SCIENTIFIC SECTION

Are photographic records reliable for orthodontic screening?

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Abstract

Aim: The aim of the study was to evaluate the reliability of a panel of orthodontists for accepting new patient referrals based on clinical photographs.

Sample: Eight orthodontists from Greater Manchester, Lancashire, Chester, and Derbyshire observed clinical photographs of 40 consecutive new patients attending the orthodontic department, Hope Hospital, Salford.

Method: They recorded whether or not they would accept the patient, as a new patient referral, in their department. Each consultant was asked to take into account factors, such as oral hygiene, dental development, and severity of the malocclusion.

Statistics: Kappa statistic for multiple-rater agreement and kappa statistic for intra-observer reliability were calculated.

Results: Inter-observer panel agreement for accepting new patient referrals based on photographic information was low (multiple rater kappa score 0.37). Intra-examiner agreement was better (kappa range 0.34–0.90).

Conclusion: Clinician agreement for screening and accepting orthodontic referrals based on clinical photographs is comparable to that previously reported for other clinical decision making.

Index words:
Clinical photographs, consultant reliability, inappropriate referrals, new patient referrals.

Introduction

This study was designed to investigate the reliability of orthodontists in accepting new patient referrals based on clinical photographs. The main aim was to assess whether photographic records might reliably be used for a teledentistry system to screen inappropriate referrals.

The data reported is in addition to a randomized clinical trial that is being carried out to assess the validity of a teledentistry system for screening orthodontic referrals. Currently, patients are being referred through a 'store and forward' teledentistry link, and later being evaluated clinically, to assess whether the same decision to accept the referral is made.

Teledentistry is becoming an increasingly important tool in clinical dentistry.[1–4] It combines computer and telecommunications technology with medical expertise to enable health professionals to send and receive information, and provide diagnostic and consulting services from locations distant from their patients.[5]

One problem with the UK orthodontic services is long waiting lists for the first consultation appointment. For example, Russell *et al.*[6] reported an average wait of 4.6 months (range 0–24 months+). Additionally, 45% of new orthodontic referrals have been shown to be inappropriate[7] and this must contribute to the long new patient waiting lists.

The latter study also revealed that the commonest reasons for inappropriate referrals were mild malocclusion, poor oral hygiene, and timing of referral. It could be suggested that these factors are detectable from electronically transferred clinical photographs only, particularly, since the use of full records has not been shown to make large differences to clinical decision making.[8] Therefore, the aim of this study was to evaluate the reliability of a panel of consultant orthodontists for acceptance of new patient referrals based on clinical photographs.

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Sample

Forty consecutive orthodontic patients attending a new patient clinic at Hope Hospital, Salford agreed to have clinical photographs taken at the end of their consultation appointment. Eight consultant orthodontists from Greater Manchester, Lancashire, Chester, and Derbyshire comprised the assessment panel.

Methods

Photographic material

The 40 new patients comprised a mixture of those who were suitable for treatment and those who were not because of poor oral hygiene, mild malocclusion, or referral that was too early. The colour clinical slides for each patient were mounted for viewing on light boxes. Each patient had full face and profile, labial, and right and left buccal views in occlusion, and upper and lower occlusal views.

Panel of consultant orthodontists

Each orthodontist was asked to indicate whether or not they would accept the patients as new referrals with a view to either (i) starting treatment straight away, (ii) providing a treatment plan, or (iii) giving advice to general dental practitioners. It was emphasized that this was meant as a screening process only and factors, such as oral hygiene, severity of malocclusion, and timing of the referral were to be considered. The decision was made based on the orthodontists' usual clinical practice, rather than use strict referral guidelines. The following additional information was provided:

- Patient age.
- Patient complaint.
- Overjet (mm) provided because it could not be accurately assessed from clinical photographs and is important for assessment of treatment need.

Intra-examiner reliability

Each orthodontist viewed the same series of photographs, on the second occasion, at least 2 weeks after the initial assessment. They re-recorded whether they would accept the patient for treatment, treatment plan or advice.

Statistics

Kappa statistic for the outcome variable, for multiple raters, was calculated using 'Stata' software (Stata Corporation, Texas). Kappa statistic was used to assess intra-examiner reliability.

Results

The multiple-rater kappa score (inter-consultant reliability) for acceptance of an orthodontic referral was 0.37. Kappa scores for intra-consultant reliability ranged from 0.34 to 0.90 (Table 1).

Discussion

The results suggest that reliability between consultants for accepting an orthodontic referral based on photographs was low. However, agreement was generally better for the same clinician over time. Nevertheless, the values reported are comparable with other published literature and these are shown in Table 2. There may be several reasons for the findings in this study, which may be summarized as:

The length of the new patient waiting lists. Orthodontists with longer new patient waiting lists may be more stringent in whom they would see.

Clinic policy. In this series of patients, there were some adults with fairly severe malocclusion that would require routine orthodontics only. Some consultants worked in hospitals that only accept adults if they required interdisciplinary treatment.

The extent of formal use of orthodontic indices. The widespread use of the Index of Orthodontic Treatment Need (IOTN)[9] has helped to prioritize patients with high or definite need for treatment on aesthetic or dental health grounds. It is possible to screen new patients using the aesthetic component of IOTN from clinical photographs alone. However, the rigorous application of the dental health component of IOTN to clinical photographs is not possible, even though additional information, such as overjet was provided.

Table 1 Intra-consultant reliability for the use of photographs to screen new patient orthodontic referrals.

Orthodontist	Kappa score	Standard error	95% Confidence interval
1	0.44	0.14	0.17–0.71
2	0.55	0.12	0.31–0.80
3	0.90	0.10	0.69–1.00
4	0.70	0.11	0.48–0.92
5	0.34	0.16	0.02–0.66
6	0.50	0.13	0.24–0.76
7	0.45	0.14	0.02–0.72
8	0.44	0.13	0.19–0.69

Table 2 Comparison of previous studies investigating orthodontists' clinical reliability.

Author (date)	Method	Clinical decision	Findings
Baumrind (1996)[11]	Full patient records ($n = 148$) 5 orthodontists	Extraction/non-extraction	In 34% of cases, clinicians disagreed about whether to extract.
Ribarevski (1996)[12]	Full patient records ($n = 60$) 10 orthodontists	Extraction/non-extraction	Multiple-rater inter-examiner Kappa value =0.38. Agreement between combinations of two examiners within the group ranged from 0.11 to 0.73. Intra-examiner agreement kappa range 0.54–0.96.
Luke (1998)[13]	Full records and radiographs as requested ($n = 6$) 39 orthodontists	Diagnosis and treatment planning	Considerable disagreement between orthodontists reported. No statistical analysis.
Lee (1999)[10]	Case vignettes ($n = 60$) 10 orthodontists	Diagnosis and treatment planning	Multiple-rater inter-examiner Kappa value = 0.54. Intra-examiner agreement kappa range 0.24–0.90
Mandall (2001)	Photographic records ($n = 40$) 8 orthodontists	Acceptance of orthodontic referral	Multiple-rater inter-examiner Kappa value = 0.37. Intra-examiner agreement Kappa range 0.34–0.90

Individual clinician variability. Since full use of IOTN to screen new patients using clinical photographs is impossible, it is likely that a degree of clinician judgement will be used in these cases.

The severity of the cases presented. Lee *et al.*[10] suggested that agreement may be lower between orthodontists if the variables that were being examined were mild. Within this sample, however, there was a range of malocclusion and this is unlikely to account, in isolation, for the low inter-examiner agreement.

Conclusions

Clinician agreement, for screening and accepting orthodontic referrals based on clinical photographs, is comparable to that previously reported for other clinical decision making.

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