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ORIGINAL ARTICLE

Why are the Developing Malocclusion Not Referred Timely? Absence of a Guideline? A Novel Index for the Dental Frontliners

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ABSTRACT

Orthodontic treatment has always been highly quested for various apposite reasons, which includes, function and aesthetics. The orthodontic treatment need will be screened by the dental frontliners, prior to booking into the orthodontic waiting list. The turnover of the waiting list may take as short as 3 to 6 months to as long as a few years, before orthodontic treatment commences. Although, there are indices available to grade the presenting malocclusion, the absence of a guideline to grade the severity of a developing malocclusion and the urgency for treatment, can overwhelm the orthodontic waiting list and eventually overshoot the ideal period of interception. The accuracy of the referral is crucial to ensure that the subsequent step taken is beneficial and timely. To address the difficulty in recognising and triaging developing malocclusion, a novel screening tool, the Index for Interceptive Orthodontics Referral was developed, to assist the dental frontliners during the routine orthodontic screening.

Keywords: Dental frontliners; Developing malocclusion; Referral grading; Orthodontic referral; Index for interceptive orthodontics referral; Interceptive orthodontics

1 INTRODUCTION

General dental practitioners (GDPs), dental nurses (DNs) and dental therapists (DTs) play a vital role in bridging the community to specialist orthodontists. This path of communication is vital for successful wholesome dental health service provision. These dental frontliners are the first to screen and triage any presenting dental concern prior to deciding if the malocclusion warrants monitoring or referral to the orthodontist. Their ability to evaluate the presenting features, such as, the age at presentation and the severity of the malocclusion before deciding on the immediate and subsequent management is pertinent. Their decision will pave the management of the developing malocclusion in the correct path by getting a referral to be seen by the orthodontist timely, placed in the waiting list and missing the ideal timing for treatment, or receive the orthodontic treatment precisely.

A study was carried out in North Wales, United Kingdom, to evaluate if the presenting malocclusion cases were referred timely by the GDPs and if the inappropriate referrals can be minimised to avoid unnecessary delay in the waiting list [(1)]. They had concluded that a standard referral form used by the GDPs, resulted in a more accurate referral. However, out of the 44 referrals which were inaccurate, 12 referrals were incorrectly prioritised, causing loss to those who were in the waiting list who may have benefitted if they were assessed earlier [(1)].

The Index of Orthodontic Treatment Need (IOTN) has been used to assess the need for orthodontic intervention based on the malocclusion presentation. It is a very useful tool and has been used worldwide. Unfortunately, the GDPs were inadequately equipped in the knowledge of IOTN and performed below the acceptable agreement with the expert score [(2)].

Developing malocclusion begins to manifest in the mixed dentition, which starts with the eruption of the first permanent molars at around 6 years of age and ends when the last deciduous tooth exfoliates around 12 to 13 years of age [(3)]. Although not all of it necessitates early intervention, careful case selection will definitely benefit the patient in terms of dental health, without exhausting the orthodontic waiting list. At times, interceptive orthodontics may negate future treatment altogether.

2 FACTORS CONTRIBUTING TO INADEQUACY OF ORTHODONTIC REFERRAL

- **Lack of knowledge among the dental frontliners**

Accurate referrals can facilitate interceptive orthodontics provision that may negate or simplify future orthodontic treatment and prevent unnecessary insertion into the waiting list. The event of being consulted by the orthodontist, largely depends on the referral made by the GDPs, especially in the public dental health settings. This indirectly can encourage a more effective management and prevent the long waiting list[4]. Inaccurate information in the traditional referral letter may be deficient and varied without using guidelines correctly[5]. Consequently, these incomplete referrals will be inserted into the waiting list, weighing it down unnecessarily.

Therefore, the dental frontliners must be sufficiently furnished with critical referral awareness and protocols to ensure the referral pathway to be efficient.

- **Limitations of existing guidelines**

Presently, the high demand for orthodontic treatment among children may not be well reasoned with the need outlined by existing index, such as IOTN. There must be a mutual approach and understanding between the orthodontic fraternity and the common population[6]. Additionally, the IOTN lacks specific description on developing malocclusion such as, poor prognosis first molars, clinically missing permanent teeth and early loss of primary molars, which are crucial to be intercepted timely.

Although, the existing guidelines are still useful, there are voids that may impair the ideal orthodontic treatment provision promptly.

- **Absence of a guideline for developing malocclusion**

In New Zealand, the dental therapists (DTs) work closely with the orthodontists, in the primary dental healthcare, mainly involved in the orthodontic screening of children and adolescents. There was a significant variation in the referral process between the DTs, due to differences in their age, qualification and working background. As such, they were acceptive to standard guidelines for orthodontic screening of children and adolescents[7]. Moreover, the lack of referral consistency among the DTs were rooted to lack of confidence, unavailable referral guideline and high load of patients to be screened during their scheduled clinics, especially in the national healthcare scenario[7]. High load of children to be screened at national schools, as part of the national school health program, is common in most developing countries.

Accordingly, a tool that is easy to use, simple to understand and with a tick-box proforma will facilitate a uniformed referral pathway among the dental frontliners. It will also be encouraging to boost the confidence among the dental frontliners.

3 INDEX FOR INTERCEPTIVE ORTHODONTICS REFERRAL

A guideline or a referral tool can direct the user systematically to arrive to a decision. It can also indirectly increase the user's knowledge for an accurate outcome. Despite only selective developing malocclusion must be addressed early, weighing the consequences of complex orthodontic management at a later presentation, which may have been treated with a simpler plan and yielded faster benefits, we embarked on a journey to address this vacuum. A valid and reproducible index was coined as a screening tool for the dental frontliners (Figure 1).

The Index for Interceptive Orthodontics Referral (IIOR) was developed and validated by a team of orthodontists, paediatric dental specialist and orthodontic postgraduates. This novel index was published in 2023[8]. A total of 413 schoolchildren aged between 8.1 and 11.9 years from 7 schools were examined, prior to study model fabrication. The malocclusion present were graded based on the British Standards Institution classification, IOTN and clinician expert opinions.

A total of 14 malocclusion and 3 grades of referrals were tabulated with tick boxes at each malocclusion. A column of 'Others' was included at the end of the index, to accommodate any malocclusion that have not been listed. The dental frontliner will need to screen the patients according to the listed malocclusion and sieve through the grading based on the severity. The grades listed include, 'Monitor', 'Standard Referral', and 'Urgent Referral'. The presenting malocclusion will be ticked, and the grade of referral will correspond to these ticks. For instance, if there are 3 ticks under the 'Monitor' grade and only 1 tick under the 'Urgent Referral' grade, the referral will be urgently made to the orthodontist. Meaning the most severe grade will be the referral grade, regardless of the total number of ticks. The section at the end of the IIOR was made available, to select to whom should the patient be referred to according to the malocclusion presentation and grade of severity.

With IIOR, it is hoped that the dental frontliners will be confident to refer suitable developing malocclusion in a timely manner to the orthodontists. This will give an opportunity for the malocclusion to be screened by the expert, who will decide on the necessity of early interception. In this way, it is hoped that there will be less late referrals seen for significant malocclusion. For example, there will be less canines or central incisors seen impacted, in patients presenting in their 20s, and more Class 3 skeletal malocclusion may be intercepted early.

A pilot study has been carried out to test the feasibility of the IIOR usage among the dental frontliners[9]. The study showed that it was well-received by the dental frontliners and they perceived the IIOR to be effective, simple to use, and easy to understand.

Grade / Component of malocclusion	1 Monitor	2 Standard referral	3 Urgent referral
Supernumerary (S)		· All teeth well aligned	· Clinically missing permanent teeth · Crowding · Trauma · Displacement of tooth
Clinically missing teeth (excluding permanent canine) (M)	· Contralateral tooth erupting · Spaced arch		· With or without a palpable bulge · Fully erupted contralateral tooth
Clinically missing permanent canine (PC)	· Contralateral canine erupting · Presence of 'deciduous canine'	· Labially palpable · Contralateral canine erupted · Not palpable by 10–11 yr	· Palatally palpable
Early loss of deciduous canine (C)	· Presence of contralateral tooth · No dental centreline shift	· Presence of dental centreline shift	
Early loss of deciduous second molar (E)		· Inadequate space for eruption of successor	· Adequate space for eruption of successor
Midline diastema (D)	· Physiological	· >2 mm diastema · Low frenal attachment	· Persistent diastema (>2 mm) · Missing permanent teeth
Carious first permanent molar (PM)		· Asymptomatic · Presence of crowding	· Symptomatic · Not restorable · Presence of crowding
Crowding (Cr)	· Cr <4 mm · Over retained deciduous teeth	· 4 ≤ Cr ≤ 8 mm · Over retained deciduous teeth	· Cr > 8 mm · Over-retained deciduous teeth
Anterior crossbite (AnC)		· Present without displacement	· Present with displacement
Posterior crossbite (PoC)		· Present without displacement · Non-nutritive sucking behaviour	· Present with displacement · Non-nutritive sucking behaviour
Increased overjet (OJ)		· 5 < OJ ≤ 9 mm · Non-nutritive sucking behaviour	· OJ >9 mm · Non-nutritive sucking behaviour
Reversed overjet (RO)		· Present without displacement	· Present with displacement
Deep bite (DB)	· No palatal mucosa contact	· Complete to palatal mucosa · Non-traumatic	· Complete to palatal or labial mucosa · Traumatic
Open bite (OB)		· Absence of non-nutritive sucking behaviour	· Presence of non-nutritive sucking behaviour
Others (please specify)			

Tick ALL the components of malocclusion and the corresponding grades above as screened. Tick the immediate personnel for a referral.

Dental staff nurse	General dental practitioner	Orthodontist	Others (please specify)

Fig. 1: Index for Interceptive Orthodontics Referral (IIOR) [8]

Following this positive conclusion, the IIOR is now being tested for usability among the dental frontliners to use the IIOR as a screening tool, and among the dental undergraduates for overall knowledge exposure and familiarization for future use.

4 CONCLUSION

In view of the orthodontists' dependency on the dental frontliners for recognising, grading and referring the suitable cases of developing malocclusion, the IIOR will be functional and handy to increase the possibility of the patients to be consulted by the orthodontists for selective early orthodontic interception.

Subsequently, the orthodontists may decide on the suitability and timeliness of interceptive orthodontics provision and prevent the delay in accurate diagnosis and treatment planning. This novel index has been developed for the benefit of the patient and the orthodontic service in entirety.

Conflict of Interest

The author declares that there is no conflict of interest.

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