Research Article

EFFECT OF REMINDER TEXT MESSAGE ON NUMBER OF MISSED APPOINTMENTS AND ON PATIENT'S SELF-REPORTED LEVEL OF PAIN AFTER PLACEMENT OF RUBBER SEPARATORS

Achint D. Chachada., Chinmay Rathod., Hazarey P. V., Sanjeev Jakati *., Mrunal Aley., Harish Atram and Mugdha Mankar

Department of Orthodontics, Swargiya Dadasaheb Kalmegh Smruti Dental College, Nagpur, India

A R T I C L E   I N F O

A B S T R A C T

Objective: To determine effect of Reminder Text Message on number of missed appointments and Patient's self reported level of Pain after placement of rubber separators.

Materials and Methods: 100 patients were randomly divided into two groups of 50 each: Text Message group and Control Group. Reminder text messages were sent to text message group before each appointment during the complete course of treatment while no such message were sent to control group subjects. After placement of rubber separators, a structured Text Message concerning about patient's well being was sent to Text message group patients. Patients in both groups were given Visual Analogue Scale chart to mark the level of pain perception immediately after placement of separators, 4hours after placement. Effect of text message on number of missed appointments was analyzed using student's t-test while self reported level of pain was analyzed using ANOVA test.

Results: Text message group missed less number of appointments as compared to control group patients. Pain intensity was highest at day 2 in both groups, text message group reported 6.56% reduction in pain as compared to control group.

Conclusion: A simple text message can be an effective tool to reduce number of missed appointments as well as reduce level of pain perceived after placement of separators.

INTRODUCTION

Orthodontic treatment is a multi visit treatment modality requiring number of visits to the Orthodontic clinic. Usually every appointment, that is given to the patient is prescheduled, which will be suitable to both patient and clinician. Missing any of these appointments may cause disturbance of prescheduled recall follow up and treatment as well. There are various reasons due to which patients miss number of prescheduled appointments out of which forgetting the date of appointment is most common. To avoid this, many clinicians send reminder messages on the date of appointment. There are many studies stating that active reminders play an important role in improving appointment attendance. (Almog D *et al* 2003, Roth J *et al* 2004, Geraghty M *et al* 2007, Hussein W *et al* 2011, Can S *et al* 2003, Foley J *et al* 2009). But there are no long term studies carried out for orthodontic patients. Hence this study was designed to study the effect of active reminder messages on number of missed appointments during complete orthodontic treatment.

Also, initial placement of any component of fixed orthodontic appliance causes discomfort, pain to the patient. It takes time for substantial adaptation of patient to the appliance. Placement of rubber separators into the patient's mouth causes pain to the patient. Most of the patients have fear of pain because of which they avoid to undergo orthodontic treatment. Pain could adversely affect the patient compliance during orthodontic treatment. Jones ML 1984 reported that primary complaint of the patient after placement of an arch wire was pain. There are various procedures which cause pain during orthodontic treatment, like separator placement, arch wire placement, activation etc. It was reported that pain intensity was greater after placement of orthodontic arch wire than after dental extractions (Jones M *et al* 1992).

Bartlett *et al* 2005 reported that the telephone call from health care provider reduced pain intensity & anxiety during orthodontic treatment. Because of busy daily schedule, patient prefers text messages as a primary way of communication. Communication through text messages is increasing day by day. Text message is an easier way to communicate with patient.

Text messages sent from orthodontic clinic following initial appliance placement were effective in reducing self reported pain level of patient following placement of orthodontic arch wire (Keith D *et al* 2013). It was also reported that text message reminders were effective in improving oral hygiene compliance (Eppright M *et al* 2014), and also effective in improving appointment attendance but with smaller size. But till date there is no study which determines the effect of

comforting text message on patient's self reported pain level after placement of rubber separators, in patient undergoing orthodontic treatment.

The aim of this study was to determine if there is any difference in number of missed appointments of patients who receive text message reminder on the day of appointment and those who receive no text message reminder, and also to determine if there is any difference in self reported level of pain after placement of rubber separators, who receive post procedural text messages and those who receive no text messages.

MATERIALS AND METHODS

A Randomized Control Trial was designed for this study. Convenience sample of 100 Subjects were selected from Department of Orthodontics and Dentofacial Orthopedics, Swargiya Dadasaheb Kalmegh Smruti Dental College and Hospital Nagpur India and were randomly divided into 2 groups. Sampling was done using throw of dice. Guidelines of CONSORT 2010 (Moher D *et al* 2010) were followed to enhance study design and reporting. Inclusion criteria were; patients between 12 and 18 years, having individual cellular phones, undergoing orthodontic treatment, with tight contact between maxillary second premolar and maxillary first permanent molar, maxillary first permanent molar and maxillary second permanent molar of both right and left side, mandibular second premolar and mandibular first permanent molar, mandibular first permanent molar and mandibular second permanent molar of both right and left side. Patients were excluded if they had any significant medical history, immune compromised status, not having cellular phone, absence of tight contact in between maxillary second premolar and maxillary first permanent molar, maxillary first permanent molar and maxillary second permanent molar of both right and left side, mandibular second premolar and mandibular first permanent molar, mandibular first permanent molar and mandibular second permanent molar of both right and left side.

Subjects were divided into text message group, consisting of 50 patients, who received text message reminder, and control group, consisting of 50 patients, who did not receive any such text message. Text message group composed of 38 girls and 12 boys with mean age of 15.66 years. The power analysis showed that our sample size was sufficient to maintain a type I alpha risk of 0.05 and to achieve power of 80%. Subjects were blinded as to group status and were unknown about the fact that text messages were the part of study. Minimization strategy described by Pandis *et al* 2013, were used to match or randomize subsequent study participants. Minimization is a dynamic method of randomization that ensures balance of important prognostic factors between treatment groups without disadvantages of stratification (Pandis *et al* 2013).

At the initial appointments, thorough case history, upper-lower arch impressions, radiographic investigations, model and radiographic analysis were carried out. Text message reminder of every appointment was sent to patients included in text message group, on the day of appointment, at 9.00 am. There was no statistically significant difference in appointment schedule of both text message group and control group.

After treatment plan was finalized, rubber separators were placed in between proximal contact point of maxillary second premolar and maxillary first permanent molar, maxillary first permanent molar and maxillary second permanent molar of both right and left side, mandibular second premolar and mandibular first permanent molar, mandibular first permanent molar and mandibular second permanent molar of both right and left side, as a part of routine treatment procedure. A visual analog scale having measurement from 0 to 100mm was prepared and handed over to all patients. After placement of rubber separators, patients were informed to mark score in response to severity level of pain.

A score was obtained immediately after placing rubber separators, in response to severity level of pain. A text message group received a well structured, standardized text message concerning to their well being and offered the patient encouragement. Patients included in control group did not receive any such text messages. Patients of both groups were advised to mark score at their home on visual analog scale chart which was handed over to them, after 4 hours, on day 2, day 3, day 4, day 5, day 6, and day 7 after placement of rubber separators. Timing of scoring was also standardized i.e. at 9.00 am in morning.

Following initial placement of rubber separators, patient were given post operative instructions and reminder regarding how and when to fill out the aforementioned visual analog scale chart. Since previous studies have reported patient discomfort following initial arch wire placement, this analysis covers the discomfort after placement of rubber separators and allows for treatment procedure variations. Patients were advised to avoid analgesic medications unless necessary.

RESULT

Results showed that patients of both the groups had missed some number of appointments. Obtained Data was analyzed using SPSS software version 21. Effect of text message on number of missing appointment was analyzed using student's t-test for independent means while self reported level of pain was analyzed using repeated measure ANOVA test.

Results showed that control group missed more number of appointments as compared to text message group. Mean value for the number of Scheduled appointments in text message group was 19.86 ± 2.391, whereas in control group it was found to be 20.4 ± 2.914. Mean value for number of missed appointments in text message group was 0.6 ± 0.833, whereas in control group it was 3.04 ± 1.628. (Table 1)

Table 1 Descriptive statistics showing Mean number of missed appointments in Text message and Control Group

	Text Message group		Control group	
	Missed Appointment	Number of Scheduled appointments	Missed Appointment	Number of Scheduled appointments
Mean	0.6	19.86	3.04	20.4
S.D.	0.833	2.391	1.628	2.914
T Value	9.433		9.433	
P value	<0.001		<0.001	

Following these subjects for a 7 day period after initial placement of rubber separators, both groups reported some degree of pain. Upon comparison, the overall self reported pain level varied in both the groups when time is used as a comparative factor (F=3.28, P<0.001) (Table 2)

A Benferroni post hoc analysis revealed that there were statistically significant high levels of pain in control groups and were greater (P<0.001) at day 2, day 3, day 4, day 5 and day 6 as compared to the text message group. (Table 3) Text message group also reported a greater amount of pain at 4 hours, day 2, day 3 after initial rubber separators placement.

Table 2 Variation in overall self-reported pain level when time is used as a comparative factor

Source	Type III Sum of Squares	df	Mean Square	F	P value
factor1	15061.441	1	15061.441	286.187	0.000
Error(factor1)	2578.773	49	52.628		
time	176034.269	6	29339.045	1758.542	0.000
Error(time)	4905.017	294	16.684		
factor1 * time	125508.389	6	20918.065	1086.768	0.000
Error(factor1*time)	5658.897	294	19.248		

Tests of Within-Subjects Effects — Measure: MEASURE_1

Table 3 Benferroni post hoc analysis showing statistically significant difference in mean VAS scores on day 2 to day 6.

	Experimental			Control			T value	P value
	Mean	Std. Deviation	N	Mean	Std. Deviation	N		
VAS Score baseline	4.84	2.436	50	4.58	2.167	50	0.564	0.574
VAS Score 4 hrs	49.44	5.478	50	50.22	5.227	50	-0.728	0.468
VAS day 2	55.98	5.571	50	62.54	5.578	50	-5.88	0.000[*]
VAS day 3	31.74	7.455	50	57.12	5.561	50	-19.29	0.000[*]
VAS day 4	18.72	6.178	50	40.70	5.874	50	-18.233	0.000[*]
VAS day 5	10.58	3.887	50	22.92	3.641	50	-16.384	0.000[*]
VAS day 6	7.22	2.509	50	12.08	3.036	50	-8.724	0.000[*]
VAS day 7	5.38	1.602	50	5.94	1.845	50	-1.62	0.108

Descriptive Statistics

[*]$p<0.001$

There was no statistically significant difference in pain level at baseline in both the groups as well as on the seventh day. Pain intensity was highest at day 2 in both the groups, as text message group reported average 55.98mm and control group reported average 62.54mm (Figure 1).
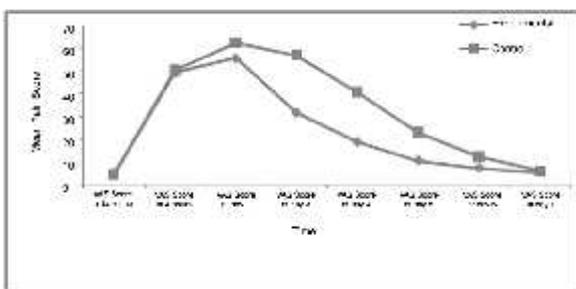

Figure 1 Comparison of Pain score in Text message and Control Group over the period of 7 days

At the time of maximum discomfort i.e. day 2, it was revealed that the text message group reported 6.56% reduction in pain as compared to the control group. There was highest difference in pain level on day 3, control group reported 57.12mm while text message group reported 31.74, text message group reported 25.38% reduction in pain as compared to control group. On day 4, text message group (Mean 18.72 mm) reported 21.98% reduction in pain compared to control group (Mean 40.70mm).

DISCUSSION

The present was designed to check the efficiency of reminder text message on reducing the number of missed appointments and on reducing level of self reported pain. To our knowledge, this was the first clinical trial comparing the effect of reminder text message on both number of missed appointments and on reducing level of self reported pain after placement of separators. We found that text message sent as active reminder resulted in decreased number of missed appointments. We also found that text message sent following initial placement of rubber separators resulted in decreased perception of pain. This finding is similar to that reported by Bartlett *et al* 2005, in which it was found that the mere act of telephonic call to patient following an initial orthodontic procedure resulted in reduced level of pain. Keith *et al* 2013 also reported that there was reduced level of patient's self reported pain when a text message sent from an orthodontic office following initial placement of an arch wires. In our study text message group showed statistically significant results compared to control group. The result of this study shows that a reminder text message reduces number of missed appointments and also reduces patient's self reported pain.

Text message is easiest mode of communication as most of the young patients have their own cellular phones. Using this technology for communication purpose is not the only advantage, however. Free *et al* 2011 in their study reported that motivational message sent to individual having habit of smoking, resulted in increase in number of individuals who quit smoking. Furthermore, number of individuals owning a cellular phone is greater number of individuals owning computers, it would be reasonable to think that this may be the preferred method of communication. On comparing Generation A (those born between 1960s to 1980s) and Generation B (those born between 1980s to 2000s), it was reported that 43% of generation B have adopted to this communication mode when compared to generation A (31%) (Hamilton JY 2011).

It is the duty of orthodontic professionals and/or staff to make the patient as comfortable as possible. Contact with the patient following initial placement of rubber separators can serve as an effective way of minimizing a number of measures that cause pain, anxiety and stress among orthodontic patients. Regular communication with the patient is the one way to accomplish this.

In conduction of any randomized controlled trial study, existence of certain degree of bias is inherent. Researchers should attempt to minimize the influence of various factors such as random error, bias, trial's outcome, to maximize the reliability and validity of the results. According to Pandis 2011, performance bias, selection bias, detection bias and post randomization bias are the most common types of bias. In this study, we attempted to control for each form in various way.

All the results were individually analyzed for proper statistically reporting.

In this study, sample size of 50 and 50 (text message and control group respectively) subjects per group was included for achieving an ideal type I alpha risk and power. Further studies may look at using other methods of appointment reminders such as dedicated mobile application.

CONCLUSION

A text message reminder sent to patients undergoing orthodontic treatment, reminding them of their appointment is an effective way to reduce number of missing appointments
This study also established that a text message sent to patients following rubber separators placement was effective in reducing level of self reported pain.

References

1. Almog D, Devires J, Borrelli J, Kopycka-Kedzierawski D. The reduction of broken appointment rates through an automated appointment confirmation system. *J Dent Educ*.2003;67:1016–1022.
2. Bartlett BW, Firestone AR, Vig KWL, Beck FM, Marucha PT. The influence of a structured telephone call on orthodontic pain and anxiety. *Am J Orthod Dentofacial Orthop*. 2005; 128:435 441.
3. Can S, Marfarlane T, O'Brien K. The use of postal reminders to reduce non-attendance at an orthodontic clinic: a randomized controlled trial. *Br Dent J*. 2003;195:199–201.
4. Eppright M, Shroff B, Best A, Barcoma E, Lindauer SJ. Influence of active reminders on oral hygiene compliance in orthodontic patients. *Angle Orthod*. 2014;84:208–213
5. Foley J, O'Neill M. Use of mobile telephone short message service (SMS) as a reminder: the effect on patient attendance. *Eur Arch Paediatr Dent*. 2009;10:15–19
6. Free C, Knight R, Robertson S, *et al*. Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomized trial. *Lancet*. 2011;378:49–55.
7. Geraghty M, Glynn F, Amin M, Kinsella J. Patient mobile telephone ''text'' reminder: a novel way to reduce non-attendance at the ENT out-patient clinic. *J Laryngol Otol*.2007;1:1–3.
8. Hamilton JY. Orthodontists shd B txtN Patients. The Progressive Orthodontist. 2011;Q2:42–44.
9. Hussein W, Hasan K, Jaradat A. Effectiveness of mobile phone short-message service on diabetes mellitus management; the SMS-DM study. *Diabetes Res Clin Pract*. 2011;94:e24–e26.
10. Jones ML. An investigation into the initial discomfort caused by placement of an arch wire. *Eur J Orthod*. 1984;6:48–54.
11. Jones M, Chan C. The pain and discomfort during orthodontic treatment: a randomized controlled clinical trial of two aligning arch wires. *Am J Orthod Dentofacial Orthop*.1992;102:373–381.
12. Keith D, Rinchuse D, Kennedy M, Zullo T. Effect of text-message follow-up on patient's self-reported level of pain and anxiety. *Angle Orthod*. 2013;83:605–610
13. Moher D, Hopewell S, Schulz KF, *et al*.; for the CONSORT Group. CONSORT 2010 explanation and elaboration: updated guidelines for reporting parallel group randomized trial.*BMJ*. 2010; 340:c869.
14. Pandis N. Randomization. Part 2: minimization. *Am J Orthod Dentofacial Orthop*. 2011; 140:902–904.
15. Pandis N. Sources of bias in clinical trials. *Am J Orthod Dentofacial Orthop*. 2011; 140:595–596.
16. Roth J, Kula T, Claros A, Kula K. Effect of a computer-generated telephone reminder system on appointment attendance. *Semin Orthod*. 2004; 10:190–193.

****