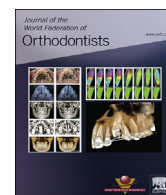Contents lists available at ScienceDirect

Journal of the World Federation of Orthodontists

journal homepage: www.jwfo.org

Featured Original Research

Compliance with retainer wear in the first year: An analysis of 320 cases

Abram Abeskharon [a], Michael Fischer [b], John Burnheimer [a,*]

[a] Department of Orthodontics and Dentofacial Orthopedics, University of Pittsburgh, Pittsburgh, Pennsylvania
[b] Information Technology, University of Pittsburgh, Pittsburgh, Pennsylvania

ABSTRACT

Background: Compliance with retainer wear is one of the most challenging aspects of orthodontic treatment and is a concern to all orthodontists.
Objectives: To determine whether there is a statistically significant difference in compliance in retainer wear during the first year posttreatment.
Methods: A total of 320 patients were randomly selected from the electronic health records of the University of Pittsburgh, Department of Orthodontics and Dentofacial Orthopedics (Pittsburgh, Pennsylvania). The records were hand-searched for completeness, with age, sex, retainer type, and insurance as the categories. Incomplete records were immediately excluded. A descriptive analysis of the frequency and percentage distribution of variables was made. Categorical data were tested with Fisher exact tests and continuous data with analysis of variance.
Results: Patient compliance between the 15- to 18-year-old age group and the group older than 24 years, treatment duration over 30 months, Hawley retainers, and state insurance all proved significant ($P < 0.05$).
Conclusions: Compliance with retainer wear declines substantially from the initial visit to the final visit. The most compliant patients over this time period wore the Hawley retainer. Patients with state insurance are the least compliant at both time points.

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1. Introduction

Once the active phase of orthodontic treatment has been completed, the next and perhaps more important part of orthodontics begins: retention. Because most contemporary practitioners prescribe removable retainers, patient compliance is essential to maintain the results. Typically, orthodontists advise a period of full-time retainer wear followed by lifetime part-time wear [1]. This period of full-time wear varies according to the type of retainer. When prescribing Hawley retainers, the recommendation is often 3 to 9 months of full-time wear, whereas with vacuum-formed retainers (VFRs), full-time wear is often less than 3 months [1].

Much research has been spent on identifying the characteristics of a compliant orthodontic patient. Even though the orthodontic literature abounds with studies assessing patient compliance, these studies have yielded contradictory or inconclusive results [2—7]. Weiss and Eiser [2] attempted to assess compliance by using a questionnaire and discovered that patients younger than 12 years were more cooperative in wearing removable devices than the older subjects. This agrees with a previous report by Allan and Hodgson [3], which found better compliance in patients younger than 14 years. In contrast, Cucalon and Smith [4] found no relationship with age in patients between 11 and 17 years, and others have found no relationship with age using other age ranges [5—7].

With regard to sex, Starnbach and Kaplan [8] evaluated 362 patients treated in one orthodontic practice and found that female individuals are more likely to be excellent patients with regard to cooperation. Similarly, Cucalon and Smith [4] found that the most important variable in predicting compliance was the sex of the patient, with female patients more compliant than male patients. This agrees with studies of Mehra et al. [9]; however, others found no significant difference with regard to sex [3,5—7].

With respect to type of insurance, Wilson and Harris [10] found that patients with state-subsidized insurance were generally less compliant with orthodontic treatment. Patient compliance is also

an issue in other areas of dentistry and medicine. In a study on adult compliance with periodontal maintenance, Famili and Short [11] found that only 30% returned for the 3-month follow-up visit. In medicine, studies have suggested that anywhere from 25% to 50% of patients fail to comply [12,13].

Certainly, patient compliance with wearing retainers is a challenging and complicated issue. Many factors are associated with patient behavior in wearing retainers for the recommended time. The patient's age and sex, and parental encouragement supporting retainer wear, in addition to the type and design of the prescribed retainer are just a few of the factors that may influence compliance with retainer wear. Given that most orthodontic patients are in their adolescence, this volatile time may be a particularly difficult time to ensure compliance. Those tending to nonconformity may wear them less, whereas those tending to conformity may wear them as prescribed, when given the same instructions by the orthodontist [4].

Data on patient compliance with retainer wear has generally been gathered through the use of questionnaires or surveys [14–16]. One study found a strong relationship between comfort level and compliance [14], whereas others found just forgetting to wear the retainer as the main reason for noncompliance [16].

The purpose of this study was to investigate patient compliance in retainer wear during the first year after completion of active orthodontic treatment as documented in their electronic health records (EHRs). The null hypothesis was that there was no difference in compliance of retainer wear between the first and last retention visit.

2. Material and methods

This study of patient records examined compliance with retainer wear over the first 12 months subsequent to completion of orthodontic treatment. Institutional review board approval was obtained from the University of Pittsburgh (PRO17030411). EHRs of those treated at the postgraduate orthodontic clinic, University of Pittsburgh (Pittsburgh, PA), were hand-searched for completeness with age, sex, retainer type, and insurance. Incomplete records were excluded. Records consisted of those patients who completed comprehensive orthodontic treatment from 2009 to 2014 and had the first retention visit within the first 2 months post debond, followed by a final retention visit 1 year later. This visit was the last scheduled retention visit before patients were dismissed from supervised retention. Exclusion criteria consisted of patients who had undergone orthognathic surgery (these generally followed a different retainer-wear schedule), patients who terminated treatment early, patients who did not return for the first retention visit, and patients with no notes regarding retainer wear in the EHR. The resulting sample of 320 patients consisted of 190 self-pay patients and 130 Medicaid patients.

The data were either categorical (male, female) or continuous. Categorical data were tested with Fisher exact tests, whereas continuous data were tested with analysis of variance. Alpha was set at 0.05 for the level of significance.

3. Results

The distribution of variables is listed in Table 1. It is apparent that there has been a dramatic shift toward VFRs (79%) versus Hawley retainers (21%). Additionally, it is clear that our patient population is skewed toward those out of high school (19 years and older). The statistical results are given in Table 2. There was a dramatic and significant decrease in wearing the retainer the recommended amount of time between the first retention visit and the final visit 1 year later.

Table 1
Frequency and percentage distribution of variables

	n	Percent
Overall	320	
Gender		
Male	144	45.0
Female	176	55.0
Retainer type		
VFR	253	79.1
Hawley	67	20.9
Insurance		
Private	190	56.4
State	130	40.6
Age (y)		
<14	23	7.2
15–18	77	24.1
19–23	114	35.6
>24	106	33.1
Duration (mo)		
≤30	182	56.9
>30	138	43.1

Overall compliance exceeded 74.1% at the first visit, dropping to 47.8% at the 1-year retention visit.

The patient's sex had little effect on compliance in wearing retainers for the recommended amount of time. At the first visit, nearly identical percentages (73.6%, 73.8%) of male and female patients were compliant. At the 1-year visit, these percentages dropped to 50.6% for male patients and 45.1% for female patients, but they were not significant for either time point.

Similarly, at the first retention visit, the type of retainer made no statistical difference. However, at the final visit, 62.1% of those in the Hawley retainer group complied with the recommended instructions, whereas 44.5% of those in the VFR group complied, which was statistically significant ($P = 0.0107$). Patients in the Hawley retainer group were instructed to wear their retainers for 24 hours per day until their first posttreatment visit, whereas patients in the VFR group were instructed to wear their retainers at nighttime only for the same period. By the last visit, both were to be worn nights only.

The type of insurance was statistically significant at both the first and last visits. On the first visit, the patient's compliance among those with private insurance was very high, with more than 80.5% wearing the retainers as directed, whereas compliance among

Table 2
Compliance with retainer wear according to other variables

Variable	Compliance first visit		Compliance last visit	
	Mean (%)	P	Mean (%)	P
Total sample	74.1		47.8	0.0001
Gender				
Male	73.6		50.6	
Female	73.8	ns	45.1	ns
Retainer type				
VFR	73.6		44.5	
Hawley	74.2	ns	62.1	0.0107
Insurance type				
Private	80.5		56.3	
State	63.8	0.0008	36.1	0.0004
Age (y)				
<14	78.3		39.1	
15–18	62.3	*	49.4	
19–23	68.4		44.7	
>24	86.8	*0.0008	52.8	ns
Treatment duration (mo)				
≤30	75.9		55.6	
>30	58.5	*0.0361	48.8	ns

ns, not significant.
The asterik indicates the 2 groups that differed significantly.