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A comparison of information retention at an initial orthodontic consultation

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SUMMARY The exchange of information is an everyday part of orthodontic treatment. However, the amount of information that is understood and retained, by patients and their parents, is not known. There has been very little research in the area of information retention in dentistry. This has implications with the demands for improved provision of information for patients.

This questionnaire-based study, compared the effectiveness of written, verbal, and visual methods of providing orthodontic information. It assessed the retention of this information, by patients and parents, in both the short- and long-term. Twenty-eight patients and their parents, were allocated alternately into one of three groups, receiving written, verbal, or visual information. Short-term retention of knowledge was assessed 10–15 minutes after receiving the information and long-term retention rated by a second questionnaire mailed 8 weeks later.

Overall, little difference was found between the three methods. The findings suggested that verbal information should not be given to patients unless supplemented by written and/or visual information, and that parents were more attentive to verbal instructions than their children.

Introduction

It is important that health care professionals have appropriate skills to communicate with patients. Witt and Bartsch (1996) recommended that special training in communication should be provided for prospective dentists and orthodontists. However, whilst this fact may be acknowledged, these skills are still poorly taught in most undergraduate and postgraduate schools (Maguire, 1990).

Ley (1988), Newton (1995), and Witt and Bartsch (1996) noted the importance of communication skills in medicine and dentistry in order to improve the quality and amount of information that the patient receives, understands, and retains. Improved communication is associated with greater patient satisfaction, increased compliance, reduced anxiety, and improved treatment outcome. These, in turn, may lead to reduced treatment times and, as a consequence, to lower costs. It is also important to be aware that errors in communication can prompt allegations of malpractice (Newton, 1995).

Research into communication in dentistry is limited. The initial consultation is an extremely important opportunity to establish a good and stable relationship with the patient. Therefore, it can be regarded as somewhat unfortunate to find that patients tend to be unhappy with the amount of information they receive from their dentist, and often the information given is misunderstood or forgotten (Witt and Bartsch, 1993). Treatment tends to have a better clinical outcome and patients are more compliant if they are well informed, especially if they have been involved in making treatment decisions (Lefer *et al*., 1962). In spite of an increased awareness of the importance of communication skills, there is no evidence which implies that the problems of dissatisfaction with communication and the subsequent low co-operation with

treatment requirements have been resolved (Ley, 1972).

Witt and Bartsch (1993) studied the retention of information provided during an initial orthodontic consultation. On average, just over 30 per cent of single information units were recalled correctly by the patient after 10 days. Patients were found to particularly recall those issues that concerned and interested them and affected everyday life. Hence, the most poorly retained facts related to diagnostic and aetiological issues, whilst information on treatment needs, possible side-effects and risks had better recall. Pratelli *et al*. (1996) showed how so-called 'experienced' parents (i.e. parents whose children had received or were receiving treatment, or who had been patients themselves) had little knowledge of the implications of orthodontic treatment. Only 41 per cent knew that caries can develop beneath a fixed appliance and less than a third knew that relapse can occur following treatment. These findings highlight the need for a serious review of the modes of communication within orthodontics. A decision has to be made on the content and method of provision of information given to patients. The challenge for the profession is to provide information in the patient's preferred format (Merritt, 1991). Witt and Bartsch (1996) investigated the effects of providing information and communication during orthodontic consultation and treatment. They stated that doctor–patient communication was the key to the establishment and maintenance of patient compliance. Nanda and Kierl (1992) also stated that successful orthodontic treatment depended not only on the knowledge and skills of the clinician, but also on the co-operation of the patient and parents. They noted that the relationship between the dentist and patient or parent was the best long-term predictor of patient co-operation and that by improving communication with patients, it may be possible to 'salvage' a potentially uncooperative patient.

To date there have been no studies that have compared the understanding and recall of information, given in different formats to orthodontic patients at their initial consultation. The aim of this study was therefore to compare retention of orthodontic information provided in three different formats: written, visual, and verbal.

Subjects and methods

The subjects for this study were recruited from new patient clinics at the Orthodontic Department at the Eastman Dental Hospital, over a 40-week period. All new patients between the ages of 9 and 16 years, and their parents were asked to participate. Only those subjects who spoke English as a first language and those accepted for treatment were included. The subjects were allocated alternately to receive information in one of three given formats: written, visual, or verbal. Twenty-eight patients and parents were recruited into each of the three categories. Ethical approval was obtained from the Joint Research and Ethics Committee of the hospital involved in the study. Patients were informed that the study was confidential and that any results would not be recorded in their notes. They were also free not to participate or to withdraw at any time without their subsequent care being affected.

The information provided aimed to cover the topics routinely discussed by clinicians with their patients; namely, length of treatment, frequency of appointments, types of appliances, oral hygiene, dietary restrictions, effects on day-to-day life, breakages, retention, and the importance of maintaining regular contact with their general dental practitioner. To represent the written category within the study a leaflet was produced which covered all of these points. This was subjected to a Gunning Fog readability test, as described by Albert and Chadwick (1992; Appendix 1). Each child and his parent were given the leaflet to read in their own time in the department. The leaflet was removed before asking the subjects to complete the questionnaire (Appendix 2) and they were not permitted to take it home. The visual method provided the same information as the leaflet, in exactly the same order, only in pictorial format. Images were scanned into a Power Point presentation and 20 slides produced. Each slide had an illustration and short caption. The slides

were operated using a Karamate projector (Bell and Howell Imaging International, Middlesex, UK) and subjects were required to push two keys to move the slides forward or backwards. With this technique they had the ability to return to the slides more than once. However, the projector was removed prior to completion of the questionnaire. The verbal format, again, provided exactly the same information as the other two methods, but with no further supplementation. Subjects were not allowed to ask any additional questions relating to the information.

Both short- and long-term retention of the information was assessed using an identical questionnaire that had been designed in conjunction with a statistician and a clinical psychologist (Appendix 2). A combination of open and closed questions were used, relating to the relevant points of information given. Questions 13 and 14 were included in the questionnaire to provide feedback from the subjects on their feelings about orthodontic treatment. All patients and parents were informed that they would be required to complete two questionnaires: the first, 10–15 minutes after receiving the information, to assess short-term retention, and the second 8 weeks later, to test long-term retention. The second questionnaire was mailed with a covering letter and stamped addressed envelope to facilitate its return. Those who failed to reply within 2 weeks were mailed a further questionnaire and stamped addressed envelope. The child and parent were asked to complete their questionnaires independently, and not to converse whilst doing so.

Statistical analysis was undertaken using SPSS for Windows (Version 7.5, SPSS UK Ltd. Woking, Surrey, UK, 1996) and the Chi-square test was used to compare the proportion of correct responses for both patients and parents, within each individual group. This test is known to be inaccurate for expected frequencies of less than 5 in a cell. Where this situation arose, Fisher's exact test was used as an alternative analysis.

McNemar's test was used to compare proportions of correct answers for paired data, i.e. individual patient compared with his parent (for both questionnaires), and individual patient and parent responses (i.e. patient questionnaire 1 versus patient questionnaire 2, etc.). For the results of the McNemar's tests, *P*-values were quoted according to probability tables (Petrie and Watson, 1999).

Significance was taken at four levels of probability: $P \geq 0.05$ non-significant (NS); $P < 0.05$ weakly significant (*); $P < 0.01$ significant (**); $P < 0.001$ highly significant (***).

For both questionnaires the results were divided into patient and parent responses within each of the three groups (written, verbal, visual). Patient data was further subdivided according to gender and also into two age groups, 9–12 and 13–16 years. All data was initially studied according to this breakdown, but as there was little variation between the patient groups, they were combined for further analysis.

Results

The first questionnaires were completed within the department and, therefore, the response rate was 100 per cent (28 in each group). The return rate for the second questionnaires was good at 75 per cent (22 subjects for the written category, 21 subjects for the verbal category, and 20 subjects for the visual category). Whilst all of the first questionnaires were completed separately by patients and their parents, one can only assume that this occurred for the second questionnaires which were completed away from the hospital.

The results of the study are summarized in the Tables 1–4. Within each table the significant findings are highlighted.

Table 1 shows the proportion of respondents giving the correct response to each question in both the short- and long-term. Significant findings are highlighted. The data was initially subjected to 3×2 Chi-square tests (Table 1) and subsequently to 2×2 comparisons (Table 2) to establish exactly where the significance lay. Four questions (3, 7, 11, and 12) produced significant findings in Table 1. However, when subjected to 2×2 comparisons only three questions gave significant findings (3, 7, and 11), with written information tending to show a slightly better outcome (Table 2). In the short-term, verbal information

Table 1 Proportion of respondents giving correct response to each question in both the short- and long-term (%).

	Written presentation	Verbal presentation	Visual presentation	Chi-square *P*-value
Question 2				
Patient	89 (100)	86 (100)	96 (100)	0.38 (0.57)
Parent	93 (91)	93 (95)	89 (95)	0.86 (0.72)
Question 3				
Patient	**93** (64)	**57 (**45)	**71** (63)	**0.01**** (0.35)
Parent	**96** (86)	**71** (65)	**93 (**90)	**0.01**** (0.20)
Question 4				
Patient	89 (82)	64 (85)	75 (68)	0.09 (0.36)
Parent	93 (68)	93 (80)	89 (68)	0.86 (0.59)
Question 5				
Patient	82 (96)	89 (80)	89 (95)	0.66 (0.15)
Parent	96 (96)	96 (90)	100 (95)	0.60 (0.92)
Question 6				
Patient	82 (73)	71 (80)	86 (63)	0.38 (0.49)
Parent	73 (73)	54 (75)	75 (74)	0.09 (0.94)
Question 7				
Patient	**89** (73)	**64 (**65)	**61** (58)	**0.04*** (0.48)
Parent	**82 (**82)	**75** (95)	**21** (63)	**<0.001***** (0.08)
Question 8				
Patient	7 (0)	0 (0)	14 (11)	0.12 (0.11)
Parent	25 (5)	14 (10)	14 (26)	0.48 (0.10)
Question 9				
Patient	7 (18)	0 (5)	7 (11)	0.35 (0.37)
Parent	29 (18)	36 (15)	32 (32)	0.85 (0.21)
Question 10				
Patient	82 (96)	86 (100)	93 (90)	0.48 (0.37)
Parent	100 (100)	100 (100)	93 (95)	0.13 (0.81)
Question 11				
Patient	68 (**91**)	61 (**50**)	57 (**63**)	0.70 (**0.01****)
Parent	79 (96)	82 **(**90)	93 (90)	0.31 (0.97)
Question 12				
Patient	18 (32)	7 (15)	25 (37)	0.20 (0.27)
Parent	**36** (46)	**64** (45)	**32** (63)	**0.03*** (0.42)

All *P*-values are non-significant unless marked with an asterisk(s). Long-term results given in parentheses.

Table 2 Summary of significant differences detected from the 3 × 2 Chi-square, expressed as 2 × 2 comparisons.

	Chi square *P*-value with continuity and Bonferroni corrections applied		
	Written versus verbal	Written versus visual	Verbal versus visual
Question 3—short-term			
Patient	**0.02 (*)**	0.24 (NS)	1.00 (NS)
Parent	0.09 (NS)	1.00 (NS)	0.24 (NS)
Question 7—short-term			
Patient	0.17 (NS)	0.09 (NS)	1.00 (NS)
Parent	1.00 (NS)	**<0.001 (***)**	**<0.001 (***)**
Question 11—long-term			
Patient	**0.02** (*)	0.14 (NS)	1.00 (NS)
Question 12—short-term			
Parent	0.18 (NS)	0.10 (NS)	1.00 (NS)

Table 3 Comparison of paired patient/parent data.

		Written	Verbal	Visual
		Patient versus parent (%)	Patient versus parent (%)	Patient versus parent (%)
Question 2	Q1	89; 93	86; 93	96; 89
	Q2	100; 91	100; 95	100; 95
Question 3	Q1	93; 96	57; 71	71; 93
	Q2	64; 86	45; 65	63; 90
Question 4	Q1	89; 93	**64; 93**	75; 89
	Q2	82; 68	85; 80	68; 68
Question 5	Q1	82; 96	89;96	89; 100
	Q2	96; 96	80; 90	95; 95
Question 6	Q1	82; 73	71; 54	86; 75
	Q2	73; 73	80;75	63; 74
Question 7	Q1	89; 82	64; 75	**61; 21**
	Q2	73; 82	**65; 95**	58; 63
Question 8	Q1	7; 25	0; 14	14; 14
	Q2	0; 5	0; 10	11; 26
Question 9	Q1	7; 29	**0; 36**	7; 32
	Q2	18; 18	5; 15	11; 32
Question 10	Q1	82; 100	86; 100	93; 93
	Q2	96; 100	100; 100	90; 95
Question 11	Q1	68; 79	61; 82	**57; 93**
	Q2	91; 96	**50; 90**	63; 90
Question 12	Q1	18; 36	**7; 64**	25; 32
	Q2	32; 46	**15; 45**	37; 63

Question 4: $0.010 < P < 0.050$; 95% CI 0.07–0.50.
Question 7: $0.001 < P < 0.010$; 95% CI 0.19–0.60 (Q1).
$0.010 < P < 0.050$; 95% CI 0.10–0.50 (Q2).
Question 9: $0.001 < P < 0.010$; 95% CI 0.18–0.53.
Question 11: $0.010 < P < 0.050$; 95% CI 0.13–0.58 (Q1).
$0.010 < P < 0.050$; 95% CI 0.14–0.66 (Q2).
Question 12. $P < 0.001$; 95% CI 0.39–0.76 (Q1).
$0.010 < P < 0.050$; 95% CI 0.10–0.50 (Q2).
Significant findings = percentages in bold and underlined; Q1 = questionnaire 1; Q2 = questionnaire 2.

Table 4 Comparison of paired patient and paired parent data.

	Written		Verbal		Visual	
	Patient Q1 versus Q2 (%)	Parent Q1 versus Q2 (%)	Patient Q1 versus Q2 (%)	Parent Q1 versus Q2 (%)	Patient Q1 versus Q2 (%)	Parent Q1 versus Q2 (%)
Question 2	96; 100	96; 83	95; 95	90; 90	95; 95	85; 90
Question 3	**96; 64**	100; 79	62; 43	71; 62	70; 60	90; 85
Question 4	91; 82	92; 63	67; 81	95; 76	70; 65	85; 65
Question 5	82; 96	100; 88	86; 76	95; 86	90; 90	100; 90
Question 6	86; 73	79; 67	71; 76	67; 71	90; 60	75; 70
Question 7	77; 73	88; 75	71; 62	81; 90	70; 55	35; 60
Question 8	9; 0	25; 4	0; 0	19; 10	15; 10	20; 25
Question 9	5; 18	33; 17	0; 5	28; 14	5; 10	40; 30
Question 10	86; 96	100; 92	91; 95	100; 95	90; 85	90; 90
Question 11	64; 91	83; 88	57; 48	81; 86	50; 60	90; 85
Question 12	18; 32	42; 42	10; 14	62; 43	30; 35	35; 60

Question 3: $0.010 < P < 0.050$; 95% CI 0.09–0.55.
Significant findings = percentages in bold and underlined; Q1 = questionnaire 1; Q2 = questionnaire 2.

given to parents produced a significant result for question 7. The visual format of presenting the information produced no significant results.

Table 3 illustrates the comparison of paired patient/parent data for both questionnaires. Five questions produced significant findings (4, 7, 9, 11, and 12). The most obvious finding was that parents gave significantly better answers than did their child when given verbal information (4, 9, and 12 in the short-term; 7, 11 and 12 in the long-term). Patients given visual information had a significantly higher proportion of correct responses compared with their parents, for question 7, in the short-term, whilst parents given visual information, for question 11, had a significantly higher proportion of correct responses, compared with their children, in the short-term.

Table 4 shows paired patient and paired parent data for both questionnaires. There was only one significant finding, where written information produced a significantly higher response rate for patients in the first compared with the second questionnaire, for question 3.

Question 1 (Do any of your friends/family wear a brace?) (Appendix 2) was not included in the results tables, even though it was statistically analysed, as the answers to this question had no bearing on the format of the information received during the study. Rather, it was included in the questionnaire to assess any possible information either the patients or parents could have received prior to the study. Similarly, the replies to questions 13 and 14 (What are the good/bad things about wearing a brace?) were not recorded within the results tables as these questions were not statistically analysed.

Discussion

It is difficult to decide on the content and quantity of information that patients require, for informed consent to be given. It has been shown (Ley, 1979) that the more statements given to the patient, the greater the proportion forgotten. However, Ley (1988) claimed that there is no argument for providing patients with less information. It was against this background that the subjects were given information relating to questions 2–12.

Table 1 shows that, overall, only questions 8, 9, and 12 were poorly answered. The issues surrounding the importance of good oral hygiene, the day-to-day effects of treatment and the importance of retainer wear were not relayed as well as expected and greater care is required in providing information related to these areas. These results are contrary to those of Witt and Bartsch (1993), who found that information on treatment needs, possible side-effects, and risks had better recall. The findings in the present study are particularly relevant when avoiding allegations of malpractice (Newton, 1995). The remainder of the questions had high proportions of correct responses in both the short- and long-term, regardless of the format in which the information was delivered. It is possible, however, that the subjects were particularly attentive by virtue of the fact that they were taking part in a study. However, previous studies of information understanding and recall, such as Witt and Bartsch (1993), can similarly have the same criticism directed at them. Compared with their results, the findings in this study seem to show a particularly high level of recall, both in the short- and long-term. There is a danger of becoming complacent until the findings of Fallowfield *et al.* (1987) are considered. They described how 50 per cent of patients felt that the information they received was inadequate, even though they were taking part in clinical trials. Ley (1982) claimed that this was due to failures of understanding and recall, which were the result of poorly structured information presented in an incomprehensible way. However, Reynolds *et al.* (1981) showed that, even when patients were given information in an easily structured way, there was still the same level of dissatisfaction. Steptoe *et al.* (1991) suggested that satisfaction with communication skills is not simply a function of communication skills and the provision of structured information, but one must also take into account the patient's ability to cope with stress and whether they actively seek out or avoid information. This is contrary to Ley's 'cognitive model' (1982), in which it was claimed that there are significant correlations between understanding, memory, satisfaction, and compliance.

Of the significant findings detected from the 3×2 Chi square in Table 1, only three questions produced significant results when 2×2 tests were carried out to identify exactly where the significance lay (Table 2). The results indicated that for question 7 (short-term) parents, given written or verbal information, gave a significantly higher proportion of correct answers than those given visual information. These findings may reflect the fact that adults are used to receiving information about brushing, either verbally from their own general dental practitioner or from leaflets left in their dentist's waiting room. For patients, written information gave significantly better results than verbal information for question 3 (questionnaire 1) and for question 11 (questionnaire 2). It is conceivable that children are particularly keen to know how long their treatment will last and that figures written down have more of an impact than the other forms of presenting the information. Similar findings, although not significant, are seen in the response rates for question 4 also (Table 1). Why written information was significantly better at eliciting the correct response for question 11 is not so obvious. In hindsight, for question 11, it was felt that the poor response to the information presented in a visual format could relate to the fact that the slide for this question showed a patient having a check-up by a dentist wearing a conventional 'hospital style' white coat, whereas in a practice environment dentists more often wear tunics or casual clothes. Hence, the image portrayed could have been misleading, such that over time, the respondents thought that all treatment would be carried out within the hospital environment.

When comparing the different methods of delivering information, although there were few significant findings between the three methods, written information performed well (Table 2). For the purpose of this study, in order to allow direct comparison of the individual methods, no leaflets were taken home. Under normal circumstances this would be allowed, and both patients and parents would then have the benefit of being able to refer back to them at a later date. The restraints within the study ensured that each subject, regardless of which group they were in, received the information only once. George *et al*. (1983) showed that patients are known to favour written information, especially if it includes treatment advice. They also found that patients who received written information were more satisfied with their treatment as a whole. Written information may therefore perform even better in the long-term.

Table 3 illustrates the significant findings from the paired patient/parent data. Parents appeared to respond significantly better than patients when given verbal information, whereas there were no major differences between written and visual information, with both patients and parents responding equally well to these methods. For parents, one cannot be certain whether the actual words spoken were important in aiding their retention of the information or whether it was the use of non-verbal reinforcers (Newton, 1995). Neither appeared to have an effect for patients. Potentially, adolescent patients have the ability to 'switch off' if they find the subject matter boring and depend on their parents to do the listening for them. This is a very important finding and it serves to highlight the fact that patients should not be given verbal information alone. It should always be supplemented by written or visual information. It is also important that, when verbal information is given to patients, it should be given succinctly and with a responsible adult (preferably the parent) present, as they are likely to remember greater amounts of information.

Table 4 shows that there were no significant differences between questionnaires 1 and 2 for paired patient and paired parent responses, with the exception of question 3. For this question, written information produced a significantly higher response rate for patients in the short-term, rather than the long-term. The possible reason for this may relate to patients responding better to figures that are written down, which has been previously discussed. Whilst there was a significant decrease in the long-term proportion of correct responses, it must not be overlooked that the proportion of correct responses was still higher than those who received either verbal or visual information.

Although question 1 was not included in the summary tables, the data collected indicated that

more patients than parents knew people with braces (77 per cent of patients compared with 37 per cent of parents for questionnaire 1; 81 per cent of patients compared with 37 per cent of parents for questionnaire 2). However, it had little bearing on the number of correct responses given. In fact, only for questions 2, 4, 6, and 7, did patients give higher proportions of correct responses, and this was not at a significant level. This would indicate that either patients tend to forget more easily, that they had not received information from their friends/peers, that the information they were given prior to the study was incorrect or that parents, being older, simply have better retention of information.

The majority of questions were answered well and the differences between the three methods were not great. Overall, the impression was that written information performed better than the other methods. Patients responded particularly poorly to verbal information when compared with their parents.

As professionals we must not forget that the provision of patient information is becoming particularly important with the advent of Clinical Governance and improved monitoring of quality of care. This type of study is therefore becoming increasingly important if we are to establish the most effective modes of providing information. Whilst the results of this study showed a high number of correct responses to many questions, it must not be forgotten that the subjects were randomly allocated into individual groups. It is possible, if future studies allowed the subjects to receive the information in their preferred format(s), that the outcomes may be even better (Merritt, 1991).

Conclusions

The majority of questions were answered well by patients and parents in all three groups. Only questions 8, 9, and 12 were answered poorly. This highlights the need to pay more attention to providing information related to the importance of good oral hygiene, how treatment will affect day-to-day life and the importance of retainer wear. Overall, parents were found to respond better to verbal information than their children. As such it is recommended that verbal information given to patients should always be supported by written and/or visual information.

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References

Albert T, Chadwick S 1992 How readable are practice leaflets? British Medical Journal 305: 1266–1268

Fallowfield L J, Baum M, Maguire G P 1987 Addressing the psychological needs of the conservatively treated breast cancer patient. Discussion paper. Journal of the Royal Society of Medicine 80: 696–700

George C F, Waters W E, Nicholas J A 1983 Prescription information leaflets: a pilot study in general practice. British Medical Journal 287: 1193–1196

Lefer L, Pleasure M A, Rosenthal L A 1962 A psychiatric approach to the denture patient. Psychological Research 6: 199–207

Ley P 1972 Complaints by hospital staff and patients: a review of the literature. Bulletin of the British Psychological Society 25: 115–120

Ley P 1979 Memory for medical information. British Journal of Social and Clinical Psychology 18: 245–256

Ley P 1982 Giving information to patients. In: Eiser J R (ed.) Social psychology and behavioural medicine. Wiley, New York, p. 339

Ley P 1988 Communicating with patients. Chapman and Hall Press, London

Maguire P 1990 Can communication skills be taught? British Journal of Hospital Medicine 43: 215–216

Merritt S L 1991 Learning style preferences of coronary artery disease patients. Cardiovascular Nursing 27: 7–12

Nanda R S, Kierl M J 1992 Prediction of co-operation in orthodontic treatment. American Journal of Orthodontics and Dentofacial Orthopedics 102: 15–21

Newton J T 1995 Dentist/patient communication: a review. Dental Update 22: 118–122

Petrie A, Watson P 1999 Statistics for veterinary and animal science. Blackwell Science, Oxford

Pratelli P, Gelbier S, Gibbons D E 1996 Lack of knowledge among parents of the implications of receiving orthodontic treatment. Community Dental Health 13: 211–214

Reynolds P M, Sanson-Fisher R W, Poole A D, Harker J, Byrne M J 1981 Cancer and communication: information-giving in an oncology clinic. British Medical Journal 282: 1449–1451

Steptoe A, Sutcliffe I, Allen B, Coombes C 1991 Satisfaction with communication, medical knowledge, and coping style in patients with metastatic cancer. Social Science and Medicine 32: 627–632

Witt E, Bartsch A 1993 The effect of information and communication in the orthodontic consultation. Part 1: the imparting of information. Fortschritte der Kieferorthopädie 54: 187–195

Witt E, Bartsch A 1996 Effects of information giving and communication during orthodontic consultation and treatment. Part 3: optimized orthodontist-patient communication. Journal of Orofacial Orthopedics 57: 154–167

Appendix 1: the Gunning Fog Test

This tests readability and gives the text a score:

1. Choose a passage of about 100 words, which must end in a full stop.
2. Find the average sentence length by dividing 100 by the number of sentences.
3. Find the number of long words, defined as those of three syllables or more, excluding: (a) proper nouns; (b) combination of easy words, such as photocopy; (c) verbs that become three syllables when '-es', '-ing', and '-ed' are added (for example, committed); (d) jargon that the reader will know.
4. Add the average sentence length to the number of long words.
5. Multiply by 0.4 to get the 'reading score'.

If the score is above 12, then one should try and alter the text to become more readable.

Appendix 2: the questionnaire

Please place a tick, or write the answer in the space provided, for each question below.

1. Do any of your friends/family wear a brace?
   Yes
   No
2. What does a brace do?
   Accepted correct answer: Straightens teeth
3. How long does treatment usually take?
   About 6 weeks
   About 6 months
   About 1 year
   About 2 years—*Accepted correct answer*
   About 3 years
   More than 3 years
4. How often will you need to have the brace checked?
   Every day
   Every 1–2 weeks
   Every 4–6 weeks—*Accepted correct answer*

Every 2–3 months
Every 4–6 months

5. How do you think your teeth will feel after the brace has been fitted?
   They will feel no different
   They may ache a bit—*Accepted correct answer*
   It will be easier to bite certain foods
   They will feel cleaner
6. Which is the most common type of brace?
   Accepted correct answer: Fixed braces ('Train tracks')
7. How often should you brush your teeth whilst wearing a brace?
   When they feel dirty
   Twice a day, morning and night-time
   Morning and night-time and, if possible, after every meal—*Accepted correct answer*
   When you feel like it
   Once a day, at night-time
8. What will happen if you do not clean your brace properly?
   Accepted correct answer: You will develop decay and gum disease
9. How do you think a brace will affect you in your day-to-day life?
   Accepted correct answer: respondent expected to mention at least 2 or more of the following
   (i) Certain foods and drinks must be avoided
   (ii) Brushing will be more difficult
   (iii) Speech may be affected
   (iv) There may be a problem playing contact sports
   (v) There may be a problem playing wind or brass instruments
   (vi) There may be some discomfort when the appliances are fitted/adjusted.
10. If the brace breaks during treatment when should you see your orthodontist?
    Accepted correct answer: As soon as possible
11. During your orthodontic treatment do you think you need any other dental care?
    Yes—*Accepted correct answer*
    No
    Don't know
12. When do you feel that your treatment is finished?
    When you are happy with the result
    When you only have to wear a retaining brace
    When you don't have to wear any type of brace—*Accepted correct answer*
    When your teeth look straight
13. What are the good things about wearing a brace?
    N.B. Not statistically analysed
14. What are the bad things about wearing a brace?
    N.B. Not statistically analysed