Would the introduction of the Index of Orthognathic Functional Treatment Need (IOFTN) affect referrals and acceptance of people for orthognathic treatment?

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In brief

Discusses the recent development and purpose of the Index of Orthognathic Functional Treatment Need (IOFTN).

Provides audit results and a summary of available literature to evaluate the likely impact that introduction of the IOFTN would have.

Discusses the relevance of the IOFTN for GDPs and implications for commissioning.

Introduction The Index of Orthognathic Functional Treatment Need (IOFTN) was developed to measure functional difficulties arising from malocclusions related to facial deformity. The IOFTN is not currently being used to determine suitability for orthognathic treatment, however, it is a useful aid for assessing and referring patients and takes into account functional and facial appearance. This paper aims to evaluate the potential impact of introduction of the IOFTN on the future provision of orthognathic services. **Methods** Two methods were used to consider the impact of the IOFTN on orthognathic provision. Firstly, a local retrospective audit was undertaken in Leeds Teaching Hospital NHS Trust involving thirty consecutively treated patients, for whom full records were retrieved. Data was collected using a standardised data caption form. Local standards were agreed concerning the need for treatment. Secondly, a systematic search of published studies was completed to assess evidence from across the UK. **Results** The audit standard, that is, 90% of patients treated with orthognathic surgery should be categorised as grade 4 (great need) or 5 (very great need) using the IOFTN, was fulfilled. The most common reason for seeking treatment related to dental and facial aesthetics and no patients were treated for speech or TMJ problems alone. The systematic review searches identified four suitable records for inclusion in the review, including two audits and two retrospective studies undertaken in secondary care settings across England and Scotland. These studies showed that at least 86% of all participants scored 4 or 5 using the IOFTN. **Conclusions** The findings from the audit and literature review indicate that referrals from general dentists and acceptance for orthognathic treatment in secondary care is unlikely to be significantly affected by introduction of the IOFTN. Referring dentists may find the IOFTN a useful prompt for determining whether people are suitable for orthognathic treatment.

Introduction

An index is a tool that can be used as a reference against which to measure. Indices have a number of roles in healthcare: for diagnosis and grouping disease; to measure the incidence and severity of a disease; to determine possible treatment options; and for prioritising care and efficient allocation of resources. Regardless of their purpose, indices share a number of common properties. Indices should be easily applied by those who will need to use them and the descriptions of criteria should be sufficiently clear to ensure objectivity and reproducibility between users. A key requirement of any index is validity, that is, the index should effectively measure what it is designed to measure.

The most commonly used index in orthodontics is the Index of Treatment Need (IOTN), which was developed in the UK in 1989. The IOTN is widely applied to patients in the NHS to help determine whether orthodontic treatment is needed, using a risk-benefit rationale based on dental health and aesthetic handicapping. The IOTN scores dental characteristics only and does not consider the function of the teeth or the facial appearance. For this reason, it is a useful aid for determining the need for orthodontic treatment but it is less suitable for measuring those with functional or facial concerns that arise as a result of facial deformity.

The Index of Orthognathic Functional Treatment Need (IOFTN) was developed in response to the obvious need for a suitable index for measuring functional difficulties arising from malocclusions related to facial deformity. The index was designed to have similar traits to the IOTN to provide familiarity for users. The team involved in creating the

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index consisted of academic and clinical orthodontists with extensive experience in provision of orthognathic care. The rigorous development process involved an expert panel and members of the British Orthodontic Society to ensure content validity and maximise intra-operator agreement.[1] Currently, the use of IOFTN is not a contractual requirement of NHS England when determining the suitability of people for orthognathic treatment or for allocation of resources. However, it is a useful index that takes into account functional and facial appearance when assessing the need for this type of treatment. The full IOFTN tool is available through the open access journal.[1]

The aim of this paper is to evaluate the potential impact of the IOFTN on the future provision of orthognathic services. This has relevance to referring dentists, who are the gatekeepers for secondary care services and as such need to be familiar with the most appropriate and useful measures for judging suitability for treatment.

Two methods were used to consider the impact of the IOFTN on orthognathic provision:

1. A local audit of current orthognathic provision compared to the IOFTN
2. A systematic search of other published evidence regarding the likely impact of introduction of the IOFTN.

Audit

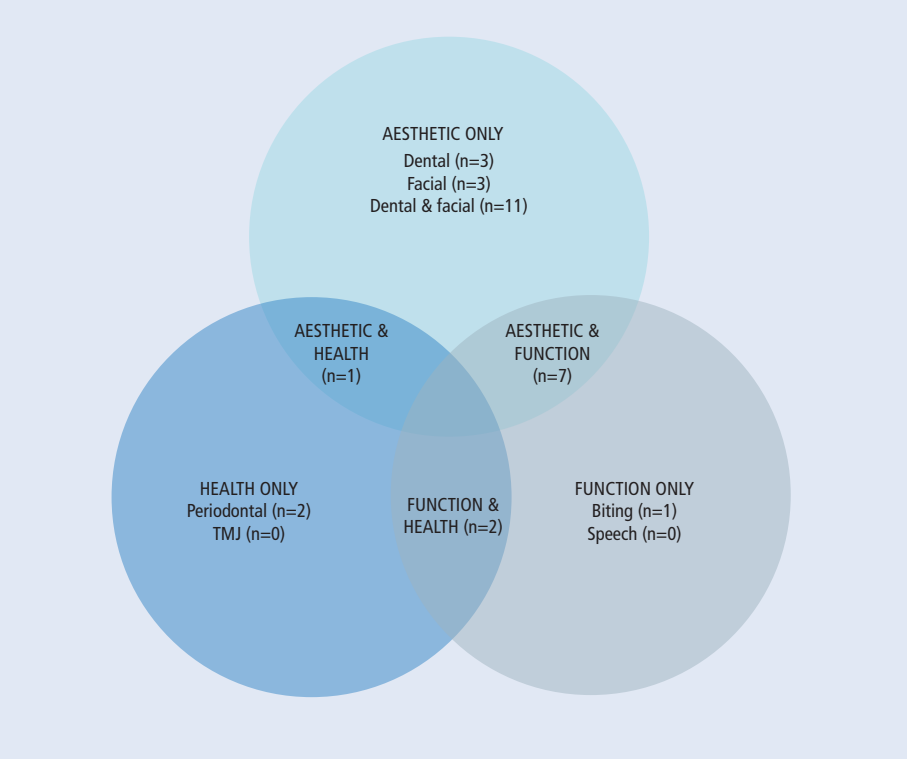
Purpose

To evaluate the potential impact of the introduction of the IOFTN on orthognathic provision in Leeds Teaching Hospitals NHS Trust.

Method

A retrospective audit was undertaken involving thirty consecutively treated patients who were identified from the Leeds Teaching Hospitals Oral and Maxillofacial Surgery theatre lists. For these patients, full records were retrieved including clinical notes, photographs and study models. Data including patient demographics, malocclusion type and IOTN, and planned orthodontic and orthognathic treatment was collected using a standardised data caption form. Information that was deemed to be necessary for application of the IOFTN was identified where possible, such as reported functional difficulty, TMJ problems, speech anomalies and history of dentofacial trauma.

Fig. 1 Presenting complaint for patients seeking orthognathic treatment



The purpose of the IOFTN was to develop a valid index that could be used to guide patient referral and treatment allocation, rather than itself providing directives for treatment acceptance. Therefore, standards were agreed locally by the audit collaborators based on clinical experience and their opinion on the clinical justification for orthognathic treatment.

Standards

- Ninety percent of patients treated with orthognathic surgery should be categorised as grade 4 (great need) or 5 (very great need) using the IOFTN.
- One hundred percent of patients should be categorised as grade 3 (moderate need) or higher. This acknowledges that some patients with a lower IOFTN grade of 3 may still be deemed suitable for orthognathic surgery based on clinical findings. However, those graded 1 or 2 have a low need for orthognathic treatment and would highly unlikely be appropriate for this treatment.
- No patients should be given orthognathic treatment for speech or TMJ problems in the absence of other indications.
- All patients should have a pre-treatment consultation on the orthognathic clinic.
- The IOFTN should be able to be reliably applied by orthodontic specialists and trainees with varying levels of experience.

Results

Thirty patients were identified from two hospitals in the Leeds Teaching Hospitals NHS Trust. All were found to have adequate records to allow inclusion in the audit. Twelve patients were male and 18 were female, with no relevant medical history noted for any patients. The age of patients at the time of surgery ranged from 19–50 years old. One patient reported a history of dentofacial trauma that was thought to have contributed to the resulting occlusal disturbance.

The reasons patients cited for seeking care varied (Fig. 1). The most common complaint related to dental and facial aesthetics, alone or in conjunction with reports of functional difficulties. The IOFTN states no patient should undergo orthognathic surgery to correct speech or TMJ problems; in our audit no patients were treated for these reasons unless there were other aesthetic or functional indications for treatment.

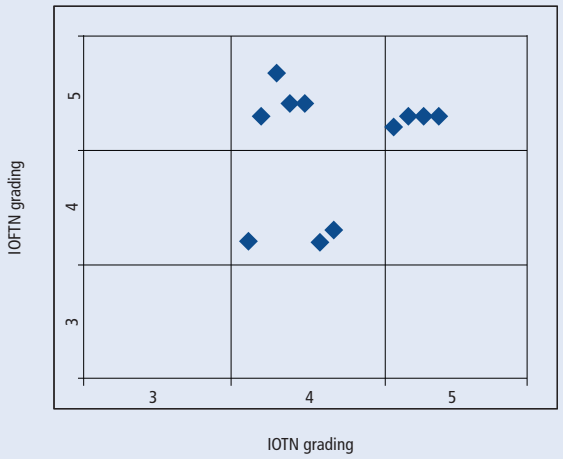
The presenting skeletal anomaly was recorded as class I for one patient, class II for 19 patients and class III for 10 patients. Each case was graded using both the IOFTN and the IOTN. Figure 2 shows the correlation between the two indices. It is notable from the figure that all patients were graded as 4 or 5 using both scales and for the majority the grading did not change. However, for some patients their

scores increased from 4 using the IOTN to 5 using the IOFTN.

The IOFTN scoring was undertaken independently by two orthodontic registrars (ZJ and SB). Comparison of the scores indicated excellent inter-rater reliability, with no disagreements between the scores that were awarded. Finally, all patients had attended the joint orthognathic clinic before commencing treatment.

All the agreed audit standards were achieved. This indicates that a shift towards the use of the IOFTN to determine suitability for orthognathic treatment would not affect the caseload in Leeds Teaching Hospitals NHS Trust. Furthermore, the audit suggests that currently referrals from general dentists for orthognathic treatment result in appropriate people being seen for orthognathic treatment.

Fig. 2 Visual representation of the relationship between the IOTN and IOFTN scores for the audit participants



Literature review

Purpose

To assess the likely impact of the IOFTN on provision of orthognathic treatment throughout the UK.

Methods

A synthesis of existing publications was deemed the most appropriate method for gaining an overall estimate of the likely impact of the IOFTN across the UK. A systematic review methodology was used to ensure a robust method for identifying potentially relevant publications. The search strategy and selection criteria for publications to include in the review are detailed in Table 1.

The relatively recent introduction of the IOFTN indicated that the number of relevant publications was likely to be low. To ensure all relevant papers were identified from grey literature sources such as conference abstracts and institution websites, a methodical search of popular internet sources was undertaken. The search terms were each systematically entered into the four databases listed. Google and Bing were selected as they are the most popular search engines in the UK. Google Scholar is the most popular search engine for scholarly literature databases. DuckDuckGo is recommended as an alternative search engine as it does not personalise searches based on previous user browsing, so the search results may identify differently to other search engines. The 100 top hits (the first 10 pages) for each search result were checked for relevance by title and short description. Any relevant pages were bookmarked and transferred to Microsoft Excel for thorough evaluation.

Table 1 Search strategy for identification of literature

Search terms	**'Index of Orthognathic Functional Treatment Need' 'IOFTN'**	
Resources	Academic databases	Pubmed Medline via Ovid
	Clinical Effectiveness Bulletins	British Orthodontic Society British Society of Oral and Maxillofacial Surgery
	Grey literature search	Google (www.google.co.uk) Google Scholar (www.scholar.google.co.uk) Bing (www.bing.com) DuckDuckGo (www.duckduckgo.com)
Study selection	Study design	Prospective and retrospective studies Audits Service evaluations
	Inclusion criteria	Any publications relating to the application of IOFTN in the UK
	Exclusion criteria	Studies based outside the UK Studies involving other indices Publications containing only expert opinion with no empirical data

Results

The results from the search and study selection are shown in Figure 3. Nine titles were initially identified through the PubMed search with no additional titles and duplication of six titles from the Medline search. Nine records were therefore screened by title with no exclusions. Six records were deemed irrelevant based on the abstract resulting in full text retrieval for three records. Of these three full texts, two fulfilled the inclusion criteria and were included in the review[2,3] while one was excluded as the study was not based in the health service in the UK.[4] The grey literature search identified a further three titles; one from the BOS clinical effectiveness bulletin[5] plus a conference abstract[6] and a publication in the Royal College of Surgeons Faculty Dental Journal,[7] which were both identified through the internet search engines. The resulting five records from the searches were included in the review. However, data extraction revealed two records to be data from one audit undertaken by the same group of authors and the findings are therefore only reported once.[2,6]

The data from the four included records was extracted using a standardised form and

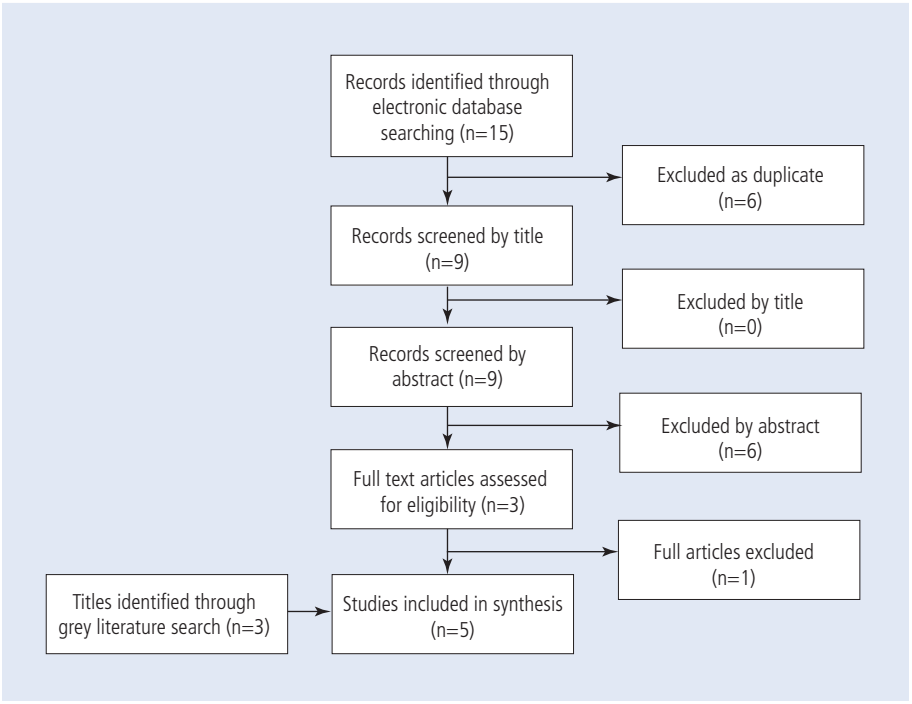
Table 2 Summary of the studies that were included in the review. The publications from Shah *et al.* 2016[2] and Chand *et al.* 2015[6] arose from the same audit and have therefore been combined to ensure the results are reported only once

Author, date	Institution	Journal	Study design	Number of participants	Summary of method	Key findings
Shah *et al.* 2016[2] Chand *et al.* 2015[6]	University Hospitals, Coventry and Warwickshire	*British Journal of Oral & Maxillofacial Surgery;* *Journal of Oral & Maxillofacial Surgery*	Audit	100	IOFTN scoring using records for consecutive patients accepted for OGN surgery 2010–2014	Sufficient clinical information for 59/100 patients. 95% (56/59) were awarded grade 4 or 5 on the IOFTN. The remaining 3 patients were treated due to anticipated psychological advantages for that particular individual.
Harrington *et al.* 2015[3]	University of Warwick	*International Journal of Pediatric Otorhino-laryngology*	Retrospective study	78	IOFTN scoring of patients who had undergone or were in preparation for OGN 1997–2014	92.3% were awarded grade 4 or 5 using the IOFTN
C Dunbar & GT McIntyre 2015[5]	Dundee Dental Hospital & Perth Royal Infirmary	*BOS Clinical Effectiveness Bulletin*	Audit	100	IOFTN scoring of 100 patients who attended the OGN clinic using study models	86% patients scored 4 or 5 using IOFTN. Good intra-observer reliability in application of IOFTN.
James *et al.* 2015[7]	University of Bristol	*Faculty Dental Journal*	Retrospective study	200	IOFTN scoring of models from 4 district general hospitals in South West England using study models	No significant differences in IOFTN categories between hospitals. IOFTN showed good reproducibility scores. On average, 58% and 35.5% cases were categorised as grade 5 and 4 respectively on the IOFTN.

is summarised in Table 2. The records include two audits and two retrospective studies undertaken in secondary care settings across England and Scotland. The number of participants ranged from 78–200 and all were adults due to the type of treatment under investigation. The method used was similar across all four studies as well as our own audit; that is, retrospective scoring of the treatment need of patients undergoing orthognathic treatment using the IOFTN based on records.

The findings of all the studies showed a good level of agreement, with one study reporting 86% of participants as scoring a 4 or 5 using the IOFTN and the remaining studies reporting greater than 90%. The IOFTN was shown to be reproducible among scorers. The systematic review supports the findings from the local audit in suggesting that referrals from general dentists and acceptance for orthognathic treatment in secondary care would not be significantly affected if the IOFTN were introduced in the future.

Fig. 3 Study selection for inclusion in the review



Discussion

The findings of our audit and those undertaken across the UK indicate that the IOFTN has slightly different sensitivities to IOTN, but this is unlikely to lead to a significant change in the prioritisation and provision of care to patients seeking orthognathic treatment. For example, the IOFTN is more sensitive for class III and open bite cases. In class III cases the reverse overjet must be greater than 3.5 mm or alternatively, a smaller reverse overjet of 1–3.5 mm must be associated with recorded masticatory or speech difficulties to score a 5 using the IOTN. In comparison, a reverse overjet of 3 mm or more scores a 5 on the IOFTN regardless of functional effects. Similarly, the highest score possible for open bite using IOTN is 4 while the IOFTN awards a score of 5 for the same degree of open bite (4 mm or greater). The subtle change in scoring is unlikely to alter the orthognathic caseload, although potentially more patients will fall into the category of 'very great need'.

The IOFTN was shown to have good inter-rater agreement both during the original development[1] and in the subsequent audits.[5,7] The reliable application of the index for clinicians with varying experience is imperative for transparency and equitable care in the

NHS. The IOFTN seems to therefore be fit for purpose in this way and this reflects the thoroughness of the development process.

For dentists and specialist orthodontists in primary care the IOFTN is unlikely to change the referral process, as the same history-taking and clinical examination are required to determine patient suitability for orthognathic treatment. The IOFTN does highlight the importance of identifying key information during history-taking and examination which may affect suitability for orthognathic treatment. These include a history of dento-facial trauma or pathology, sleep apnoea or functional difficulties that the patient may be experiencing as a result of their malocclusion, evidence of facial asymmetry or gingival effects secondary to excessive gingival exposure. Functional impairments occurring as a result of class III and anterior open bite malocclusions can cause social embarrassment when eating. The sensitivity of the IOFTN to these malocclusions emphasises the importance of these issues for referring dentists. The IOFTN may also be helpful for dentists in providing guidance for patients about the purpose and scope of orthognathic treatment. However, this discussion may be most appropriate within the orthognathic service where all information can be provided and tailored to the individual patient. It must also be highlighted that all patients have the right to a second opinion and if unsure, dentists should feel able to refer patients to an orthodontist for a specialist opinion.[8]

While the IOFTN was not developed as a commissioning tool it is possible that, much like the IOTN, it will in the future be used as a means to determine which patients are appropriate for NHS-funded orthognathic treatment. In this circumstance it is essential that referring dentists have an understanding of the criteria against which patients will be considered for treatment.

Conclusions

While the IOFTN shows greater sensitivity to certain malocclusions, such as open bites and class III discrepancies, current evidence indicates that the introduction of the IOFTN is unlikely to have a significant impact on the provision of orthognathic care in the UK. Unlike the IOTN, the IOFTN does consider functional impairments and facial concerns arising from malocclusion and facial deformity. Referring dentists may therefore find the IOFTN a useful prompt for determining whether people are suitable for orthognathic treatment.

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