

Do Failed Appointments Lead to Discontinuation of Orthodontic Treatment?

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Abstract: A retrospective case note study was performed on 500 consecutive patients attending an orthodontic clinic. The total number of appointments and number of failed appointments was ascertained. The outcome of treatment was recorded as one of five categories: default before treatment, 46 (9.2%); still under treatment, 42 (8.4%); transferred elsewhere, 9 (1.8%); default during treatment, 88 (17.6%); or completed treatment, 315 (63.0%). Using a chi-square test, the 315 patients who completed treatment were compared with the 88 who defaulted during treatment. The total number of appointments was significantly fewer, but the number of failed appointments was significantly greater in the discontinued treatment groups. The standardized failure rate (total number of failed appointments ÷ total number of appointments × 100) was used to compensate for the difference in the total number of appointments between the groups. The mean standardized failure rate was only 10.3% for the completed treatment group compared with 21.4% for the discontinued treatment group. (*Angle Orthod* 2003;73:51–55.)

Key Words: Discontinued treatment; Failed appointments; Orthodontics; Standardized failure rate

INTRODUCTION

Failed appointments have an important influence on the efficient scheduling of clinics and, as a consequence, on the economics of orthodontic practice. In general, the percentage of failed appointments has been shown to relate to a number of socioeconomic factors. These include age,^{1–5} sex,^{1,6} social class,^{2,4,7} race,^{1,8,9} dental state,^{10,11} level of education,^{1,4,5,12,13} large families,⁸ broken homes,⁸ distance traveled,^{4,5,14,15} weather,^{2,3} illness,^{3,22} forgetfulness,^{2,3,8,14,16–18,22} availability of transport,²² time interval between making the appointment and the date of the appointment,^{12,16} degree of medical urgency,¹⁹ number of physicians seen by the patient,^{3,8,20,21} source of payment,⁹ medical debts,⁸ depression/psychiatric problems,^{2,8,16} and apprehension.⁶

Likewise, patients who discontinue partway through treatment waste the resources of the National Health Service and the orthodontist's time. Also, the patient fails to receive the optimum benefit from treatment, which may even be more harmful than not starting treatment in the first place.

Discontinuation rates reported in the literature vary (Ta-

ble 1). Factors that have been found to influence the discontinuation rate from previous studies are age,^{23–25} sex,^{26,27} social class,²⁸ attendance record,²⁹ motivation,^{30,31} grade of operator,^{25,32} type of practice,²⁵ appliance type,^{29,33} length of treatment time,^{29,34} and pretreatment Peer Assessment Rating, (PAR), score.³³

Although both failed appointments and discontinuation of orthodontic treatment have been studied separately, the relationship of one to the other has not been given much consideration previously. Orthodontic patients provide an ideal population to study the pattern of discontinuation because of the prolonged nature of treatment (2–3 years).

The present study was undertaken to answer the question whether failed appointments are related to discontinuation of orthodontic treatment.

MATERIALS AND METHODS

The material comprised 500 consecutively referred patients who attended the Royal Preston Hospital for orthodontic treatment. A retrospective case note survey was performed to ascertain the total number of appointments and the total number of failed appointments for each patient.

The patient outcome was also recorded as one of five categories:

- Default before treatment.
- Still under treatment.
- Transferred elsewhere.
- Default during treatment.
- Completed treatment.

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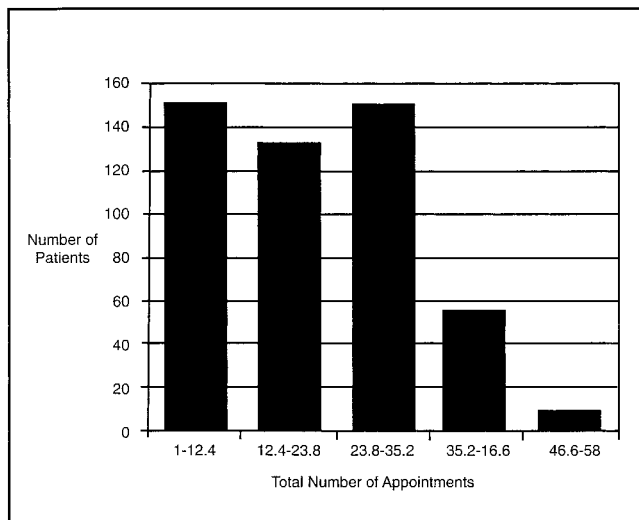
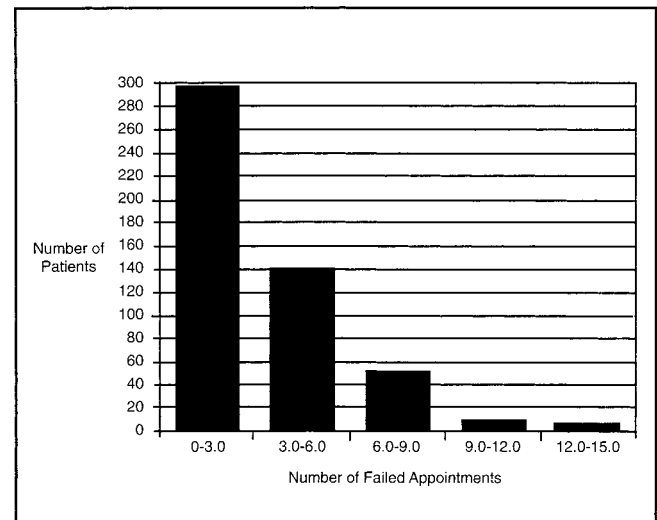
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TABLE 1. Discontinuation Rate

Author	Year	No. in Study	Country	Discontinuation (%)
Savage ³⁵	1967–1977	403	UK	18.9
Myrberg, Thilander ³⁶	1973	1486	Sweden	14.7
Rose ²⁷	1974	1000	UK	12
Savage ³⁷	1978–1982	262	UK	16.8
Berg ³⁸	1979	264	Norway	7.5
Cousins et al ³⁹	1981	250	UK	17
Cohen ⁴⁰	1981	69	UK	23
Serfl, Furk ^{41,42}	1982	300	Germany	10
Huppmann et al ⁴³	1986	869	Germany	20
Ahlgren ⁴⁴	1988	3300	Sweden	8.3
Murray ²⁹	1989	522	UK	12.8
Brattstrom et al ³¹	1991	2000	Sweden	4
Patel ²⁵	1992	406	UK	32
Roberts et al ⁴⁵	1994	294	UK	17
Eaton et al ³²	1996	CDS 2678 GDS 1948	UK UK	12.5 13.1

**FIGURE 1.** Histogram of the total number of appointments.**FIGURE 2.** Histogram of the number of failed appointments.

RESULTS

Total number of appointments

The total number of appointments per patient was mean \pm SD, 20.5 ± 12.5 ; median, 20.0; and range, 1–58. When the distribution was plotted as a histogram (Figure 1), there was a marked reduction at the top end of the range. Most patients kept 20 appointments and ceased attending after 36. The latter figure would represent three years of treatment with visits at monthly intervals, most orthodontic treatment being completed within this time period.

Number of failed appointments

The total number of failed appointments per patient was mean \pm SD, 2.6 ± 2.7 ; median, 2.0; and range, 0–15. For failed appointments, the distribution (Figure 2) demonstrated a marked positive skew giving the appearance of an exponential rate of decay. Most patients fail one to three

appointments, and a progressively decreasing number of patients fail more than this, with only a very few chronic failures occurring at the far end of the range.

Patient outcome

The largest number of patients (315 [63.0%]) completed treatment, whereas the next largest number (88 [17.6%]) discontinued treatment prematurely. The remaining patients were still under active treatment (42 [8.4%]), transferred to another hospital (9 [1.8%]), or had defaulted before treatment started (46 [9.2%]). The last group included patients who did not need treatment, who were unsuitable for treatment, or who needed treatment but declined when the implications were explained. The fact that 9.2% of patients fell into this group suggested that the system of diagnosis and counseling of patients, to some extent, was successful in filtering out unsuitable cases. The problem group com-

TABLE 2. Comparison of Completed and Discontinued Groups

	Completed Treatment Group		Discontinued Treatment Group		Mann-Whitney <i>U</i> -test
	Mean	SD	Mean	SD	<i>P</i>
Total number of appointments	23.3	12.3	17.5	8.6	.001
Number of failed appointments	2.5	2.8	3.5	2.6	.001
Standardized failure rate	10.3	10.6	21.4	14.1	.001

TABLE 3. Correlation of Appointment Measures

	Total Number of Appointments	Number of Failed Appointments	Standardized Failure Rate
Total number of appointments	—	.45	-.13
Number of failed appointments		—	.45
Standardized failure rate			—

prised 17.6% of patients who discontinued during active treatment.

Comparison of completed treatment and discontinued treatment groups

Three hundred fifteen patients completed treatment, and 88 discontinued before treatments could be completed. The two groups were analyzed statistically to find any differences arising because of factors other than chance. The Mann-Whitney *U*-test was chosen because the data were not normally distributed.

The total number of appointments was significantly fewer ($P > .001$) for the discontinued treatment group than for the completed treatment group (Table 2), whereas the number of failed appointments was significantly greater ($P > .001$) for the discontinued treatment group than for the completed treatment group (Table 2).

The standardized failure rate

The total number of failed appointments appeared to be related to the total number of appointments (Table 3). To compensate for this relationship, the number of failed appointments was expressed as a percentage of the total number of appointments. (Standardized failure rate = total number of failed appointments ÷ total number of appointments [failed and attended] × 100.) The distribution of the standardized failure rate (Figure 3) appears similar to that of the failed appointments (Figure 2).

To test the relationship between the number of failed appointments, the total number of appointments, and the standardized failure rate, the correlation coefficient, *r*, was calculated for each combination of the three factors (Table 3).

Whereas there is a correlation of .45 between the number of failed appointments and the total number of appointments and also between the number of failed appointments

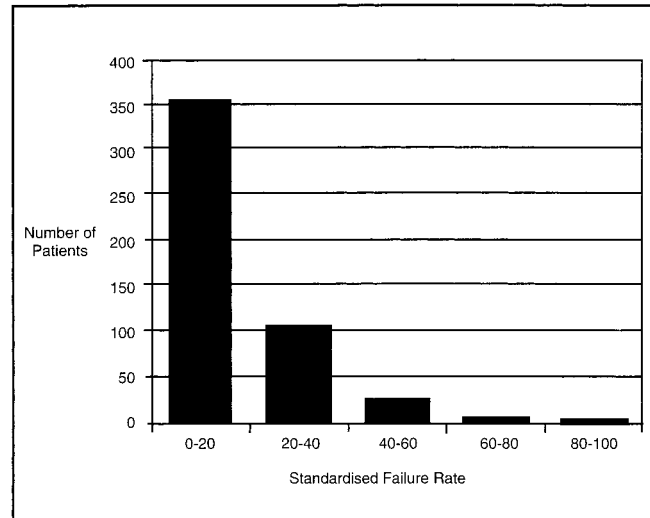


FIGURE 3. Histogram of the standardized failure rate.

and the standardized failure rate, there is no correlation between the standardized failure rate and the total number of appointments. Thus, the standardized failure rate is independent of the total number of appointments but still related to the number of failed appointments.

When the standardized failure rate was compared between the completed treatment group and the discontinued treatment group (Table 2), the difference was still highly significant ($P > .001$). The mean standardized failure rate was only 10.3% in the completed treatment group, compared with 21.4% in the discontinued treatment group.

DISCUSSION

In the present study, 17.6% of patients discontinued during active treatment. This is comparable to the values reported in other UK studies (Table 1) but is greater than the values reported in Norway and Sweden. It would seem that social and cultural factors are responsible for the lower number of patients discontinuing treatment in Scandinavia. In the United States, the discontinuation rate may well be lower because of payment of fees for treatment. Exemption from paying fees seems to lead to an increased appointment failure rate. In the United States, appointment failure rate increases among patients receiving Medicaid^{9,18} and among those with medical debts.^{1,8,21} In the UK, patients exempt from dental charges were significantly more likely to fail appointments than nonexempt ones.⁴⁵ No information is

available on whether direct payment of fees reduces the discontinuation rate, but this would be expected, given the relationship between failed appointments and discontinuation of treatment. The outcome of the present study was very similar to that reported by Roberts et al.⁴⁶ An almost equal percentage of patients discontinued during active treatment, 17.6% in Preston compared with 17% in North Derbyshire, although the Preston study was retrospective, whereas the North Derbyshire study was prospective.

It was of greater interest that when the discontinuation rates for the noncompleted cases were compared, the cumulative percentage of dropouts showed a similar pattern in both studies. Roberts et al.⁴⁶ used the least squares method to find the best model to fit this data, which was a quadratic relationship. When the same procedure was applied to the Preston data,⁴⁷ the best fit was again a quadratic model, which had equally good properties in terms of goodness of fit, significance of coefficients, and validity of model assumptions. Thus, a clear pattern emerges from both studies that a progressively decreasing number of patients discontinue as time goes on, between 65–70% dropping out in the first 12 months.

The present study showed a statistically significant increase in the number of failed appointments in the discontinued treatment group, although there were significantly fewer total number of appointments in this group. This finding was confirmed using the standardized failure rate, which took into account the varying number of appointments in the completed and discontinued treatment groups. Murray²⁹ also found that patients with two or more failed appointments were significantly more likely to discontinue ($P < .001$). Thus, failed appointments are related to discontinuation of treatment and are an ominous sign. Also, it has been found that patients who cancelled appointments were more likely to fail subsequent appointments.¹⁴ In addition, regression analysis has shown that failed appointments have a significant influence on prolongation of treatment duration.⁴⁸

Strategies to reduce discontinuation

Brattstrom et al.³¹ interviewed 80 patients for the reasons why they discontinued treatment. Lack of motivation was the most common reason for discontinuation (46%). Difficulties with the appliance because of pain was the second most common reason (26%). Ten percent were unaware that the treatment was terminated prematurely, whereas a further 10% found incomplete treatment adequate. The remaining 8% had a conflict with the dentist. The majority of patients contacted had been unaware of the difficulties involved with wearing orthodontic appliances. They felt that they had not been sufficiently well informed before the start of treatment.

To reduce the discontinuation rate, it would make sense to target the population of patients prone to failing appoint-

ments. This could involve attempts at behavior modification in the early stages of treatment when the discontinuation rate is greatest. For example, providing adequate information on the prolonged nature of orthodontic treatment at the consultation and treatment planning stage because this has been found to be an important reason for discontinuation.³¹

Also, patients who use a diary were less likely to fail appointments¹⁴ and presumably less likely to discontinue treatment. Noting down appointment dates and times in a diary should therefore be encouraged as a simple and effective method of reducing failed appointments.

It also has been shown that both postal and telephone reminders significantly reduce the failed attendance rate in general dental practice.⁴⁹

CONCLUSIONS

When the completed and discontinued treatment groups were compared, a significantly increased number of failed appointments was found in the discontinued treatment group despite significantly fewer total number of appointments.

The standardized failure rate compensated for the differences in total number of appointments between the two groups. The mean standardized failure rate was only 10.3% for the completed treatment group compared with 21.4% for the discontinued treatment group.

It would seem that the population of patients who ultimately discontinue treatment is more prone to fail appointments. These patients tend to dissociate from the general patient population mainly during the first 12 months. Strategies to reduce failed appointments should therefore be targeted toward the early stages of treatment.

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