

An audit of orthodontic treatment eligibility among new patients referred to a Health Service Executive orthodontic referral centre

Précis

An audit of new patient orthodontic referrals showed that 29% were eligible for orthodontic treatment under HSE guidelines introduced in 2007.

Abstract

Aim: The aim of this audit was to evaluate orthodontic treatment eligibility among new patients referred for assessment from primary dental care clinics in the Health Service Executive (HSE) South region to a HSE orthodontic referral centre.

Method: A data collection form was designed and applied prospectively to consecutive new patient referrals who attended diagnostic clinics at the Orthodontic Unit, Cork University Dental School and Hospital, between October 2011 and February 2012. Orthodontic treatment eligibility was based on guidelines introduced by the HSE in 2007.

Results: Data on 291 patients (147 males and 144 females) with a mean age of 11.6 years ($SD \pm 2.4$ years; range 8-19 years) were evaluated. Of the 83 (29%) patients eligible for orthodontic treatment under the guidelines, the most commonly diagnosed malocclusion traits were a crossbite with greater than 2mm discrepancy between retruded contact position and intercuspatal position (24 patients), followed by an overjet greater than 9mm (21 patients).

Conclusions: A total of 29% of new patient referrals were deemed eligible for orthodontic treatment under HSE eligibility guidelines introduced in 2007. Reduction of new patient referrals not eligible for treatment, under these guidelines, is required to enable more efficient use of resources.

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Maurice J Meade

BDS MFDSRCSEd MJDFRCSEng
Postgraduate Orthodontic Student
Cork University Dental School and
Hospital
Wilton
Cork

Declan T Millett

BDSc DDS FDS(RCPSGlasg) FDSRCSEng
DOrthRCSEng MOrthRCSEng
Professor of Orthodontics/Consultant
Cork University Dental School and
Hospital
Wilton
Cork

For correspondence:

T: 021-490 1139
E: d.millett@ucc.ie

Introduction

The Index of Orthodontic Treatment Need (IOTN) was developed to provide an objective measure of orthodontic treatment

need and has been used to prioritise limited resources in publically funded healthcare systems.^{1,2} It attempts to identify individuals whose orthodontic need is greatest and who

Table 1: The dental health component of the Index of Orthodontic Treatment Need (IOTN).

<p>Grade 5 (need treatment)</p> <p>5i Impeded eruption of teeth (except for third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause.</p> <p>5h Extensive hypodontia with restorative implications (more than one tooth missing in any quadrant) requiring pre-restorative orthodontics.</p> <p>5a Increased overjet >9mm.</p> <p>5m Reverse overjet >3.5mm with reported masticatory and speech difficulties.</p> <p>5p Defects of cleft lip and palate and other craniofacial anomalies.</p> <p>5s Submerged deciduous teeth.</p>	<p>Grade 3 (borderline/moderate need)</p> <p>3a Increased overjet >3.5mm but ≤6mm with incompetent lips.</p> <p>3b Reverse overjet >1mm but ≤3.5mm.</p> <p>3c Anterior or posterior crossbites with >1mm but ≤2mm discrepancy between retruded contact position and intercuspal position.</p> <p>3d Contact point displacements >2mm but ≤4mm.</p> <p>3e Lateral or anterior open bite >2mm but ≤4mm.</p> <p>3f Deep overbite complete on gingival or palatal tissues but no trauma.</p>
<p>Grade 4 (need treatment)</p> <p>4h Less extensive hypodontia requiring pre-restorative orthodontics or orthodontic space closure to obviate the need for a prosthesis.</p> <p>4a Increased overjet >6mm but ≤9mm.</p> <p>4b Reverse overjet >3.5mm with no masticatory or speech difficulties.</p> <p>4m Reverse overjet >1mm but <3.5mm with recorded masticatory and speech difficulties.</p> <p>4c Anterior or posterior crossbites with >2mm discrepancy between retruded contact position and intercuspal position.</p> <p>4l Posterior lingual crossbite with no functional occlusal contact in one or more buccal segments.</p> <p>4d Severe contact point displacements greater than 4mm.</p> <p>4e Extreme lateral or anterior open bites >4mm.</p> <p>4f Increased and complete overbite with gingival or palatal trauma.</p> <p>4t Partially erupted teeth, tipped and impacted against adjacent teeth.</p> <p>4x Presence of supernumerary teeth.</p>	<p>Grade 2 (little need)</p> <p>2a Increased overjet >3.5mm but ≤6mm with competent lips.</p> <p>2b Reverse overjet >0mm but ≤1mm.</p> <p>2c Anterior or posterior crossbite with ≤1mm discrepancy between retruded contact position and intercuspal position.</p> <p>2d Contact point displacements >1mm but ≤2mm.</p> <p>2e Anterior or posterior open bite >1mm but ≤2mm.</p> <p>2f Increased overbite ≥3.5mm without gingival contact.</p> <p>2g Pre-normal or post-normal occlusions with no other anomalies (includes up to half a unit discrepancy).</p>
	<p>Grade 1 (none)</p> <p>1. Extremely minor malocclusions including contact point displacements <1mm.</p>

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would benefit most from orthodontic treatment. It is graded on two component scales: the dental health component (DHC) and the aesthetic component (AC). The DHC records the single worst occlusal feature of the malocclusion that impacts on dental health.¹ A hierarchical scale is used to identify the worst feature of the malocclusion. In order of reducing dental health impact, these are:

- missing teeth;
- overjet;
- crossbites;
- displacement of the contact points; and,
- overbite.²

A letter notation is added to indicate the malocclusion trait. Having determined the worst trait, the malocclusion can be categorised into one of five grades, which determine the orthodontic treatment need (Table 1). Grades 4 and 5 indicate a need for orthodontic treatment, whereas grade 3 indicates a borderline/moderate need. For example, a patient with no missing or impacted teeth, presenting with an overjet of 10mm, is categorised as grade 5a.

The AC assesses the aesthetic handicap posed by a malocclusion and the consequent potential psychosocial impact on the patient.^{1,2} It consists of 10 standard photographs, showing malocclusions with increasing levels of aesthetic impairment. The photographs are scored

Table 2: HSE Orthodontic Eligibility Guidelines

Grade 5	Treatment required
5a	Increased overjet >9mm
5h	Extensive hypodontia (two or more teeth missing in any quadrant excluding third molars) requiring pre-restorative orthodontics. Amelogenesis imperfecta and other dental anomalies that require pre-prosthetic orthodontic care. Incisors lost due to trauma assessed on a case-by-case basis
5i	Impeded eruption of teeth (apart from third molars and second premolars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth, and any pathological cause
5m	Reverse overjet >3.5mm with reported masticatory and speech difficulties
5p	Defects of cleft lip and palate
5s	Submerged deciduous teeth – arrange removal of teeth but orthodontic treatment not necessarily provided
Grade 4	Treatment required
4b	Reverse overjet >3.5mm with no masticatory or speech difficulties
4c	Anterior or posterior crossbites with >2mm discrepancy between the retruded contact position and intercuspal position
4d	Severe displacements of teeth >4mm but only with Aesthetic Component of 8 to 10.
4e	Extreme lateral or anterior open bites >4mm
4f	Increased and complete overbite with gingival or palatal trauma
4l	Posterior lingual crossbite with no functional occlusal contact in an entire buccal segment
4m	Reverse overjet >1mm but <3.5mm with recorded masticatory and speech difficulties
Additional Eligibility Criteria – assessed on a case-by-case basis:	
■	Children who are in the care of the HSE and do not fall under any of the other eligibility criteria.
■	Children with special needs who are referred by the primary dental care special needs service or a paediatric dental consultant.
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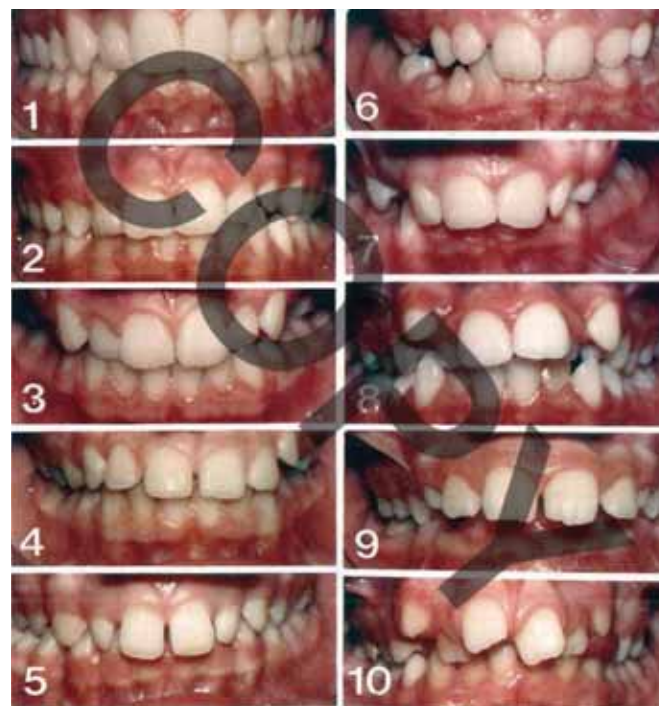


FIGURE 1: The Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN). The SCAN scale was first published in 1987 by the European Orthodontic Society (Ruth Evans and William Shaw, for rating dental attractiveness. European Journal of Orthodontics 9: 314-318). IOTN AC and DHC reproduced courtesy of Orthocare (© Victoria University of Manchester). Only AC grades 8, 9 and 10 are eligible for orthodontic treatment under HSE guidelines when the malocclusion trait is grade 4d.

from 1 (most aesthetically pleasing) to 10 (least aesthetically pleasing). (Figure 1). The patient's teeth are viewed in occlusion from the anterior aspect and the patient's AC score is determined by choosing the photograph that most closely represents the aesthetic handicap of the patient's malocclusion.³ The scores are categorised according to the required orthodontic treatment need:

- score 1 or 2 – no need for orthodontic treatment;
- score 3 or 4 – slight need for orthodontic treatment;
- score 5, 6 or 7 – moderate/borderline need for orthodontic treatment; and,
- score 8, 9 or 10 – definite need for orthodontic treatment.

In the Republic of Ireland (RoI), orthodontic treatment is not provided for all who seek it within the public Health Service Executive (HSE) orthodontic service.⁴ A modified IOTN was developed in the RoI to determine the eligibility of HSE patients for orthodontic treatment (HSE orthodontic eligibility guidelines (Table 2)) and has been used for screening of new patient referrals within the HSE since July 2007.⁴ Similar orthodontic treatment priority systems operate in the UK and Sweden.^{5,6} The HSE guidelines are intended to prioritise public funds

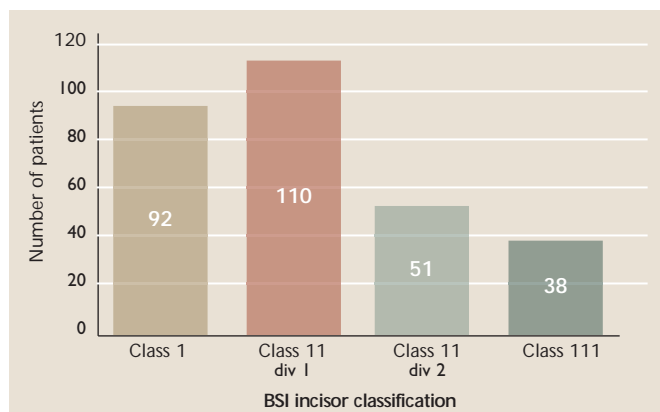


FIGURE 2: Distribution of new patient orthodontic referrals by malocclusion type (n=291).

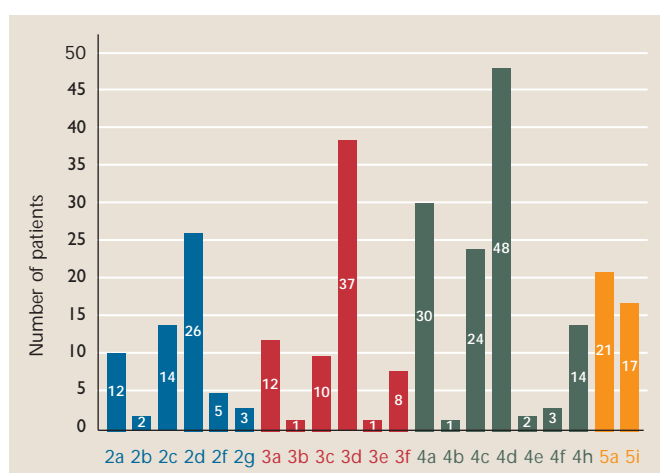


FIGURE 3: Distribution of IOTN (DC) grades among new patient orthodontic referrals (n=291).

for those most in need of orthodontic treatment and to ensure equity of access for all patients deemed eligible.⁴ The 'modified' IOTN uses the same alpha-numeric descriptors as the corresponding IOTN DHC malocclusion traits, but differs in the 'definitions' of several of the descriptors. With the IOTN, for example, grade 5i includes impeded eruption of all teeth (apart from third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause. According to HSE guidelines, grade 5i also excludes impeded eruption of second premolars. In addition, several other malocclusion traits considered to be in need of treatment according to the IOTN are not included in the guidelines (e.g., grade 4a – increased overjet >6mm but ≤9mm). Previous RoI studies have shown that between 30 and 35%^{7,8} of new patient referrals were not eligible for orthodontic treatment based on Department of Health guidelines in use at those time points.⁹ Reducing the number of new patient orthodontic referrals not eligible for orthodontic treatment may shorten waiting times for new patient assessment and enable more efficient use of resources.¹⁰⁻¹³ Since their introduction, there appears to be no published prospective

evaluation of the outcome of referrals based on the 'modified' IOTN. The aim of this audit was to evaluate orthodontic treatment eligibility among new patients referred for assessment from primary dental care clinics in the HSE South region to a HSE orthodontic referral centre.

Materials and methods

All patients from the North Cork area of HSE South requiring orthodontic assessment are referred from HSE primary dental care clinics to the Orthodontic Unit, Cork University Dental School and Hospital (CUDSH). At diagnostic clinics, referred patients are assessed by one of two consultant orthodontists, one specialist orthodontist or by postgraduate orthodontic/undergraduate students (with supervision). Those who are eligible⁴ and willing to undergo treatment are placed on the orthodontic treatment waiting list; the referring primary care dentist is informed of the assessment outcome and requested to carry out any necessary primary dental care. Patients are advised that failure to maintain adequate oral hygiene and dental health will preclude them from receiving orthodontic treatment. The new patient referrals for this prospective audit were assessed in the Postgraduate Orthodontic Unit by one of four postgraduate orthodontic students and a supervisor (consultant orthodontist or specialist orthodontist) calibrated in the use of the IOTN. The following information was recorded for consecutive new patients attending diagnostic clinics from October 2011 to February 2012:

- patient hospital number;
- gender;
- age;
- BSI incisor classification;¹⁴
- length of time since referral;
- IOTN (DHC)¹ (Table 1);
- IOTN (AC) [only if DHC grade 4d]³ (Figure 1); and,
- whether eligible for orthodontic treatment under HSE criteria⁴ (Table 1).

The information recorded for every twentieth patient was compared with the original patient records at the end of the audit in order to assess examiner reliability in data recording.

Results

No errors were noted with regard to data entry. In total, 305 patients were assessed. Fourteen were excluded from analysis as a decision on likely eligibility for orthodontic treatment could not be made until after further dental development and re-assessment at review. Data on 291 patients (147 males and 144 females) with a mean age of 11.6 years (SD ± 2.4 years; range 8-19 years) were therefore assessed. All patients were referred after the introduction of the HSE guidelines in 2007.

The mean waiting time since referral was 18.6 months. Figure 2 illustrates the distribution of patients by malocclusion type and shows that Class II division 1 was the most common malocclusion referred (38%). According to the IOTN, 55% of new patient referrals had a need for orthodontic treatment (DHC grades 4 and 5) (Figure 3). The most common malocclusion trait diagnosed was a severe contact

point displacement >4mm (grade 4d; 48 patients), but only 18 had an additional AC score of 8, 9 or 10 required for HSE orthodontic treatment eligibility. Of the 83 (29%) patients eligible for orthodontic treatment under the guidelines, the most commonly diagnosed malocclusion traits were a crossbite with >2mm discrepancy between retruded contact position and intercuspal position (24 patients), followed by an overjet >9mm (21 patients). Three patients were eligible under the HSE's 'Additional Eligibility Criteria'.

Discussion

The mean age of new patient referrals was 11.6 years, which is less than the 13-14.6 years reported previously in the Rol,^{7,8,15,16} but consistent with the assessment age recommended elsewhere.^{10,17} Class II division 1 was the most common malocclusion type (38%), which compares with 32-46% found previously in the Rol.^{7,8} The greater demand for treatment of Class II division 1 may have been due to parental perception and concern for this malocclusion type.⁷

This audit found that 55% of referrals fell into IOTN DHC grade 4 or 5, which indicates a need for orthodontic treatment on dental health grounds. This is less than the 76-82% categorised with IOTN DHC grade 4 or 5 among new patient orthodontic referrals in the UK.^{10,13,18} It is, however, greater than the 28-31% of 12- and 15-year-olds recorded in the most recent Irish dental health survey,¹⁹ who had "a definite orthodontic treatment need" in the Southern Health Board region (the Health Board region that covered the North Cork area). Some 29% of patients in this audit were eligible for orthodontic treatment,⁴ which is less than the 65-70% who qualified under the 1985 screening guidelines⁹ in operation at the time of previous Rol studies.^{7,8} Further research is required to investigate whether the discrepancy found in the cohort reported here, between "treatment need" (DHC grade 4 and 5) according to the IOTN and "treatment required" according to HSE eligibility guidelines, is reflected elsewhere in the HSE Orthodontic Service.

The most common malocclusion trait diagnosed was grade 4d; this trait indicates at least one area of crowding with a contact point displacement of 4mm or more. According to the HSE guidelines, grade 4d applies to crowding in anterior teeth only, whereas with the IOTN, it applies to all teeth. This may explain why only 38% of these patients fulfilled HSE criteria. In addition, the AC is used in the HSE assessment of eligibility of grade 4d and orthodontic treatment need is less when assessed by the AC.¹⁹ Reducing the high number of referrals in the DHC 4d category not eligible for treatment⁴ may require further training of primary care dentists in the appropriate use of AC photographs for patients with crowding of anterior teeth.

Grade 4c was the most common malocclusion trait eligible for orthodontic treatment through the HSE. This trait involves an anterior or posterior crossbite >2mm discrepancy between the retruded contact position and intercuspal position. Orthodontic correction for this malocclusion trait is required to remove the possibility of temporomandibular joint dysfunction in a susceptible patient (although the evidence for this is weak),²⁰ eliminate attrition at the site of premature contact and prevent exacerbation of plaque-related recession.¹⁷

The present audit only looked at one aspect of treatment eligibility. The decision to provide orthodontic treatment depends on additional factors such as caries, oral hygiene status, patients' awareness of an orthodontic problem and motivation for treatment; it cannot be made solely on the basis of indices of treatment need.^{4,7,11-13,17}

The number of patients in this cohort not eligible for orthodontic treatment, under HSE guidelines, may indicate some shortcomings in the current referral process. Financial and manpower pressure within the HSE means that schoolchildren may only be seen twice (at approximately eight and 12 years of age) for dental examination and required primary dental care in the North Cork region of HSE South. Primary care dentists do not routinely screen patients between those time points and may decide to make a judgement on earlier referral as referral at the later time point may not afford optimal timing to address any orthodontic treatment requirement. Referring primary care dentists may also want the reassurance of specialist orthodontic advice to adequately assess treatment need.¹² Parental concern and pressure, in addition, may influence the decision to refer. Studies, however, have shown that parental orthodontic concern may not be consistent with their children's normative orthodontic treatment need.²¹

This audit provides baseline data for the North Cork area only of HSE South with regard to orthodontic treatment eligibility under HSE guidelines introduced in 2007. Preliminary education and training of HSE primary care dentists with regard to eligibility for orthodontic treatment referrals has been carried out once by staff at CUDSH and subsequently by HSE consultant orthodontists. Guidelines for orthodontic referrals, however, have been found to have little influence on the behaviour of primary care dentists.²² Research is required into the optimum methods of dissemination and implementation of referral guidelines in order to encourage the most appropriate use of the referral service.^{21,22} In the meantime, it is recommended that the Orthodontic Unit and referring primary care dentists work closely to minimise the number of new patient referrals not eligible for orthodontic treatment. This should shorten waiting times for new patient assessment and enable more efficient use of resources.¹⁰⁻¹³

Conclusions

- A total of 29% of new patient referrals were deemed eligible for orthodontic treatment under HSE eligibility guidelines introduced in 2007.
- Reduction of new patient referrals not eligible for treatment under these guidelines is required to enable more efficient use of resources.

Recommendations

- Continuing education for referring primary care dentists including provision of proforma for orthodontic referrals.
- Re-audit during the next postgraduate training cycle to evaluate the effect of the changes introduced.

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