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ORIGINAL RESEARCH

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Barriers and challenges faced by orthodontists in providing orthodontic care and implementing new innovative technologies in the field of orthodontics among children and adults: a qualitative study

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Abstract

Orthodontic treatment requires the cooperation of patients as well as orthodontists. Therefore, the aim of the study was to investigate and address the challenges and barriers orthodontists have in achieving the desired orthodontic results, as well as make recommendations for ways to address the stated problems and introduce new innovative technologies to the area of orthodontics. This qualitative study wasbased on the grounded theory. Twelve orthodontists participated in face-to-face interviews, which were primarily comprised of open-ended questions. Data analysis was carried out manually using the "by hand" method. Orthodontists between the age group of 29–42 were interviewed. The answers varied depending on the years of experience of the interviewees. Teenagers and boys were found to be most non-compliant with the treatment. The average treatment span ranged between 6 months for mild cases up to 3 years for severe orthodontic cases occurring most commonly in government hospitals. Patient compliance plays a major role in orthodontics. Poor oral hygiene maintenance, brackets breakage by patients, and missed appointments were the major concerns mentioned by participants and hindered getting the desired results. Patients' main worries were related to the cost of therapy, premolar extractions, the length of treatment, and the possibility of relapse. Patient counseling and reinforcement at the start of the treatment can help to overcome the challenges and barriers in orthodontics since patient motivation is a very important factor in obtaining the desired results. It is recommended to conduct more training sessions for the orthodontists in order to introduce them to new technological paradigms.

Keywords

Barriers; Challenges; Innovative technologies; Orthodontists; Orthodontic results

1. Introduction

Orthodontics has achieved unbelievable goals and success in this day and age, and the introduction of new technologies in orthodontics, that led to new road maps for orthodontists to design diagnosis and treatment planning [1, 2]. Despite recent developments in orthodontics, the success rate of any case still depends on the following four key principles: "(a) the diagnostic and clinical skills of the orthodontist, (b) favorable biologic characteristics of the patient (such as bone turnover, craniofacial morphology, stage of growth, *etc.*), (c) the patients' willingness to cooperate during treatment and to follow all treatment recommendations (*i.e.*, patient compliance), and (d) the use of an appropriate and effective orthodontic appliance" [3]. Modern orthodontic therapy may constantly be hampered by patient cooperation. Compliance can be defined as the extent to which a patient obeys health care worker's guidelines, *e.g.*, the patient's willingness to wear elastics or any other removable appliances, showing up on the day of scheduled appointments, or maintaining oral hygiene as advised [4]. There is a growing concern about dental appearance, and malocclusion is among the top three rankings of dental health priorities. It is a challenge for an orthodontist to seek the available technologies and decide the best cost-effective treatment options [5, 6]. New innovations are shifting 2D technologies to 3D in the field of orthodontics [7]. The aim of this qualitative study was therefore to explore and address the challenges and barriers faced by orthodontists to achieve

the desired orthodontic results, and suggestions regarding solutions to the stated problems as well as implementing new innovative technologies in the field of orthodontics.

2. Materials and methods

2.1 study design

In this study, a qualitative methodology based on a grounded theory of inductive approach was employed. Inductive cases were studied (in the form of face-to-face interviews), and then qualitative data were thoroughly analyzed. The theory was then built using the data that had been gathered.

2.2 Context and sampling strategy

This study was carried out among the orthodontists of the School of Dentistry, Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU), Islamabad, Pakistan, and the College of Dentistry, Jouf University (JU), Saudi Arabia. The study setting was the respective offices/workplaces of the enrolled participants. It was assured that the environment is calm and comfortable for the conduction of interviews. Participants in this study were of both sexes, age ranged from 30 to 45 year, and had successfully finished their orthodontics post-graduation program. The orthodontists, not more than 45 years were not included in the study to eliminate sampling bias. The data collected through interviews were conducted until no new themes were arising, and the theoretical saturation of results was achieved. The purposeful sampling was done, and only orthodontists were included in interviews since they are the subject specialists and could answer the questions better than the general dentists.

2.3 Researcher characteristics

To minimize the risk of bias only one researcher (A.F) interviewed each participant in both the centers mentioned above (SZABMU and JU). However, the second interviewer (M.H) was also present all the time for recording and managing the interviews.

2.4 Data collection

The data was collected in the form of one-on-one interviews from 3rd to 30th April 2022, using a semi-structured questionnaire. The questionnaire comprised both, open-ended and close-ended questions. During the interviews, notes were taken along with complete audio recordings. The gestures like laughs pause and voice tones were also noted. The average time for each interview was 15–20 minutes, and the aid of guided questions was used to facilitate the participants and interviewer. The guided questions included:

1. What is the average treatment span of each patient?
2. How severe do you encounter orthodontic cases?
3. What are the barriers faced in patient compliance regarding premolar extractions and loss of follow-ups?
4. How do patients react to pain and inconvenience followed by elastics?
5. What are the patient's concerns regarding relapse?
6. Which age group and gender shows more reluctance in getting orthodontic treatment done?

After the conduction of twelve interviews, the saturation of results was achieved.

2.5 Data analysis

Following the qualitative study methodology, no statistical testing was used. All the data collected was analyzed "by hand" using the framework approach of content thematic analysis. Thematic content analysis was done by identifying themes and sub-themes that emerge from the available data by four researchers (A.F, M.H, F.A.C and M.M.J) to guarantee consistency. In the first stage, the process of open coding was done. The interviews were transcribed verbatim, and each interview transcript was read by all four researchers. In short terms, the margin of words and phrases was marked through consensus. The "dross" material was filtered during this process. At the end of open coding, the initial coding framework was obtained.

In the second stage, all information, excluding duplication, was collected on a clean set of pages, and the axial coding was done by developing the possible connections between the codes, and categories were made [8]. Different categories and codes extracted in this study were mentioned at the end of the results section.

2.6 Verification of data analysis

For the verification of qualitative data analysis, the process of peer review in which one experienced researcher (F.A.C) reviewed all the transcripts and analyzed data and codes. Then, according to the expert opinion, the required changes were made [9].

3. Results

Interviews with a total of 12 participants were conducted for this study including six female and six male orthodontists. Although there was variation in experience (3 years to 16 years), all the included participants were orthodontists. All of them were working in government hospitals, while most of them had their private practice as well. The last t column of Table 1 addresses the demographics of each participant included in the study.

3.1 Category: 1 orthodontic treatment span

3.1.1 Based on severity

The average period of treatment mainly was dependent on the severity of cases ranging from mild to severe cases. The range of treatment span was documented as between 6 months for mild cases up to 3 years for severe cases.

3.1.2 Frequency of severe orthodontic cases

The participants replied that a variety of cases of patients is addressed. The occurrence of severe orthodontic cases is very common in practice at government hospitals. However, private clinics patients commonly report slight to moderate malocclusion. Hence, patients showing up at private clin-

TABLE 1. Demographics of each interviewee.

Partici pant#	Age	Gender	Experience in yr	Government (Govt.)/private practice	As per the participants, non-compliance is mostly shown by age- group/gender
1	29	Female	3 yr	Govt. + private	Teenagers/boys
2	32	Female	7 yr	Govt.	10–14-yr age group/boys
3	32	Male	7 yr	Govt. + private	Early mixed dentition/boys + girls
4	38	Male	10 yr	Govt. + private	17–21-yr age group/boys
5	35	Female	8 yr	Govt. + private	12–14-yr age group/boys
6	42	Male	16 yr	Govt. + private	Teenagers/boys
7	41	Male	11 yr	Govt.	14–18-yr age group/boys + girls
8	39	Female	9 yr	Govt.	Early mixed dentition/boys + girls
9	42	Female	12 yr	Govt. + private	Teenagers/boys
10	38	Male	9 yr	Govt.	10–14-yr age group/boys
11	30	Female	4 yr	Govt.	Teenagers/boys
12	36	Male	8 yr	Govt. + private	12–15-yr age group/boys + girls

ics have commonly aesthetic concerns, and those coming to government tertiary hospitals have severe alignment issues. Participant #4 told that: "Those showing up to the tertiary hospitals are referred cases either from the other departments, like oral and maxillofacial surgery (OMFS) or other health care facilities.".

Moreover, participant #5 documented that 1 in 50 patients report grade 5 malocclusion.

3.2 Category: 2 barriers in patient compliance

Patient compliance is an important factor in orthodontics without it the desired orthodontic results can never be achieved. Interviewee #4 stated that: "I explain to the patient scheduled on the 45-minute first appointment about four majors' points: (a) oral hygiene maintenance (b) brackets breakage (c) appointments (d) retainers.".

3.2.1 Uncomfortable appearance

Patients mainly complain about uncomfortable appearances because of the braces. However, patients are counseled to show compliance with the treatment. Patients who come for braces mainly show compliance. Participant #5 explained that: "Teenagers are non-compliant in wearing removable appliances and have eating problems. In contrast to that, adults have esthetic concerns.".

3.2.2 Oral hygiene maintenance

During treatment, a patient needs counseling to maintain good oral hygiene. Participant #1 informed that in most cases, oral hygiene is improved after the treatment ends. According to participant #2, most children lack intrinsic motivation. As a result, their parents are reinforced to follow the given instructions. Participant #3 stated that: "White spot lesions might occur on the enamel surface if oral hygiene is not maintained.". Participant #4 informed that: "Patient is guided about the basics of orthodontic treatment compliance from the beginning during the first appointment.".

3.2.3 Length of treatment

Patients are guided about the length of treatment from the beginning. Patients that are internally motivated conform well. Otherwise, the treatment is delayed if patients miss their appointments. In that case, patients have managed accordingly. Interviewee #3 explained that: "Internal motivation is required since patient attendance is very important. Otherwise, bracket failures will occur. Even if the patient is careful with the brackets, treatment is prolonged.". Interviewee #4 stated that: "Even though patients are informed about the length of treatment during their initial visit, patients often have unrealistic expectations. Thus, we must manage patients accordingly.". In contrast, interviewee #5 told that missed appointments are not an issue per se, since the patient has to visit once a month. If a patient couldn't show up on the day of his/her appointment, then it can be rescheduled depending on the availability of both parties.

3.2.4 Treatment charges

All the interviewees showed agreement on the issue of the treatment costs. Since orthodontic treatment is expensive, patients frequently have financial issues. In regard to this, patients are informed about the total payment but divided into advanced payments and installments. Interviewee #4 stated: "Issue of cost varies from place to place. It's an issue in the government setup. However, in private practice, it's not an issue.".

3.2.5 Compliance with removable appliances

It becomes evident for orthodontists if patients show reluctance in wearing removable appliances. Interviewee #4 stated that: "If patients are non-compliant in wearing removable appliances, then they will not be fluent in wearing them. They will face difficulty in wearing it. And it will be evident on the day of the appointment.". Interviewees #3 and #4 stated that in case of non-compliance with removable appliances, a treatment plan is modified. Participant #3 told with an example that removable elastics will be replaced by fixed springs in that case.

3.2.6 Breathing and speech impairment

All the interviewees were on one page regarding the breathing issue. They showed that no such breathing issue occurs with orthodontic treatment. However, there might be difficulties in speech and eating which may lead to non-compliance with the removable appliances and treatment plan. Interviewee #2 said that: "Patient is asked to read in front of a mirror to improve speech". Interviewee #3 stated that: "Patient is asked to move from mouth breathing to nasal breathing.".

3.3 Category: 3 patient concerns

The following concerns of patients are being addressed in the present study:

3.3.1 Premolar extractions

Normally patients are worried and concerned about premolar extractions. In this regard, patients are explained properly on study casts, otherwise, they have to proceed with compromised results. Interviewee #1 documented that: "Counselling of patient is required. Patients are demonstrated by simulation and pre- and post-op pictures. But yes, there is an issue in surgeries.". Interviewee #4 stated that: "You have to have the patient and family on board. In a hospital, patients follow doctors. If it clear-cut an extraction case, then the patient is explained clearly that you have to sacrifice the teeth.". Interviewee #5 stated that: "There are two types of extraction cases: (a) severe crowding-in this case, the patient is not treated without extraction (b) over-jet-70–80% of patients comply with the treatment plan on reinforcement by the dentist. However, 20–30% don't comply, and alignment is done only.".

3.3.2 Relapse

Relapse might occur in orthodontic cases. Interviewee #4 stated that: "If there is minor relapse, we do segmented orthodontics. For major relapse, we have to start the treatment from the beginning.". Interviewee #6 stated that: "After the completion of treatment, I keep my patients on recall for one year. The patients are called for follow-up after every three months. I give fixed retainers in the upper arch and try to give fixed retainers in the lower arch too.".

3.3.3 Esthetic concerns

Cosmetic versus functional stability issues will persist. The patient will eventually have psychological issues about appearance. However, patients receive counseling and an explanation of the course of their treatment. Interviewee #4 stated that: "Patients are explained why the function is important. They have also explained the importance of TMJ function, swallowing, and devolution; and how the chewing efficiency is improved.". Interviewee #5 said that: "Patients in government hospitals are more concerned about the functional stability, while private patients are more worried about the aesthetics and looks.".

3.4 Category: 4 challenges in introducing new innovations

New innovations will always remain a challenge despite their user-friendly nature.

3.4.1 Lack of technology and training

Technological issues with the new innovations have been a concern of all the participants. Interviewee #3 stated that: "Proper training sessions in proper training centers are required. A hands-on training session is lacking. Software is lacking. In lingual orthodontics, training is lacking.".

3.4.2 Desired movements not achieved

All the participants showed consensus with respect to the use of innovative technologies that the desired movements cannot be achieved by using them. Interviewee #4 stated that: "Aligners can only be used in adult patients with minimal malocclusion and cater up to 2–3 mm crowding and 4–5 mm spacing only.". However, all the participants had concurrence that although we lack basic technology and skills, the future is aligners, CAD-CAM, mini-implants, and intra-oral scans. Table 2 demonstrates the different categories and codes extracted in this study.

TABLE 2. Final coding framework after reduction of the categories in the initial coding framework.

Categories	Codes
1. Orthodontic treatment span	
	• Based on severity
	• Frequency of severe orthodontic cases
2. Barriers in patient compliance	
	• Uncomfortable appearance
	• Length of treatment
	• Treatment charges
	• Oral hygiene maintenance
	• Compliance with removable appliances
	• Breathing and speech impairment
3. Patient Concerns	
	• Premolar extractions
	• Relapse
	• Esthetic concerns
4. Challenges in introducing new innovations	
	• Lack of technology and training
	• Desired results not achieved

4. Discussion

In this study, orthodontists have addressed the barriers and challenges they encountered when dealing with different orthodontic patients. The normal length of treatment, as reported by orthodontists, ranged from six months to three years, depending on the severity of the treatment plan. Severe orthodontic cases were frequently reported in government hospitals, while mild cases were found to be common in private clinics. Contrarily, one of the previous reviews conducted on 1089 patients concluded that the average treatment duration till the case completion is approximately 20 months [10]. Yet, given the variations in treatment times for similar operations, this

would have been a crucial subject for research. Moreover, orthodontists reported that patients are more worried about their aesthetics than their functional stability. In the previous literature, it has been noted that patients wanted to improve their smiles and to become able to eat properly. The patients mainly desired to eat meals of their own choice. This finding is in contrast to the present study [11]. Although orthodontists are more concerned about functional stability, the aesthetics are as important as any other factor in regard to smiling. All orthodontists showed consensus regarding barriers in patient compliance in maintaining oral hygiene, length of treatment, treatment charges, and bracket breakage. Counseling and reinforcement by pressure were found to be thoughtful in this aspect.

In this study, the interviewees stated that premolar extraction cases had been a major concern for the patients. Explaining to the patients about the outcomes through study casts, simulation, or pre-and post-treatment pictures had been helpful. One of the systematic reviews and meta-analyses of 5 studies concluded that more profile flattening was evident in the extraction group cases as compared to that of the non-extraction group. Remarkable changes were noted in nasolabial angle, upper lip thickness, and upper lip position among the extraction group [12]. Similar results were obtained from other previous studies [13, 14]. Also that soft tissue profile changes remained the same irrespective of the number of premolar teeth selected for extraction, *i.e.*, results were the same regardless of whether the first premolar or second premolar was extracted [15]. In order to get appealing results, extraction cases need to be treated after the required extractions are executed. Otherwise, the treatment will have proceeded with compromised results. In the present study, the length of treatment has been a major concern for all the patients. Usually, orthodontists guide patients about the duration of treatment from the start. Moreover, internal motivation is required at the patients' end. This finding is found to vary from another study where patients showed perseverance in the treatment to get the desired results because they would be worthwhile [16–18]. Patient compliance plays a vital role in following treatment, or else the chances of relapse will be increased. Patients are monitored for up to 6 months to 1 year in case of relapse. The time span varied from one orthodontist to another. In the previous studies, it has been noted that patients with any concurrent diseases (such as compromised periodontal status) were kept on follow-up [19] for any relapse. It is crucial to guide patients about the importance of patient compliance during their initial visit as well as to continue doing so throughout subsequent visits. It is found to be in concordance with the previous studies [20]. Albeit the future lies in the hands of new innovations, it has been a big challenge for orthodontists to deal with new techniques, since they are technique-sensitive procedures and require expertise. Lack of training and lack of training centers for introducing such innovations have been a challenge, especially in underdeveloped/developing countries. This finding was found to in relevant to the previous literature [21]. In orthodontics, the advent of new innovative technologies has led to roadways of simplicity. But still, learning and polishing skills are the need of the hour.

There were a few limitations in this study, that should be taken into consideration when interpreting the results, only one researcher was included in a principal investigation which might cause a lone researcher bias, the study settings were government institutes leading to selection bias, and the saturation of sample size was achieved too early which didn't allow to increase the number of participants and create a gap in the years of experience between different orthodontists. It is recommended further to study other factors (*e.g.*, effect of work environment on patient compliance). Also, future studies should include orthodontists working in private settings to eliminate selection bias. In order to review new themes, further research on the following topic is recommended. An irreconcilable conflict between the doctor and the patient will remain there, due to many underlying factors (like prolonged orthodontic treatment span, increased charges, and patient compliance).

5. Conclusions

Patient counseling and reinforcement by the start of the treatment can help to overcome the challenges and barriers in orthodontics since patient motivation is a very important factor in obtaining the desired results. In the future, it is recommended to conduct more training sessions for orthodontists in order to introduce them to new technological paradigms.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on reasonable request from the corresponding author.

AUTHOR CONTRIBUTIONS

AF, FAC, OK and MH—designed the research study. AF, FAC, MMJ, AI and MH—performed the research. HMA and FHM—provided help and advice on data curation and methodology. FAC, AMG and RI—analyzed the data. AF, FAC, BKA, AMG and OK—wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was conducted in accordance with the Declaration of Helsinki and approval was taken from the ethical review board of Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU). Reference number: SOD/ERB/2022/118. Moreover, written informed consent was taken from each participant before.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

[1] S. Kapila, J. Nervina. CBCT in orthodontics: assessment of treatment outcomes and indications forts use. DentoMaxilloFacial Radiology. 2015; 44: 20140282.

[2] Grünheid T, McCarthy SD, Larson BE. Clinical use of a direct chairside oral scanner: an assessment of accuracy, time, and patient acceptance. American Journal of Orthodontics and Dentofacial Orthopedics. 2014; 146: 673–682.

[3] Chow J, Cioffi I. Pain and orthodontic patient compliance: a clinical perspective. Seminars in Orthodontics. 2018; 24: 242–247.

[4] Inkster ME, Donnan PT, MacDonald TM, Sullivan FM, Fahey T. Adherence to antihypertensive medication and association with patient and practice factors. Journal of Human Hypertension. 2006; 20: 295–297.

[5] Kazancı F, Aydoğan C, Alkan. Patients' and parents' concerns and decisions about orthodontic treatment. Korean Journal of Orthodontics. 2016; 46: 20–26.

[6] Bennett ME, Michaels C, O'Brien K, Weyant R, Phillips C, Vig KD. Measuring beliefs about orthodontic treatment: a questionnaire approach. Journal of Public Health Dentistry. 1997; 57: 215–223.

[7] E. Taneva, B. Kusnoto, C. A. Evans. 3D scanning, imaging, and printing in orthodontics. Issues in Contemporary Orthodontics. 2015; 148: 862–867.

[8] Skjott Linneberg M, Korsgaard S. Coding qualitative data: a synthesis guiding the novice. Qualitative Research Journal. 2019; 19: 259–270.

[9] P. Mihas. Qualitative data analysis. Oxford Research Encyclopedia of Education. Oxford University Press: Oxford. 2019.

[10] Tsichlaki A, Chin SY, Pandis N, Fleming PS. How long does treatment with fixed orthodontic appliances last? A systematic review. American Journal of Orthodontics and Dentofacial Orthopedics. 2016; 149: 308–318.

[11] Bradley E, Shelton A, Hodge T, Morris D, Bekker H, Fletcher S, *et al*. Patient-reported experience and outcomes from orthodontic treatment. Journal of Orthodontics. 2020; 47: 107–115.

[12] Almurtadha RH, Alhammadi MS, Fayed MMS, Abou-El-Ezz A, Halboub E. Changes in soft tissue profile after orthodontic treatment with and without extraction: a systematic review and meta-analysis. The Journal of Evidence Based Dental Practice. 2018; 18: 193–202.

[13] Pan F, Yang Z, Wang J, Cai R, Liu J, Zhang C, *et al*. Influence of orthodontic treatment with premolar extraction on the spatial position of maxillary third molars in adult patients: a retrospective cohort cone-bean computed tomography study. BMC Oral Health. 2020; 20: 321.

[14] Vilhjálmsson G, Zermeno JP, Proffit WR. Orthodontic treatment with removal of one mandibular incisor: outcome data and the importance of extraction site preparation. American Journal of Orthodontics and Dentofacial Orthopedics. 2019; 156: 453–463.

[15] Omar Z, Short L, Banting DW, Saltaji H. Profile changes following extraction orthodontic treatment: a comparison of first versus second premolar extraction. International Orthodontics. 2018; 16: 91–104.

[16] Oliver RG, Knapman YM. Attitudes to orthodontic treatment. British Journal of Orthodontics. 1985; 12: 179–188.

[17] Chaudhary FA, Ahmad B, Sinor MZ. The severity of facial burns, dental caries, periodontal disease, and oral hygiene impact oral health-related quality of life of burns victims in Pakistan: a cross-sectional study. BMC Oral Health. 2021; 21: 570.

[18] Chaudhary F, Ahmad B, Butt D, Hameed S, Bashir U. Normal range of maximum mouth opening in pakistani population: a cross-sectional study. Journal of International Oral Health. 2019; 11: 353–356.

[19] D. Feu. Orthodontic treatment of periodontal patients: challenges and solutions, from planning to retention. Dental Press Journal of Orthodontics. 2020; 25: 79–116.

[20] Perry J, Johnson I, Popat H, Morgan MZ, Gill P. Adolescent perceptions of orthodontic treatment risks and risk information: a qualitative study. Journal of Dentistry. 2018; 74: 61–70.

[21] M. Sandhya Jain, M. Kuriakose. Latest technologies in orthodontics—a review. International Journal. 2020: 3: 1–11.

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