Is remote monitoring a reliable method to assess compliance in clear aligner orthodontic treatment?

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A commentary on:

Timm L H, Farrag G, Baxmann M, Schwendicke F.
Factors Influencing Patient Compliance during Clear Aligner Therapy: A Retrospective Cohort Study. *J Clin Med* 2021; **10:** 3103.

Practice point

- Digital-based apps can be practical tools to detect compliance. Such apps and reminders can help in early intervention of addressing non-compliance in orthodontic patients undergoing clear aligner therapy.

Abstract

Data source and study design Retrospective cohort study using the data obtained from PlusDental – a Berlin-based health-tech company

Cohort selection and data analysis Patients who completed clear aligner therapy (CAT) in 2019 were selected for this study. A digital-based app was utilised for analysing compliance among patients who underwent non-extraction orthodontic treatment with clear aligners. The sample included 2,644 adult orthodontic patients, three-fourths of them being women and one-fourth men. The primary outcome involved patient compliance, which was evaluated using a questionnaire in the app, completed by the patient. The questionnaire required patients to enter details about the aligner change date, daily wear time and pressure exerted by each aligner. The effect of variables including age, sex, previous orthodontic treatment and satisfaction with one's smile on compliance, were also analysed. Statistical analysis was performed using two-sided chi-square tests.

Results Only 36% of the patient sample were fully compliant and poor compliance was exhibited by 25%. Authors observed that women were less compliant than men and patients with no prior orthodontic treatment were better compliant towards CAT. Also, patients treated with removable appliances exhibited better compliance among those who had a history of previous orthodontic treatment.

Conclusions The authors concluded that non-compliant patients can be identified early, using their results as a guideline. This will help in timely intervention of addressing compliance issues during clear aligner orthodontic treatment.

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Commentary

Patient compliance is a crucial factor in successful orthodontic therapy. With treatments involving removable appliances like clear aligners, patients are expected to be more responsible in terms of adhering to specified wear time, changing aligners on periodic intervals and aligner maintenance. This is in addition to the routine oral hygiene measures they must follow, which needs to be more rigorous during active orthodontic treatment. All these require a high level of compliance during clear aligner therapy (CAT). This cohort study addresses compliance as the main outcome in subjects who completed CAT in 2019. The data for the current study was obtained from PlusDental, which is a health-tech company based in Berlin, Germany.

The sample for the study consisted of 2,644 patients, with all study subjects being above 18 years of age and with a sex distribution of 75% women and 25% men. Patients who had undergone and successfully completed orthodontic therapy for malocclusion in anterior and premolar region and requiring no extractions, were recruited in the study. The outcomes for compliance observed were: 36% fully compliant; 38.3% fair; and 25.7% poorly compliant. The fact that 679 patients (25.7%) were poorly compliant and yet they successfully completed orthodontic treatment are contradicting each other. To avoid this problem, a preferable way of appraising compliance would be to utilise a prospective study design.

The total number of aligners prescribed for treatment ranged from 6 aligners to more than 24 aligners. Specifically, the number of aligners worn by the patients were spread out between 6, 9, 12, 15, 18, 21, 24 and >25 among 2,644 patients. With a huge non-homogeneity in the aligner numbers, which also makes the total treatment duration spread out, understanding the triggers in non-compliance becomes confounded by multiple unknown variables. Especially given that some patients are finishing treatment considerably earlier than the others, it is unclear if the longer

GRADE rating

duration in treatment has any contribution to compliance and whether the lack of compliance starts early in treatment or later.

A self-reported questionnaire for the patient was formulated in the app. It involved patients entering details about their daily aligner wear time, aligner change date and pressure felt during aligner wear. The analysis of the data largely depends on the assumption that patients always provide an honest response to the questionnaire. Adding a more objective method in the remote monitoring can add reliability to the assessment of compliance. One technique reported in the literature used sensors and indicators with CAT and removable appliances which estimates the wear time more accurately.[1]

Additionally, rating the pressure felt by patients as very weak, weak, strong or very strong has a subjective component to it. The responses by the patients can be influenced by personal variation, including individual pain tolerance and as a result, could be over-reported or under-reported. Furthermore, the significance of the pressure felt was not clinically correlated to the compliance. Thus, even though this study attempts to present a practical guideline in detection of compliance, the few relevant confounding factors were not considered. A more blinded form of detection will add precision to the results, rather than depending on patients' subjective reporting.

The authors have made a crucial step toward understanding patient involvement and ways to improve them. With clear aligner therapy being a popular form of treatment in orthodontics, having guidelines to improve patient cooperation is essential for successful treatment. From a clinician's perspective, it is also important to ensure that the instructions are thoroughly conveyed to the patient from the beginning of treatment. Proper patient education about the role of compliance is key to positive orthodontic outcome. Literature even reports that 'effective communication is the main requirement for an evidence-based, patient-centred and outcomes-focused practice.'[2] Repeated communication and reminders in the form of apps and digital means should potentially strengthen the patients' sense of responsibility.

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