



Use of short-term orthodontics by the specialist orthodontist

Bedan Lyanda Musima; Parmjit Singh*

¹General Dental Practitioner, Private Practice, Nairobi, Kenya

²Principal Lecturer in Orthodontics and Specialist Orthodontist, Department of Orthodontics, BPP University, London, England

*Corresponding Author(s): Parmjit Singh

Principal Lecturer in Orthodontics and Specialist Orthodontist, Department of Orthodontics, BPP University, 137 Stamford Street, London, SE1 9NN, England

Tel: +44-7808-887-457;

Email: parmjitsingh@hotmail.com

Abstract

Background and Objective: Short-Term Orthodontic treatment (STO) is mainly performed by General Dental practitioners (GDPs). This study aimed to acquire the orthodontic specialist's knowledge, experience and opinion of STO via a focus group discussion and survey.

Method: A descriptive observational study was undertaken via a focus group discussion of eight orthodontists followed by a survey of 54 orthodontists using an online self-administered questionnaire (SurveyMonkey™). Data was analysed to investigate the role of gender, age and sphere of practice on the opinion of STO using Fisher's Exact Testing. The level of statistical significance was set at 5% (0.05).

Results: The valid response rate was 50% (n=27). Forty-one percent (n=11) of the respondents stated that they used STO but there was no statistically significant effect on gender, age or sphere of practice. Clear aligners (especially Invisalign™) and conventional labial fixed appliances to achieve STO objectives were the most commonly used systems with most stating that few cases involve STO (<10%) and the treatment is more of limited objective rather than short-term.

Conclusion: STO is a useful treatment alternative in the specialist's armamentarium as long as the objectives are clear from the outset to both the patient and practitioner and an adequately trained operator carries out the procedure. There is definitely an increase in acceptance and use of STO especially clear aligners by the specialist community.

Received: Aug 30, 2018

Accepted: Oct 10, 2018

Published Online: Oct 18, 2018

Journal: Annals of Dentistry and Oral Health

Publisher: MedDocs Publishers LLC

Online edition: <http://meddocsonline.org/>

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Keywords: Short term orthodontics; Limited objective orthodontics; Invisalign

Introduction

STO is a term used to describe an orthodontic treatment modality whose main aim is to improve the patient's smile by aligning the anterior teeth i.e. the 'social six' [1] whilst not correcting the posterior malocclusions or aiming to achieve Andrew's Six Keys of Normal Occlusion. The treatment time usually does not last more than nine months [2].

The orthodontic community has experienced a continued rise of adult patients as a percentage of the total number of patients seeking orthodontic interventions to improve their smiles [3]. This may be due to greater availability, awareness and understanding of the benefits of orthodontic treatment, and the development of a wide array of acceptable appliance systems.



STO origins can probably be traced back to the United States of America, when in 1997, the Invisalign™ aligner system was marketed to specialist orthodontists, however, following its popularity and demand, it was made available to general dentists two years later [4]. Other companies came up with their STO systems and some of these include Inman Aligner™, Six Months Smile™ and Fast Braces™. These treatment modalities then spread to the United Kingdom and the rest of the world with increasing popularity in the 2000s.

This popularity has also resulted in a corresponding increase in litigation. The rate of professional misconduct increased from 2.9% in 2005 to 20% in 2015 as a result of aligner treatment alone and of these cases, 80-90% of the treatments were performed by GPs [6].

Reducing the risk of litigation should involve prospective patients being given sufficient information about all the various treatment options available including the pros and cons for each. There is currently a drive to refer to STO as Limited Objective Orthodontics (LOO) so that the patient understands from the outset that their treatment is a compromise and not comprehensive [7].

Even with such a change in terminology, there are other potential challenges with STO. Some have suggested that in cases of relapse following STO, retreatment may result in a significant increase in the risk and extent of root resorption [8] that is thought to be due to the use of orthodontic jiggling forces [9] and therefore compromising the long-term health of the teeth. As regards relapse, if it occurs, the patient may not be inclined to undergo another round of treatment (whether STO or comprehensive) and instead opt for restorative camouflage which may end up being more destructive to the tooth structure than would have been originally [10].

Given the benefits as well as the challenges of STO, the aim of this study was to acquire knowledge, experience and opinion of STO use by the specialist orthodontic community via a focus group discussion followed by a survey.

Materials and method

A descriptive observational study via a focus group discussion of eight orthodontists known to the authors followed by a pilot survey of 54 orthodontists was carried out between August and September 2017 through an online self-administered questionnaire (SurveyMonkey™). Since this was a pilot study that would help ensure the validity of the questionnaire, a larger sample size was not considered necessary.

The inclusion criterion was any orthodontist registered as a specialist with the General Dental Council (GDC) at the time the research project obtained ethical approval. Participants had to be living and practising in the United Kingdom (UK). The exclusion criterion was any orthodontist currently undergoing professional misconduct investigations.

Approval for the study was sought and granted by BPP University Research Ethics Committee. No personal data of the participants was collected with only basic non-identifying data gathered including gender, age group and years practising orthodontics.

The focus group was able to ensure the questionnaire was clear and unambiguous and properly validated. To ensure that the focus group discussion was as representative as possible, the eight participants were chosen from various spheres of practice i.e. National Health Service (NHS) practice, private practice, hospital practice and academic practice with most (n=5) of them practicing in two or more of the above spheres.

A convenience sampling method was employed both in the focus group discussion and in the survey hence the risk of sampling bias was more pronounced though this was mitigated as much as possible by ensuring that the participants came from different age sets, gender, geographical locations and spheres of practice to ensure the data generated was as inclusive as possible.

The questionnaire had a total of eighteen questions that were divided into four broad thematic areas of demographics of the participants, knowledge of STO, experience (if any) in providing STO and lastly the participant opinion as regards STO. Fifteen of the eighteen questions were closed ended while the remaining three were open ended. This meant the majority of the data collected was quantitative rather than qualitative.

The null hypothesis was that there was no difference in gender, age or practice setting on STO use by specialist orthodontists. Despite there being no direct cause and effect relationship hence no independent, dependent and controlling variables per se in this survey, the questionnaire questions were construed to be the independent variable while the responses as the dependent variable and the specialist orthodontists as the controlled variable.

Data collection and collation including descriptive statistics was completed automatically via SurveyMonkey™ in the form of ratios and percentages. To investigate the role of gender, age and sphere of practice on their opinion of STO, analytical statistics was undertaken by using Fisher's Exact Test. The analytical statistics was completed using Prism Graph Pad (Graph Pad, CA, USA). The level of statistical significance was set at 5% (0.05).

Results

Fifty-four specialist orthodontists were sent the questionnaire via a SurveyMonkey web link with a reminder being sent two-weeks later to non-responders. The response rate was 50% (n= 27) and the completion rate of the online questionnaire was 100%.

The gender of the participants who completed the questionnaire was 52% males (n=14) and 48% females (n=13), with 48% (n=13) of the participants falling below of 40 years of age and most having practised orthodontics for between 6 and 15 years (67%,n=18).

As regards the sphere of practice, the majority of participants worked in private practice and either NHS practice or hospital settings. Since a significant number of participants worked in multiple practice settings, the total number of responses exceeded 27. Table 1 shows the demographics of the study participants.

Table 1: Participant’s demographics (since most participants worked in more than one practice setting, the total responses exceeds 27 for practice setting).

Gender	Females	13
	Males	14
Age (Years)	<30	0
	31-35	3
	36-40	10
	41-45	8
	46-50	1
	51-55	1
	56-60	1
	61-65	1
	66-70	1
>70	1	
Practice Setting	NHS Practice	15
	Private Practice	23
	Hospital Practice	14
	Academic Practice	2

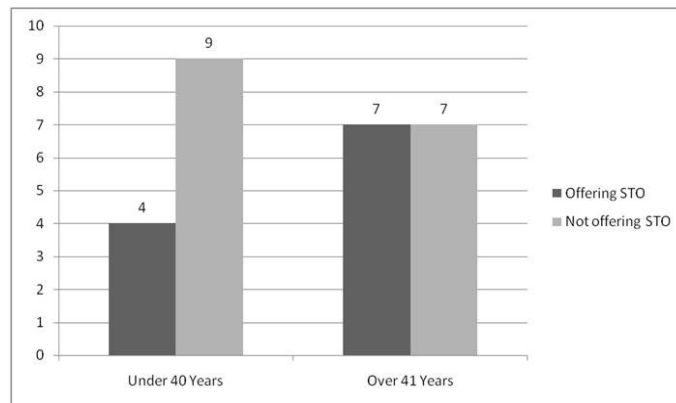


Figure 2: Influence of age on offering short-term orthodontic treatment (STO).

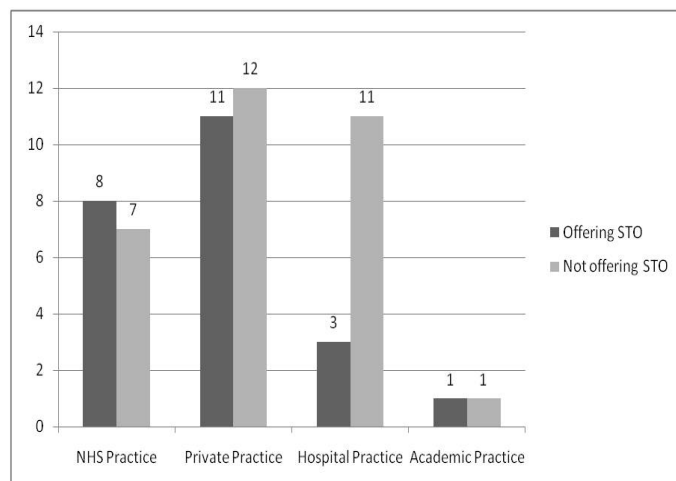


Figure 3: Influence of practice setting on offering short-term orthodontic treatment (STO) (since some participants worked in more than one practice setting, the total number exceeds 27 respondents).

For analytical statistics, due to the small sample size, Fisher’s Exact Testing was used to test for any statistically significant correlation of STO usage with the three parameters of gender (Figure 1), age of the specialists (Figure 2) and practice setting (Figure 3). No statistical significance was identified for any of the variables (Table 2) although the trends were that older participants were more likely to provide STO as well as those working in NHS practice or private practice.

Table 2: Statistical analysis on influence of gender, age and practice setting on offering short-term orthodontics.

Fisher’s Exact Test			
	Male = 14	Female = 13	p value
Gender	STO offered = 6	STO offered = 5	1.0000
	STO not offered = 8	STO not offered = 8	
Age	Under 40 years = 13	Over 41 years = 14	0.4401
	STO offered= 4	STO offered= 7	
	STO not offered = 9	STO not offered = 7	
Practice Setting	NHS Practice = 15	STO offered= 8	0.3112
		STO not offered= 7	
	Private Practice = 23	STO offered= 11	
		STO not offered= 12	
	Hospital Practice = 14	STO offered= 3	
		STO not offered= 11	
Academic Practice = 2	STO offered= 1		
	STO not offered= 1		

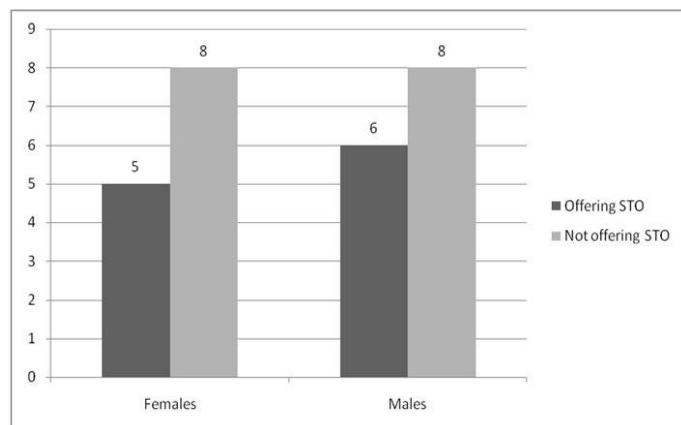


Figure 1: Influence of gender on offering short-term orthodontic treatment (STO).

Forty-one percent (n=11) of participants reported using at least one STO system even though STO cases made up less than 10% of their total treatment cases. Of the participants who used STO systems, clear aligners and conventional labial fixed appliances to achieve STO objectives were the most commonly used systems (Figure 4) with patient satisfaction (39%), clinical results (22%) and cost (11%) playing a major role in the clinician's choice of using a certain system.

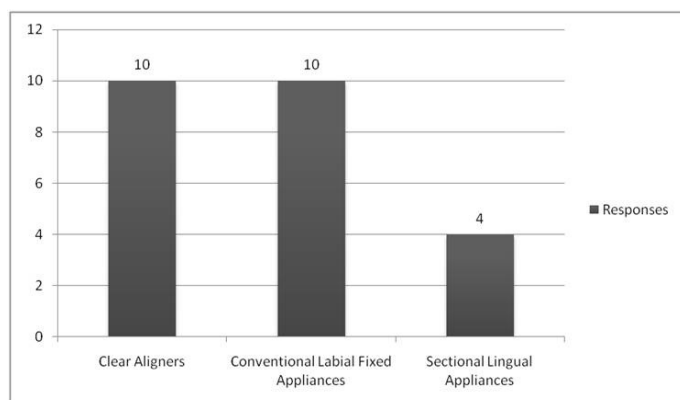


Figure 4: Most commonly used short-term orthodontic systems (since some participants used more than one type of system, the total number exceeds 11 respondents).

Most participants (78%, n=21) felt that treatment duration and marketing information by the various STO providers are the two most important determinants for patients seeking STO.

Seventy-eight percent of the participants (n=21) felt that there was no major difference in the consenting process when using STO versus conventional fixed orthodontics. The average duration of STO performed by the participants was found to range between 3 to 12 months with the mean being 7.9 months. The use of combination treatments (different systems for the upper and lower arches) was not popular with the participants (30%, n=8).

The majority of participants (59%, n=16) stated that there was no significant difference in the retention protocol they followed when performing STO as compared to conventional fixed orthodontics. Patient's aged between 31-40 years (67%, n=18) were the most commonly treated using the STO systems followed by those aged 21-30 years (22%, n=6).

Of the participants who used STO (41%, n=11), most stated that in the very few cases that these systems are used, the treatment is of limited objective rather than short-term, and it is not system dependent but rather a treatment planning decision which entails careful case selection and is usually not the first line treatment but rather in slight relapse cases, mild malocclusions or to facilitate restorative work.

Discussion

The overall response rate of 50% (n=27) for the study was quite encouraging considering that a similar study of STO use by GDPs had a response rate of 14% [11]. On gender characteristics, 52% (n=14) of the respondents were male and 48% (n=13) female. This near parity in the gender divide agrees with the reported increase in the proportion of UK registered female dentists in general and orthodontists in particular over the years [12] As regards age, 48% (n=13) of the participants were below 40 years of age while 52% (n=14) were above 40 years with the mean age being 43.9 years (SD 2.04) which is consistent with

The Report of the Orthodontic Workforce Survey of the United Kingdom of 2005 which stated that the mean age of the specialist orthodontist was 45.4 years [13]. On practice setting, nearly all participants worked in more than one setting with private practice (n=23), NHS practice (n=15) and hospital practice (n=14) being the most popular which is also similar to the 2005 Orthodontic Survey which found that the majority of the orthodontic workforce worked in more than one setting [13].

Fisher's Exact Testing was performed to test for any statistically significant correlation between STO usage with the three parameters of participant gender, age and practice setting; however, all were found to be non-significant. The possible reason for this may be the small sample size of the study hence inherent differences in gender, age and practice setting on STO use could not be easily identified. Another possible explanation could be that since most specialists received almost uniform training in orthodontics, they were well aware of the capabilities and limitations of STO regardless of their gender, age or practice setting.

Only 40% (n=11) of the participants used at least one STO system and this constituted less than 10% of their total orthodontic treatment cases. This shows that even though STO is a rapidly developing field in orthodontics, it is yet to achieve mainstream adoption by specialists. This is especially true since the majority of the respondents worked in a private practice setting (and either NHS practice or hospital), hence, it is safe to postulate that even though a large number of their patients were paying for the treatments privately, and hence offered the flexibility to have STO options, over 90% of the treatments done by these participants were still conventional orthodontic treatment.

Clear aligners (especially Invisalign™) and conventional labial fixed appliances to achieve STO objectives proved to be the most commonly used STO systems. The use of the latter can be said to be the reason why there has been a push currently from the orthodontic community, including the British Orthodontic Society, to refer to STO as more appropriately Limited Objective Orthodontics (LOO), sometimes also referred to as adjunctive treatment [14]. Even though a fixed orthodontic appliance is being used, the objectives are of a limited nature and the treatment is for a short period unlike the conventional treatment cycle which hopes to achieve Andrews Six Keys of Normal Occlusion at all times and in which the treatment duration is almost invariably longer.

The majority of the specialists who used STO systems also stated that patient satisfaction and clinical results are the two most important considerations for them when choosing an STO system. This may be due to the current paradigm shift in dentistry as a whole and orthodontics in particular to being more patient-centred with aesthetics of the orthodontic appliance playing a key role in patient attractiveness and hence choice of treatment [15].

Conversely, most participants felt that the treatment duration and marketing information are the two most important factors that influence a patient's decision on choosing an STO system. The former partly explains the rise of STO which is touted as being a 'quick fix' in achieving the orthodontic objectives which tends to particularly appeal to adult patients who are more willing to undergo the short orthodontic treatments that STO provides to improve their smiles but are hesitant to undergo lengthy conventional orthodontic treatment [2]. Indeed, in

this study, the average duration of treatment provided by the specialists performing STO ranged between 3-12 months with the mean time being 7.9 months. Furthermore, the advertising spend for cosmetic dental procedures has been increasing in the UK over the years with STO companies not being left behind and this may be resulting in patients demanding certain systems in the orthodontic office rather than a certain outcome/objective. Indeed, the popularity of clear aligners especially Invisalign™ as an STO system has been as a result of a strong brand presence and advertising directly to patients.

Lastly, the majority of patients seeking STO were aged between 31-40 years (67%, n=18) followed by those aged 21-30 years (22%, n=6). This confirms the belief that STO are mainly sought by adults who for one reason or another did not have treatment when they were teenagers or have had relapse of their originally treated malocclusions. These patients may not be willing to undergo comprehensive orthodontic correction lasting for between 18-24 months but are more amenable to limited orthodontic correction especially of the 'social six' teeth that can be performed in less than 9 months. Another reason for this may be that most specialists recommend comprehensive orthodontic treatment for younger (adolescent) patients and only offer STO as an option for adult patients.

Although the opinion as regards STO was quite diverse with more than half of the participants (59%, n=16) stating that they did not use any STO systems compared to those who use them (41%, n=11), there was general consensus on certain key issues.

On treatment consent, the majority of participants felt that there was no difference in the consenting process in STO versus conventional orthodontic treatment. This may be due to the fact that most specialists are quite clear on the objectives of the proposed treatment suggested to the patient from the outset and hence offer the option of STO only when they are sure it will meet the intended objective. This is especially important because overselling of STO systems without a properly thought out treatment plan may produce a less than ideal occlusion post treatment and could result in an unhappy patient and unwanted litigation [6].

Similar to the consent response, the majority of participants stated that they did not have any difference in retention protocol when carrying out STO or conventional orthodontic treatment. This may be because by undertaking proper treatment planning, it is ensured that when STO is offered as an alternative, it will be able to achieve the stated objective in the long term and the corrected occlusion is placed in a zone of stability. Therefore, the retention follow up after treatment of only 1-2 years (89%, n=24) as stated by the majority of participants is quite similar to the retention follow up for conventional orthodontic treatment.

The main limitation of this study was the sampling bias in the focus group discussion and the survey. However, this was mitigated as much as possible by ensuring that the participants came from different age sets, gender, geographical locations and spheres of practice to ensure the data generated was as representative as possible. Nevertheless, the number of registered orthodontic specialists in the UK is close to 2,000 and yet the survey sampled a total of only 54.

Another limitation was the lack of similar research done on the orthodontic community previously that would have enabled easy comparison of the results. Indeed, the closest study

was one carried out on GDPs [11], hence even though there was some issues with shared commonality between the two studies, most of the questions raised in the present study had no direct comparison with the study carried out on GDPs.

Conclusion

The results suggest that STO is a useful treatment alternative in the specialist's armamentarium as long as the objectives are clear from the outset to both the patient and practitioner and an adequately trained practitioner carries out the procedure. The results also show a definite increase and continuous acceptance of STO especially clear aligners by the specialist community with most of them recommending STO only for adults and not for growing (adolescent) patients for whom they feel that comprehensive orthodontic treatment is most appropriate. Finally, the null hypothesis (that there is no difference in gender, age or practice setting and STO use by specialist orthodontists) was upheld though this may be due to the small sample size.

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