

Audit of the Health Service Executive orthodontic referral pathway between 2009 and 2011 in the Dublin Mid-Leinster region

An audit was undertaken in 2009 to determine the success of the new national orthodontic referral protocol introduced to the Health Service Executive (HSE) in 2007 and operated in the Dublin Mid-Leinster HSE region. It was repeated in 2011 to determine if the HSE austerity measures have had a bearing on the orthodontic service performance in the Dublin Mid-Leinster HSE region. The audit also measured the success of referring practitioners in identifying the correct Index of Orthodontic Treatment Need (IOTN) classification of the patient. In the 2011 audit, the figures were broken down to identify the occlusal variables that caused dental practitioners most difficulties in identification.

The audit demonstrates a good referral to assessment timeframe in 2009 (85-80% compliance for IOTN 5 and 4 within three to six months, respectively), which deteriorates significantly in 2011 (26-4% for IOTN 5 and 4 within three to six months, respectively). The ability of dentists to identify the correct IOTN classification was better in 2009 (60% correct) compared to 2011 (51% correct), but both figures fell below the audit standard of 75% of referrals with correct IOTN classifications. The IOTN occlusal dental health components most readily identified by referring practitioners and meeting audit standards were 5a (overjet >9mm), 5i (impacted teeth) and 5h (extensive hypodontia). The remaining occlusal dental health components in the HSE IOTN fell below the audit standard. The audit clearly identifies a requirement for a continued educational effort to maintain the HSE IOTN skill base in primary care, and a need for additional resources to manage the demand for orthodontic assessments.

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Introduction

Orthodontics is a dental specialty that concerns itself with genetic variations and developmental aberrations in the dento-facial area. Its aim is to improve oral function, create resistance to dental disease, improve dento-facial appearance and enhance

psychosocial bearing. The public perception of orthodontics, while encompassing the above, is highly focused on cosmetics and the correction of crooked teeth, which falls in line with the growing trend for beautification in developed countries. This phenomenon has produced a high demand for orthodontic

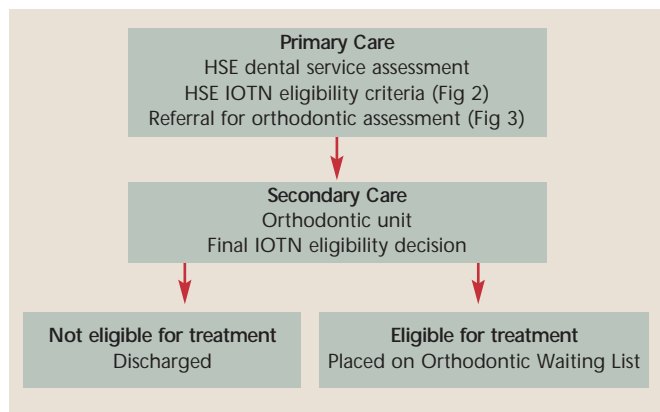


FIGURE 1. The referral process.

treatment, and many families consider treatment as a rite of passage for their children and expect the State to have a role in delivering the service.

In this Ireland is not alone; many state-funded health services find it difficult to cope with the demand for orthodontic treatment and long waiting lists are not uncommon. The dilemma of course for public health providers and politicians is where to draw the line: who should receive state-funded orthodontic treatment, especially considering the other paediatric public health demands that fall on the state?

Treatment eligibility guidelines and indices are useful to resolve this dilemma, but only if they are applied universally across the country and by appropriately trained clinicians to ensure consistency. In 2006 the Health Service Executive (HSE) Orthodontic Review Group report¹ recommended the introduction of a modified version of the internationally validated Index of Orthodontic Treatment Need (IOTN).² The Index aims to quantify specific malocclusion traits and seeks to distinguish those orthodontic patients who have a significant dental need and will obtain health gain from the intervention, from those with a low dental health need, who, on the whole, receive only cosmetic benefits. Prioritisation of care in this way ensures that limited public funds are diverted to patients with the greatest need, and that the resource-limited orthodontic workforce is able to function within its HSE service contract.

The IOTN can be difficult to use and requires a period of training and a calibration exercise to ensure that it is being used correctly. Following the introduction of the IOTN in 2007, staff training was undertaken and educational lectures were delivered to dentists in the region to reinforce the initial training exercise. Following staff training, referrals from primary care to the orthodontic service under the new arrangements began.

In 2009, based on feedback from clinicians using the service, an audit was undertaken to determine the success of the new referral protocol implementation. In 2011 a second audit cycle was undertaken to re-evaluate the process, to identify which aspects of the IOTN were proving most problematic for referring dentists, and to determine if the public sector recruitment embargo had an effect on orthodontic service performance.

Grade 5 Treatment required

- 5.a Increased overjet > 9 mm
- 5.h Extensive hypodontia with restorative implications (more than one tooth missing in any quadrant requiring pre-restorative orthodontics). Amelogenesis imperfecta and other dental anomalies which require pre-prosthetic orthodontic care.
- 5.i Impeded eruption of teeth (apart from 3rd molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth, and any pathological cause
- 5.m Reverse overjet > 3.5 mm with reported masticatory and speech difficulties
- 5.p Defects of cleft lip and palate
- 5.s Submerged deciduous teeth – arrange removal of teeth but orthodontic treatment not necessarily provided

Grade 4 Treatment required

- 4.b Reverse overjet > 3.5 mm with no masticatory or speech difficulties
- 4.c Anterior or posterior crossbites with > 2 mm discrepancy between the retruded contact position and intercuspal position
- 4.d Severe displacements of teeth > 4 mm but only with Aesthetic Component of 8 to 10 (see photographs below).
- 4.e Extreme lateral or anterior open bites > 4 mm
- 4.f Increased and complete overbite with gingival or palatal trauma
- 4.l Posterior lingual crossbite with no functional occlusal contact in one or more buccal segments
- 4.m Reverse overjet > 1 mm but < 3.5 mm with recorded masticatory and speech difficulties

Aesthetic Component 8 - 10



Additional Eligibility Criteria – assessed on a case by case basis.

- Children who are in the care of the Health Service Executive 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.

FIGURE 2: HSE modified IOTN eligibility criteria.

Materials and methods

Referral process (Figure 1)

Children in the HSE Dublin Mid-Leinster region are seen at their periodic HSE dental screening by primary care dentists and the orthodontic status of a child is first assessed using the HSE modified IOTN protocol (Figure 2). If the dentist believes the child to be potentially eligible for treatment a referral is made to the orthodontic service using a referral proforma specifically designed to facilitate the assessment (Figure 3). The referring clinician is asked only to refer those patients who they deem eligible and to indicate the IOTN classification. The final eligibility status of the patient is, however, only determined after the orthodontic examination conducted within the orthodontic department. This is important, as sometimes the initial IOTN categorisation indicated by primary care is inaccurate, and the examination carried out in the orthodontic department allows the department to accurately determine eligibility and 'priority manage' the orthodontic waiting list. This is a form of clinical governance and introduces fairness to the process.

FIGURE 3a: HSE referral proforma (front of form).

FIGURE 3b: HSE referral proforma (back of form).

The audit started in 2009, and initially the majority of clinics were audited. An audit data collection sheet, similar to that in Figure 4, was used to gather information during orthodontic assessment clinics held in the St James’s Hospital HSE orthodontic unit. The data collected were entered by the orthodontist during the assessment clinic and later evaluated by the authors. The first audit period covered assessments conducted in the department over 12 months in 2009. The second audit was a smaller sample of orthodontic assessments over the first 10 months of 2011.

Audit objectives

The initial objectives of the audit undertaken in 2009 were to determine the following:

1. The ability of the orthodontic department to meet self-imposed referral to assessment time standards.
2. The percentage success rate that primary care dentists had when using the HSE modified IOTN (to successfully identify if a patient is eligible for treatment or not).

A second audit was undertaken in 2011 to re-evaluate the process with the following objectives:

1. The ability of the orthodontic department to meet self-imposed referral to assessment time standards. To compare the 2009 data with the 2011 data to determine if the public service recruitment embargo (public service austerity measures) had an effect on the performance of the orthodontic unit.
2. To determine the percentage success rate that primary care dentists had when using the HSE modified IOTN (to identify successfully if a patient is eligible for treatment or not). To compare the 2009 data with the 2011 data to evaluate if there was an improvement or deterioration in primary care success rates using the HSE IOTN referral system.
3. To determine which particular dental health components of the HSE modified IOTN caused referring practitioners most difficulty.

Standards for the 2009 and 2011 audits

1. *Referral to orthodontic assessment timeframes*

There are no published national performance indicators for referral to assessment time for orthodontics in the Republic of Ireland. The performance indicators outlined by the HSE HealthStat³ for hospitals and local health offices were therefore

Time	Name	Admin region	Ref Dentist	Refer for opinion only	Date of referral	Date we rec'd ref	Ref in as Grade	Months since referral	IOTN Y/N.R.
9:00	XXX	Crumlin	XXX		28/09/09	16/10/09	5a	1	
9:15	XXX	Crumlin	XXX		06/10/09	16/10/09	5i	1	
9:30	XXX	DW	XXX		22/12/08	29/07/09	5a	4	
9:45	XXX	DW	XXX		10/03/08	29/07/09	5a	4	
10:00	XXX	DW	XXX	Yes					
10:15	XXX	DW	XXX		12/05/09	25/08/09	5a	3	
10:30	XXX	DW	XXX		23/10/08	03/02/09	4d	9	
10:45	XXX	DW	XXX		24/03/09	25/08/09	5a	3	
11:20	XXX	DW	XXX		29/05/09	18/08/09	5i	3	
11:40	XXX	DW	XXX		24/03/09	18/08/09	5i	3	

FIGURE 4: Audit data collection sheet.

used as a benchmark. The two following gold standards were derived to assess performance:

- A. For patients with IOTN classification 5 (highest treatment need), 100% of patients seen within three months from referral to orthodontic assessment.
 - B. For patients with IOTN classification 4 (high treatment need), 100% of patients seen within six months from referral to orthodontic assessment.
2. *Success of each referral area in the use of the HSE modified IOTN*
The IOTN classification indicated by the referring dentist was compared to the final classification given by the assessing orthodontist. As a gold standard, we set a performance indicator that 75% of referrals correctly identified the patient as eligible for orthodontic treatment.

For the 2011 data, when specific IOTN dental health component (DHC) data were analysed, a 75% success rate for the referring dentist correctly identifying the IOTN DHC category was set as the gold standard.

The figure of 75% was chosen as a desirable performance target by the authors and is not based on previous audit activity within the Republic of Ireland. A higher desirable performance was felt to be unreasonable by the authors, who accept that the HSE modified IOTN can be difficult to use, especially the aesthetic component.

Results

2009 audit

Data from 1,587 orthodontic assessments were included in the data analysis for the 2009 audit, covering a time span from January to December 2009.

First objective: referral to assessment timeframe in 2009

(The gold standard was set at 100% for IOTN 5 and IOTN 4.)

Patients referred as IOTN grade 5 were seen within the gold standard of three months for 85% of orthodontic assessments undertaken within 2009. Patients referred as IOTN grade 4 were

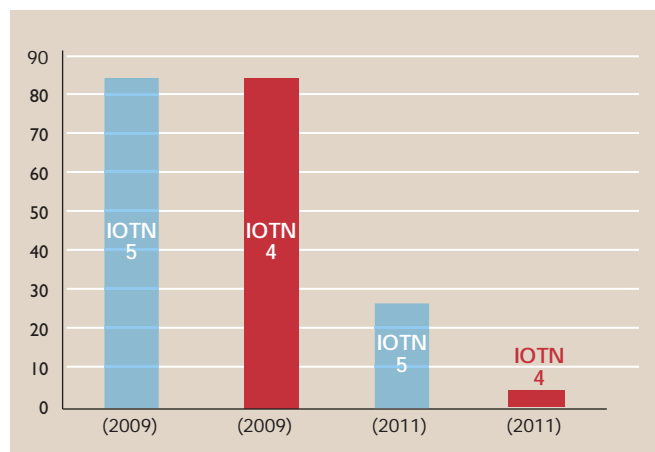


FIGURE 5: Percentage compliance with referral to assessment timeframe gold standards 2009 and 2011.

seen within the gold standard of six months for 80% of orthodontic assessments undertaken within 2009 (Figure 5).

Second objective: success of use of IOTN by primary care dentists in 2009
(As a gold standard we set a performance indicator that 75% of referrals correctly identified the patient as eligible for orthodontic treatment.)

A total of 60% of patients were eligible for treatment and the dentists in primary care had correctly identified the HSE modified IOTN classification. Some 26% of the referred population were not eligible for orthodontic treatment and 14% were kept under review pending further development, or were prescribed an interceptive orthodontic treatment and no immediate decision was made about eligibility (Figure 6).

2011 audit

Data from 453 orthodontic assessments were included in the data analysis for the 2011 audit, covering a time span from January to October 2011.

First objective: referral to assessment timeframe in 2011

(The gold standard was set at 100% for IOTN 5 and IOTN 4.)

Patients referred as IOTN grade 5 were seen within the gold standard of three months for 26% of orthodontic assessments audited within 2011. Patients referred as IOTN grade 4 were seen within the gold standard of six months for 4% of orthodontic assessments audited within 2011 (Figure 5).

Second objective: success of use of IOTN by primary care dentists in 2011

(As a gold standard we set a performance indicator that 75% of referrals correctly identified the patient as eligible for orthodontic treatment.)

A total of 51% of the sample were eligible for treatment and the dentists in primary care had correctly identified the HSE modified IOTN classification. Some 43% of the sample were not eligible for orthodontic treatment and 6% were kept under review pending further development, or were prescribed an interceptive orthodontic treatment and no immediate decision was made

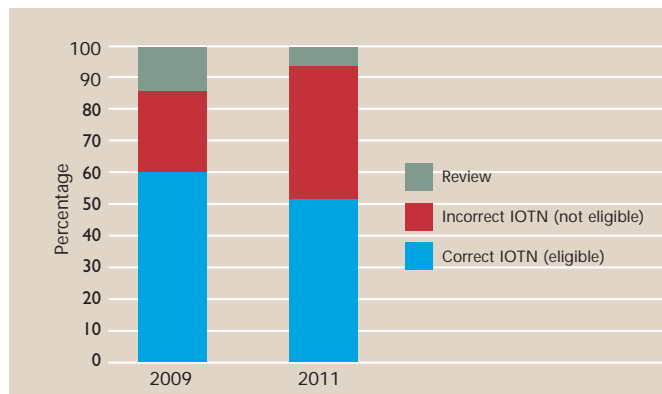


FIGURE 6: Percentage success rate of primary care dentists in the use of HSE IOTN in 2009 and 2011.

about eligibility (Figure 6).

Third objective: to determine which aspects of the HSE modified IOTN index caused referring practitioners most difficulty (Figure 7)

For the 2011 audit, when specific IOTN DHC data were analysed, a 75% success rate for the referring dentist to correctly identify the IOTN DHC category was set as the gold standard. The DHCs that were most readily identified correctly by dentists were 5a (overjet >9mm), 5h (extensive hypodontia) and 5i (impacted teeth). The audit gold standard of 75% was achieved for these dental health components.

The referring dentists had mixed success in identifying 5m, 5s, 4c, 4d, 4f and 4e, but fell below the audit gold standard of 75%.

There were no referrals sent in scoring 4l (posterior lingual crossbite), 4m (reverse overjet >1mm but <3.5mm with speech and masticatory difficulties) and 4b (reverse overjet >3.5mm without speech and masticatory difficulties). The cleft lip and palate aspect of the HSE IOTN (5p) was not scored in the audit, as all cleft patients are referred separately to a tertiary specialist cleft service.

Discussion

This audit essentially looks at the performance of the orthodontic department and primary care clinicians in the referral process of new patients. The results of the audit indicate a trend of declining performance between 2009 and 2011 in two key areas. Firstly, the ability of the orthodontic service to undertake orthodontic assessments in a timely fashion, and secondly the difficulty our referring practitioners have in correctly identifying the IOTN classification and eligibility status of the referred population.

The position in 2009 with regard to meeting our predetermined criteria for referral to assessment time was relatively good. We set a gold standard that 100% of referred patients should be seen within three months if assigned an IOTN 5 grading by the referring dentist and six months if grade 4 was scored. We achieved a compliance rate of 85% and 80%, respectively. This figure dropped quite significantly in the 2011 audit to 26% and 4%, respectively, and represents a number of difficulties imposed on the department due to funding curtailment in the HSE. The main concerns related to the flow of

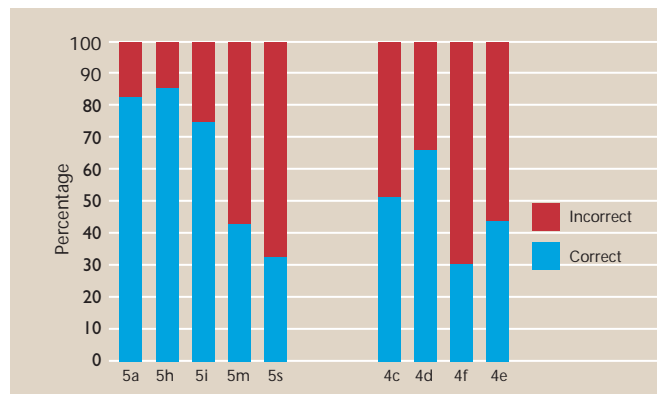


FIGURE 7: Percentage success rate that primary care dentists accurately identified the correct dental health component of HSE IOTN.

resources into the department. A key member of orthodontic department clerical staff who had responsibility for organising new patient referrals and appointments left the HSE and was not replaced. A number of clinical and clerical staff undertook maternity leave during the second audit period and no funding was made available for locum cover. These unfilled positions placed an extra burden on the remaining staff and created difficulty in administering new patient assessments. Additionally, the remaining orthodontists had to absorb additional existing in-treatment orthodontic patients from their departed colleagues, and in doing so reduced their capacity to see new referred patients. Furthermore, in the first audit period, waiting list initiatives were carried out (outside of normal working hours) to reduce the time taken from referral to orthodontic assessment and this without doubt helped the audit figures in 2009. The position in 2011 did not have the benefit of waiting list initiatives, which were stopped as part of the national austerity programme.

The performance of the dentists in the use of the modified HSE IOTN, who refer to the department, was also evaluated in the audit.

We set as a standard that 75% of referrals received to the department had the correct IOTN classification assigned by the dentist. This standard was not achieved in 2009 or in 2011. In the first audit period, 60% of patients who were referred to the department were eligible for HSE orthodontic treatment and the dentist had correctly identified the occlusal deviation that warranted referral. In the second audit period the figure dropped to 51%. So, in effect, in 2011, almost half of the referred patients were ineligible for treatment or inappropriately referred.

The use of the IOTN can be difficult for non-orthodontists and the audit demonstrates deterioration in the referring dental population's ability to correctly identify the IOTN classification. Possibly our audit standard of 75% for correctly identified IOTN classification was set too high. When the HSE modified IOTN was first introduced into the service in late 2007, calibration training exercises and education days were organised to upskill our referring population. The deterioration in performance seen in the second audit cycle may represent an educational drift and it certainly identifies a need for continued educational activities to ensure that IOTN skills are maintained. In the second audit period especially, the time on the assessment waiting list

may also have had a bearing on the dentist's deterioration in IOTN skills. It could be that there has been some spontaneous resolution of the problem that the patient was originally referred for, for example, a potentially impacted canine that correctly erupted, or a traumatic bite that resolved with favourable growth and development of the child. A further pressure is also placed on referring practitioners due to the declining economic climate within the country. Anecdotally it has been reported that parents place pressure on the referring practitioner to ensure that their child is referred to the orthodontic department for a second opinion assessment, even though the practitioner has informed the parent that the child does not qualify for treatment.

In the second audit cycle in 2011, the data were broken down further to identify the IOTN occlusal traits that caused the referring dentists most difficulty in correct identification. Our audit standard suggested that dentists should correctly identify the occlusal anomaly for 75% of referrals. This was achieved for overjet >9mm (5a), severe hypodontia (5h) and impacted teeth (5i). This is a positive finding and is possibly explained by the ease of identification and lack of subjectivity of 5a and 5h, and the enhanced clinical significance, educational investment and interceptive management of impacted canines.

The remaining occlusal discrepancies within the IOTN framework were less well identified and fell below the audit target of 75%. This finding reflects the difficulty of interpreting the IOTN dental health component descriptors. Measuring contact point displacement in the assessment of 4d is relatively straightforward with a ruler. However, subjectivity may lead to difficulty, especially when using the aesthetic component of the index for the severe crowding category 4d. Some 64% of 4d cases were correctly identified, but 36% of the 4d cases referred were found to be ineligible for treatment and indicated that dentists overestimated the severity of the aesthetic condition of the malocclusion.

IOTN occlusal discrepancy 4c, which relates to a crossbite and mandibular shift from centric relation to maximum intercuspation >2mm, was correctly identified in 52% of the referred group and incorrectly identified in 48% of patients. In the 48% who were not eligible, the mandibular shift was either not evident at all, or was below the threshold of 2mm. This is a high figure and may reflect a difficulty in measuring clinically a significant functional shift of the mandible, as many of the dentists overestimated or incorrectly measured the shift due to the crossbite presentation. This is a clinical educational issue and indicates a training requirement.

The occlusal discrepancy 4f, which relates to increased and complete overbite with gingival or palatal trauma, was correctly identified in only 30% of referrals. Some 70% of referrals were deemed not eligible when assessed by the orthodontist. The most common fault was in the interpretation of the trauma element of the overbite. Many referrals had an overbite that was in contact with the gingival soft tissue without being traumatic; this scores 3f in the IOTN classification and is not eligible in the HSE. In addition, the oral hygiene of the patient needs to be good to make an accurate assessment of trauma associated with overbite. Patients who have a marginal gingivitis with swollen gingivae are more likely to suffer trauma from the bite; however, this often resolves when gingival cleaning regimes are

improved. In essence, the diagnosis and classification of a traumatic bite (4f) needs to be made only when oral hygiene is optimal.

The occlusal discrepancy 4e – extreme lateral or anterior open bites >4mm – was only correctly identified in 44% of referrals. The larger numbers of inaccurately diagnosed 4e either indicate inaccuracy in the measurement process or represent a spontaneous improvement in open bite reductions while the patient is on the assessment waiting list. Both possibilities could account for these figures, especially if a child has a digit habit that, under the instruction of the referring dentist, is eliminated as the child matures psychosocially.

Infra-occluded primary teeth, which score 5s in the IOTN classification, were only correctly identified in 33% of cases when it came to the assessment undertaken by the orthodontist. This figure is low but probably reflects the time on the waiting list and the likely natural exfoliation of the tooth when there is a succedaneous unit below.

IOTN classifications 5m, 4m and 4b relate to reverse overjet. On the whole, 5m was poorly identified, and 4m and 4b were not scored by the dentists referring to the department. Possibly, when a practitioner observes a severe reverse overjet they automatically think the extreme presentation should score the worst IOTN classification. This could account for the greater number of 5m referrals and the absence of 4m and 4b referrals. Often there were no speech and masticatory issues associated with the 5m referrals and these should have been recorded as a 4b.

Grade 4l, posterior lingual crossbite with no functional occlusal contact in one or both buccal segments, was not used by referring dentists at all in this audit and probably reflects the limited occurrence of this occlusal anomaly in a referred population or a difficulty in diagnosing this occlusal anomaly.

IOTN classification 5p, which relates to cleft lip and palate for the purposes of the audit, can be ignored because all cleft cases are referred to the national cleft centre.

Conclusions

The audit demonstrates a number of worrying concerns relating to the performance of the orthodontic assessment referral process. The audit clearly shows deterioration in service performance that parallels the austerity measures imposed on the HSE.

The audit also demonstrates the need for periodical re-training of dentists in the use of the HSE IOTN. This educational requirement has been made difficult of late due to funding curtailment in continuing professional development (CPD) budgets across the HSE dental service. The audit demonstrates that IOTN classification 4, especially 4d (AC 8-10), 4c, 4f and 4e, require additional emphasis during education events.

References

1. **HSE Orthodontic Review Group.** HSE Orthodontic Review Group report. December 2006.
2. **Richmond, S., Daniels, C.** International comparisons of professional assessments in orthodontics. Part 1: Treatment need. *Am J Orthod Dentofacial Orthop* 1998; 113 (2): 180-185.
3. HealthStat – <http://www.hse.ie/eng/staff/Healthstat/about>.