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Adult orthodontic consultations in private dental practice: How much information do patients remember when they leave the surgery?

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Abstract

OBJECTIVE: With good communication and information retention being key aspects of valid consent, this study aimed to assess adult patient information recall immediately after an orthodontic consultation.

MATERIALS AND METHODS: Adults interested in bracket-based or clear aligners were invited to take part at a single private dental practice. A 45-minute consultation with one of three general dental practitioners (GDPs) primarily providing orthodontics took place. A participant self-completed questionnaire tested recall of 20 items from the consultation. Demographics such as gender, age, level of English, education level, previous orthodontic experience and having a close family member or friend who had orthodontic treatment were also recorded.

RESULTS: Forty-two participants completed the questionnaire, and the information recall rate was 75% (mean score = 15). Three of the 42 participants recalled all 20 items. No statistically significant differences ($P < 0.05$) were found between information recall and any demographic variable, however, older participants (36 years and over) scored less (mean = 13.83) than participants 18-25 years (mean = 15.6).

CONCLUSIONS: A quarter of information provided during an orthodontic consultation with a GDP in a private dental practice cannot be recalled immediately afterwards by patients and so it is recommended that any verbal or visual information is always supplemented with written information.

Keywords:

Adult orthodontics, information retention, orthodontic assessment, orthodontic consultation

Introduction

Good communication and effectively delivered information are critical in making patients feel involved in the informed consent process and in their own care.^[1] Although some attempts have been made to assess information retention both at the initial orthodontic consultation and at the commencement of orthodontic treatment, previous studies have focused on children or adolescents and their parents.^[2-6]

Thomson *et al.*,^[2] undertook a questionnaire-based study comparing the effectiveness of different information formats: verbal, visual and written. The authors found a high recall rate in the short- and long-term and recommendations for verbal information to be supplemented with additional information to increase information retention were made.

Significant increases in information retention after an orthodontic consultation when mind maps and acronyms are used compared with traditional leaflets have been reported.^[3,7] The use of visual computer-based information to

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supplement verbal information has also been found to successfully increase information recall in orthodontic patients.^[4] Kang *et al.*,^[5] showed that a modified informed consent form designed for 7th-grade reading level together with visual information prepared in a slide-show format can significantly improve information recall and comprehension.

Analysis of information retention in adult orthognathic patients after a pre-operative orthodontic consultation has shown 60% of information related to possible complications and risks is forgotten.^[8] This may be due to higher levels of anxiety in patients having a surgical procedure being discussed with them. Poor information retention related to orthodontic risks has also been associated with low-income levels and lower levels of education.^[9,10]

Most studies on information retention have focussed on children and adolescents, along with their parents and where adult patients have been evaluated, this relates primarily to orthognathic surgery. However, adults seeking orthodontic treatment now form a sizeable proportion of the orthodontic workload and numbers continue to rise.^[11]

Furthermore, these studies have been undertaken in secondary care settings with treatment provision led by specialist orthodontists and provided without costs to the patients. A significant proportion of orthodontic treatment is being provided in primary care, and increasingly by general dental practitioners (GDPs) and there is currently no literature available on how much information patients retain after an orthodontic consultation in such circumstances.

The aim of this study was primarily to assess the adult patient's short-term information recall after an orthodontic consultation with a GDP in a private primary care dental practice. The secondary outcomes were to determine if participant gender, age, level of English, education level, previous orthodontic experience and having a close family member or friend who had orthodontic treatment influenced the amount of recall.

Materials and Methods

This was a cross-sectional self-completed questionnaire study undertaken at a single private dental practice. The questionnaire was presented to consecutive participants after an initial orthodontic consultation with a GDP providing orthodontics. Ethical approval was obtained from College of Medicine and Dentistry Research Ethics Committee (BP0171975/240621).

The questionnaire was developed using validated questionnaires from two previous studies.^[2,4] The new

questionnaire was piloted using a focus group of five GDPs providing orthodontics but unrelated to the study and five adult laypersons. Concerns were addressed after discussion of the items that needed clarification and these were subsequently modified. The Flesch-Kincaid readability scale,^[12] was used to test the questionnaire and was perceived as easy to read by a student in 6th grade (score 82.6).

The final questionnaire comprised 19 questions with six questions of these assessing participant demographic details such as gender, age, level of English, education level, previous orthodontic experience and having a close family member or friend who had orthodontic treatment.

A total of 13 questions were used for information recall analysis and consisted of nine closed single-choice and four multiple-choice questions relating to the consultation. Each correct closed single-choice question response yielded one point, and the correct response to the multiple-choice question received one point for each correct response. The maximum total score was 20.

Inclusion criteria were adult participants over 18 years of age, who were new to the practice and interested in bracket-based or clear aligner therapy. Both participants who had previously had orthodontic treatment and those who had not were invited.

During the sampling period, consecutive participants who attended their 45-minute consultation were approached in the waiting room and invited to participate. No reward was offered for taking part and participants were given a copy of the participant information sheet and written consent form to read and sign.

Three GDPs, primarily providing orthodontics undertook the consultations. Although the practice has a standardised approach for these consultations, the lead researcher formulated a checklist of items to include in the consultation and then undertook a calibration exercise to ensure a consistent consultation process. Subsequently, the lead researcher monitored each GDP for the first two consultations to ensure an appropriate approach was undertaken.

Each consultation consisted of four parts:

1. Intra- and extra-oral photographs,
2. iTero (Align Technology Inc., Tempe, Arizona) three-dimensional scan to illustrate treatment simulation,
3. Orthodontic assessment including appropriate radiographs to determine suitability for orthodontic treatment,
4. Verbal and visual information relating to treatment options suitable for the participant, appliance types,

advantages and disadvantages, estimated treatment time, frequency of appointments, importance of maintaining dental health, impact of appliances on daily routine, retention protocol, major risks, specific risks and alternative treatments. Although the information was delivered verbally, it was also supplemented with visual information consisting of images on a computer screen and typodonts with different appliance systems and retention regimes. Where a participant was not suitable for an appliance or retainer type, these items were still explained so the participant knew they would not be suitable.

After the initial orthodontic consultation, each participant was asked to scan a QR code with their phone to access the survey platform and complete this in the reception area. This ensured knowledge recall was tested immediately after the consultation and enabled the receptionist to be on hand if the participant had any queries.

The sample size was determined using G*power 3.1 software and ANOVA analysis for three groups assuming a medium effect size and alpha (α) level at 5%. The minimum sample size required to guarantee 80% statistical power was 42.^[13]

Data were numerically coded and statistical analysis was performed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Numerical and graphical tests were used to assess for normality of data distribution. The Kolmogorov-Smirnov ($P = 0.08$) and Shapiro-Wilk ($P = 0.10$) tests showed that the data were normally distributed. Knowledge scores were calculated from a possible total of 20 for each participant. Analytical statistics were presented using the ANOVA test to detect associations between the independent variables (gender, age, English, education, previous orthodontic experience and having a close family member or friend who had orthodontic treatment) and dependent variables (information recall after the initial consultation). The significance was set at $P < 0.05$.

Results

Fifty-two participants were asked to take part in the study at their consultation with a total of 42 participants (response rate 80.8%) agreeing to take part. Those who declined to participate cited a lack of time as the main reason.

Females made up 29 (69%) of the participants and more than half of those taking part in the study ($n = 26$; 61.9%) were in the age group 26-35. Most ($n = 40$; 95.3%) participants identified as native English speakers or reported speaking English at a professional level. Thirty-five (83.4%) participants professed to have a

Bachelor, professional or doctorate degree. A little over half of participants ($n = 23$; 54.8%) had not had any orthodontic treatment themselves previously and participants were equally split between those who had a close family or friend who had previously had orthodontics and those who did not ($n = 21$; 50% in each group) [Table 1].

Three of the 42 participants responded to all 13 questions testing information recall correctly yielding a maximum score of 20. The recall score ranged from 6 to 20 with a mean score of 15 [Figure 1]. This equates to 75% of information being correctly recalled immediately after the consultation.

Fixed labial appliances were recalled as being shown to 85.7% ($n = 36$) of participants, clear aligners to 81% ($n = 34$) and fixed lingual appliances to 47.6% ($n = 20$) of participants. All but one participant ($n = 41$; 97.6%) recalled that an improvement to appearance was one of the reasons to have orthodontic treatment ([Table 2].

The average duration of orthodontic treatment (18 months) was correctly recalled by 34 (81%) participants with 30 (71.4%) participants recalling that adjustment appointments occur every four to eight weeks. Thirty-eight (90.5%) participants recalled being told that teeth will ache a little after appliances are fitted [Table 2].

When information recall relating to oral hygiene was tested, forty (95.2%) participants recalled being advised to brush their teeth three times a day but only 26 (61.9%) participants recalled that decalcifications would occur if a good level of oral hygiene were not maintained during treatment. The use of fluoride mouthwash was recalled by almost all participants ($n = 41$; 97.6%) [Table 2].

Most ($n = 41$; 97.6%) participants recalled that they should arrange an appointment as soon as possible if the appliance breaks or is lost. The impact of appliances on day-to-day life was correctly recalled by 28 (66.7%) participants and 81% ($n = 34$) recalled being advised to

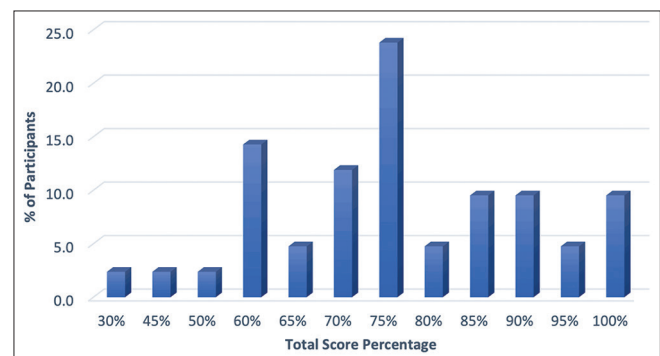


Figure 1: Total score percentage for all participants ($n = 42$). The mean score was 75% (15 out of 20)

Table 1: Demographics details of the participants

		<i>n</i>	%		<i>n</i>	%		<i>n</i>	%
Gender	Female	29	69	Male	13	31			
Age (years)	18-25	10	23.8	26-35	26	61.9	36 plus	6	14.3
Level of English	Intermediate	2	4.8	Professional	13	31	Native English speaker	27	64.3
Educational level	High school/college	7	16.7	Bachelor	28	66.7	Professional/doctorate	7	16.7
Previous orthodontic experience	Yes	19	45.2	No	23	54.8			
Family/friend had orthodontics	Yes	21	50	No	21	50			

Table 2: Number of correct responses to questions testing information recall (total *n*=42)

Theme of Question	<i>n</i>	%
Shown fixed labial appliances	36	85.7%
Shown fixed lingual appliances	20	47.6%
Shown clear aligners	34	81%
Reason for treatment: improve appearance	41	97.6%
Reason for treatment: maintain health of teeth	23	54.8%
Reason for treatment: improve function	17	40.5%
Average duration of orthodontic treatment	34	81%
Average interval for adjustment appointments	30	71.4%
Expectation after bonding of appliances	38	90.5%
Frequency of brushing during treatment	40	95.2%
Consequences of poor oral hygiene	26	61.9%
Use of fluoride mouthwash	41	97.6%
Action to take if appliances breaks or is lost	41	97.6%
Impact of appliances on day-to-day activity	28	66.7%
Need for regular check-ups during treatment	34	81%
Differences between fixed appliances and aligners	32	76.2%
Differences between fixed appliances and aligners	36	85.7%
Differences between fixed appliances and aligners	25	59.5%
Differences between fixed appliances and aligners	33	78.6%
Need for retainers at the end of treatment	21	50%

see their regular dentist for their routine check-ups. The need to use retainers at the end of active treatment was correctly recalled by 21 (50%) participants [Table 2].

The initial information recall analysis model included factors such as gender, age, level of English, education level, previous orthodontic experience and having a close family member or friend who had orthodontic treatment. No significant differences ($P < 0.05$) were found between information recall and any demographic variable, however, there were some differences in knowledge scores [Table 3]. Older participants (36 years and over) scored less (mean = 13.83) than participants 18-25 years (mean = 15.6). Notable differences were also seen in education level with those possessing a professional degree/doctorate having a mean score of 17.14 compared with those with a bachelor's degree (mean = 14.46).

Discussion

This study was the first of its kind where information recall was tested solely in adult patients attending for

an orthodontic consultation at a private dental practice. The study is particularly relevant in the current climate given the recent rise in complaints and litigation against GDPs providing orthodontic treatment.^[14] These results confirm the findings from previous reviews in the dental and medical literature, that is, part of the provided information is forgotten immediately after an orthodontic consultation.^[15,16]

In this study, participants on average recalled 75% of the information correctly, nearing the recall level achieved by Skulski *et al.*,^[6] who used a similar consultation method and by Kang *et al.*,^[5] where information was provided using a modified readability form together with a slide show presentation.

Although responses to the questions were not marked according to their importance, some questions were answered better than others. One of the most correctly recalled responses, by 97.6% of participants were an improvement to appearance as one of the reasons to undergo orthodontic treatment. Similar results were found by Brons *et al.*,^[8] who concluded that facial aesthetic changes were the most recalled item when participants were asked as to why they would undergo orthognathic surgery.

An improvement to function was poorly recalled as a reason to have orthodontic treatment (by 40.5% of participants), perhaps reflecting the level of importance patients seeking orthodontic treatment attach to this. These results are not surprising, given aesthetic improvements are the main motivational factor for seeking orthodontic treatment, whether the patient is considering treatment for the first time or looking for re-treatment because of changes following previous orthodontic treatment.^[17,18]

Positive findings were found in relation to frequency of brushing and the use of fluoride mouthwash, possibly suggesting that participants already had pre-existing knowledge about oral hygiene regimes. However, only 61.9% of participants were able to recall what happens to teeth if not cleaned properly. These findings agree with those of Thomson *et al.*,^[2] who found not all patients recalled information associated with poor oral hygiene and orthodontic treatment.

Table 3: Questionnaire recall score (out of 20) for each of the demographic variables along with means, standard deviations, and ANOVA *P*

		<i>n</i>	%	Min.	Max.	Mean	S.D.	Score %	<i>P</i>
Gender	Female	29	69%	10	20	15.14	3.95	75.7%	0.839
	Male	13	31%	6	20	14.92	2.72	74.6%	
Age	18-25	10	23.8%	10	20	15.6	3.03	78%	0.543
	26-35	26	61.9%	6	20	15.1	3.03	75.5%	
	36 and above	6	14.3%	9	20	13.83	3.76	69.2%	
Level of English	Intermediate	2	4.8%	14	18	16	2.83	80%	0.116
	Professional	13	31%	6	20	15.38	3.84	76.9%	
	Native English speaker	27	64.3%	9	20	14.85	2.81	74.3%	
Education level	High school or college	7	16.7%	10	20	15.43	3.46	77.2%	0.808
	Bachelor degree	28	66.7%	6	20	14.46	3.01	72.3%	
	Professional degree/doctorate	7	16.7%	14	20	17.14	2.48	85.7%	
Previous orthodontic experience	Yes	19	45.2%	6	20	14.32	3.53	71.6%	0.154
	No	23	54.8%	12	20	15.7	2.62	78.5%	
Family member or friend had orthodontics	Yes	21	50%	6	20	15.05	3.06	75.3%	0.961
	No	21	50%	9	20	15.1	3.22	75.5%	

Min.=Minimum; Max.=Maximum; S.D.=Standard Deviation

Only one other question scored below 50% and this related to being shown lingual appliances. These were mentioned in passing only as a typodont was shown and the participants advised this system was not provided by the dentist. It was felt appropriate to include this information to ensure the patient was aware of the full range of treatment options available. The low recall score is likely to be explained by participants discounting (and potentially forgetting) about this appliance type almost as soon as it was mentioned. Furthermore, adult health literacy is proven to be daunting,^[19,20] suggesting that a visual explanation of lingual braces did not necessarily equate to the term 'lingual brace' being clear to all participants.

The need for retainers at the end of orthodontic treatment was only correctly recalled by 50% of participants. The correct response was taken as 'retainer braces are always fitted'. A further 48% had answered 'retainer braces are sometimes fitted'. Information regarding retention regimes is known to be poorly recalled,^[2,10,21] and it has been suggested that patients do not understand why they need a retainer and the implications if not worn after treatment.^[4]

There were no significant differences found between information recall and any demographic variable. Furthermore, participants who previously had orthodontic treatment did not recall information any better than those who had not had treatment. Therefore, practitioners should not assume that individuals with previous orthodontic experience are more informed about further orthodontic treatment.

There are many variables influencing a patient's ability to recall information, and there is no one method to ensure that information provided will be completely

recalled. However, consistent findings among this and other studies suggest that around 30% of information is forgotten immediately after the consultation, and this may help change the way we provide information to patients. It is recommended that any verbal or visual information is always supplemented with written information tailored to the patient after the consultation. Furthermore, information provided at the consultation stage should be reinforced at the records, treatment planning and bonding appointments to ensure that patients have had multiple opportunities to hear the same information.

Where patients pursue litigation or regulatory claims in relation to orthodontic treatment, often a considerable amount of time has lapsed since the consultation, and it is likely that information recall diminishes by the time any claim is made. The presence of a written document would help support the details of the discussions that took place before the start of treatment.

Studies of this type are not without their limitations. Despite the GDPs providing the consultations undergoing a calibration exercise, and then being monitored for the first two consultations, there may have been variations in the information provided. For example, fixed appliances may have been considered a less favourable option in a patient with gingival attachment loss, so there may have been more of an emphasis on clear aligner therapy, despite fixed labial and lingual appliances still being shown and discussed.

Participants pre-existing knowledge in relation to the content of the questionnaire was not tested so there is uncertainty around whether the knowledge was present already or acquired after the consultation.

Furthermore, participants were given the ability to select a correct response from a given list instead of answering questions from memory. This always raises doubt as to whether the study results fully test information recall. It is possible that participants were able to recognise some information rather than genuinely remember. Finally, equal weightage was given to each correct response, and this would undervalue more critical information related to the consultation.

Another limitation of this study that it was conducted in one dental practice which would affect its generalizability. Also, the limited sample size and self-reported questionnaires might introduce bias and limit the applicability of the results to a wider population. Hence this study could be considered as a preliminary investigation. Further research with larger sample size in multi-centre settings would shed lights on this topic. A broad and larger sample will enhance our understanding of the impact of the demographic and socioeconomic status on the information retention. It is also worth measuring recall rates at different intervals to compare short- and long-term information retention.

Conclusions

A quarter of information provided during an orthodontic consultation with a GDP in a private dental practice cannot be recalled immediately afterwards by patients and so it is recommended that any verbal or visual information is always supplemented with written information tailored to the patient after the consultation. No significant differences were found between demographic variables and the amount of information recall. Previous orthodontic experience does not seem to yield higher information recall rates hence practitioners should not assume that individuals with previous orthodontic experience are more informed about further orthodontic treatment.

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Conflicts of interest

There are no conflicts of interest.

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