics and social acceptability are some of the contributing factors involved in this increase.

Adults seeking treatment can be excellent patients with high motivation and co-operation. The limitations of orthodontic treatment must be explained at the beginning of treatment since adult expectations of orthodontics can be very high.[31]

The demand for short-term orthodontics (STO) is on the rise as dentists move towards more minimally invasive cosmetic dentistry. STO treatments that reposition anterior teeth to facilitate their minimally invasive aesthetic restoration will involve inter-canine expansion and incisor proclination, both of which are inherently unstable orthodontic movements which need to be managed carefully.[32]

It is true to say that STO remains a valid treatment option; however, patients need to be aware as part of the consent process that these treatments are a compromise with limits as to what can be achieved in comparison to comprehensive orthodontic treatment. Patients need to be aware of all available treatment options including the risks and benefits of each.[33]

CONCLUSIONS

The 2003 Children's Dental Health Survey found that approximately one third of children would benefit from orthodontic treatment.[34] Indicators for treatment need have been developed and validated by the whole orthodontic profession.[6] The IOTN categorises malocclusion and ranks the need for orthodontic treatment. Its use is a contractual requirement in the NHS in England and Wales since the introduction of the new contract in 2006. This Index is based on the patient's individual need and is a perceived objective and reliable way for specialists to select patients who will benefit most from treatment in a fair way to prioritise limited NHS resource.

The demand for orthodontic treatment is on the rise. In the vast majority of well-planned cases, the benefits of orthodontic treatment outweigh the possible risks.[6] The most important aspect of orthodontic care is to have an extremely high standard of oral hygiene before and during orthodontic treatment.[35] Patient education and selection of appropriate treatment plans for individuals reduce this risk considerably.[35]

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