



The Effect of Intra-operative Text Messages in Reducing Anxiety Levels Among Family Members of Patients Undergoing Major Musculoskeletal Tumour Surgery

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Abstract

Background The family of patients undergo profound anxiety when their family member is undergoing major oncological surgery. In this study, we evaluated the effectiveness of periodic intraoperative text messages regarding the status of ongoing surgery in reducing anxiety levels among the patients' family members.

Materials and Methods Family members of 60 patients (one for each patient) who were undergoing major oncological surgery lasting more than 1 h were recruited and randomized into two groups (30 patients each). Group 1 (no SMS group) did not receive any text message while Group 2 (SMS group) received periodic intraoperative text messages. Respondents aged less than 16 years, those with associated psychiatric illnesses, and those who did not consent to the study were excluded. Anxiety among family members was assessed using the Visual Analogue Scale for Anxiety (VAS-A) and Anxiety component of Hospital Anxiety and Depression Scale (HADS-A) at five different periods; (P1) 1 day prior to surgery (P2) at separation from family at the operation theatre (P3) 1 h after commencement of surgery (P4) immediately after completion of surgery, and (P5) 1 day after surgery.

Results The mean VAS-A and HADS-S scores between both the groups did not show a statistically significant difference for P1, P2 and P5 assessment periods (preoperative period, separation in operation theatre, post-operative period). However, mean VAS-A and HADS-A scores were significantly higher for Group 1 compared to Group 2 during P3 and P4 periods, 1 h after commencement of surgery and completion of surgery, respectively.

Conclusion Periodic text messages updating the status of ongoing surgery helps to reduce anxiety for family members of patients undergoing oncological surgery during the intraoperative period.

Keywords Intra-operative · Text message · Anxiety

Introduction

Musculoskeletal malignancies are distressful due to its prolonged duration of disease, expensive treatment cost, complex and extensive nature of surgery, and risk of relapse and

poor survival. Thus, these patients and their family members are normally under profound psychological stress and anxiety. Anxiety may lead to headache, insomnia, vertigo, lack of concentration, impulsiveness, and irritability [1], thus, affecting the family member's ability as a caregiver to function normally while taking care of the patient. Hence, psychological distress and anxiety among family members of the patients should not be neglected or dealt with superficially.

As a standard operating procedure, when a patient is admitted for surgery, the surgeon and his team members would explain in detail the nature of the disease, treatment options, surgery to be conducted, and expected complications of the surgery to the patients and their family members. They would also be available during the postoperative period, to respond to the queries of patient and family

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members. However, during the intraoperative period there is minimal communication between the surgical team and the patient's family [2]. Providing timely information about the status and progress of the ongoing surgery would help reduce anxiety among family members in the waiting room [3].

Intraoperative text messages are shown to reduce parental anxiety for children undergoing posterior spinal fusion surgery for adolescent idiopathic scoliosis [4]. However, there is a scarcity of literature on the role of such intraoperative interactions in reducing distress for family members of patients undergoing surgery for musculoskeletal malignancies. This study aims to contribute to the literature on this topic of study.

Materials and Methods

This is a randomized single-blinded prospective study. Family members of 60 patients (one family member for each patient) undergoing major orthopaedic oncology surgery (lasting for more than 1 h) were recruited and randomized into two groups (30 patients each). Personal phone numbers were recorded from members of both the groups and both the groups were blinded to the variables in this study. Group 1 (No SMS group) did not receive any text messages, while Group 2 (SMS group) received periodic intraoperative text messages. Respondents of less than 16 years of age, those with associated psychiatric or mental illnesses, and those who did not consent to this study were excluded.

Anxiety among family members was assessed using Visual Analogue Scale for Anxiety (VAS-A) and Anxiety component of Hospital Anxiety and Depression Scale (HADS-A) at five different periods; (P1) 1 day prior to surgery (P2) at separation of patient from the family at the operation theatre (P3) 1 h after commencement of surgery, (P4) immediately after completion of surgery, and (P5) 1 day after surgery. VAS-A measures subjective anxiety of respondents from a scale of 0 to 10 [0 = no anxiety/fear, 10 = maximum or worst possible anxiety/fear]. HADS-A consists of seven questions each with scores ranging from 0 to 3 [minimum possible score = 0, maximum possible score = 21] for each question. The higher the HADS-A scores, the higher the anxiety level of the respondents. VAS-A and HADS-A are proven to be valid and reliable tools to assess anxiety levels [5, 6]. Table 1 below shows the intraoperative text messages via SMS sent to family members from Group 1. In cases of metastatic disease where pathological fracture fixation surgery was performed, messages two and three were replaced with messages notifying that the fracture has been fixed.

The relevant demographic data (age, level of education, employment status, and any previous experience waiting for surgery) of respondents from both the groups, clinical data

Table 1 Sequence of SMS's sent to Group 1 family members

Messages	Description
Message 1	The surgery has started
Message 2	The tumour has been completely resected
Message 3 (if any)	The reconstruction has been completed
Message 4	We are closing the wound
Message 5	Surgery has been completed, patient will be sent to the recovery zone

regarding tumour location and type of surgery performed, and the VAS-A and HADS-A scores from both groups during five different time periods were tabulated into the Microsoft Excel spreadsheet (Microsoft Excel 2010, Redmond, Washington). Statistical analysis was performed using SPSS software version 16 (Chicago, IL). Chi-square test, Fisher's exact test, and independent sample *t* tests were used to analyze statistical variations between the groups. Conclusions were then drawn based on the significance of the results ($p < 0.05$ was considered statistically significant).

Results

The demographics of the patients and the relationships of the respondents to the patients and the VAS-A and HADS-A scores are presented in Table 2. The mean age for family members in Group 1 was 38 ± 4.8 years compared to 40 ± 4.6 years for Group 2 ($p = 0.104$). The relationship of the respondents to the patients is shown in Fig. 1 and the types of lesions operated on in both groups is shown in Fig. 2, it is similar in both groups. The types of surgery performed in both groups are similar and shown in Fig. 3. Other than that, no significant statistical difference was noted between two groups for other demographic parameters such as level of education, working status and previous experience of waiting for surgery. In addition to that, the location of tumour, type of surgery performed, and the duration of surgery was also not significantly different between both groups (Table 3).

The mean VAS-A and HADS-A scores between both groups did not show statistically significant difference during the preoperative period (P1), separation in operation theatre (P2), and postoperative period (P5). However, mean VAS-A and HADS-A scores were significantly lower for Group 2 (SMS Group) compared to Group 1 (No SMS Group) at 1 h after commencement of surgery (P3) and at the completion of surgery (P4) [Table 4]. Interestingly, Group 1 respondents had the highest mean VAS-A and HADS-A scores at 1 h after commencement of surgery (P3), while respondents of Group 2 had the highest mean VAS-A and

Table 2 Showing the demographic details of the patients and participants

ID	Patient			Surgery	Participant (family member)			Anxiety Score								
	Sex	Age	Diagnosis		Relationship with patient	Age	HADS									
							P1	P2	P3	P4	P5	VAS				
Group 1: SMS																
1	F	30	Ewing sarcoma	Resection reconstruction	Husband	30	12	13	17	10	10	7	7	9	5	4
2	F	50	Pleomorphic sarcoma	Resection reconstruction	Son/daughter	18	3	5	7	3	0	3	4	6	3	2
3	F	15	Fibromatosis	Resection reconstruction	Mother	45	15	14	8	4	3	8	8	5	2	2
4	F	40	Pleomorphic sarcoma	Resection	Mother	40	16	5	5	0	0	7	3	3	2	1
5	F	21	Haemangioma	Resection	Father	55	17	12	12	11	10	9	8	8	6	5
6	M	73	Squamous cell carcinoma	Resection	Son/daughter	29	5	10	11	7	7	6	8	8	7	7
7	F	47	Pleomorphic sarcoma	Resection	Son/daughter	24	15	15	17	10	10	7	7	8	5	4
8	M	29	Chondrosarcoma	Resection	Mother	43	17	18	17	13	10	8	8	9	5	5
9	F	48	Epithelial sarcoma	Resection	Wife	45	13	13	15	13	10	7	6	7	5	5
10	M	53	Pathological fracture	Fracture fixation	Son/daughter	27	15	13	12	11	9	8	7	6	5	4
11	M	11	Osteosarcoma	Resection	Mother	33	7	9	9	8	5	3	4	4	3	2
12	P	21	Retroperitoneal neuroblastoma	Resection	Mother	40	12	15	16	5	1	7	8	8	3	1
13	P	60	Aseptic loosening	Fracture fixation	Son/daughter	35	15	14	16	14	10	8	8	9	8	5
14	M	43	Lipoma	Resection	Wife	39	11	9	10	7	5	6	5	5	4	2
15	F	51	GCT	Resection	Son/daughter	31	8	8	7	7	7	4	4	3	3	3
16	M	51	Pleomorphic sarcoma	Resection	Son/daughter	32	8	7	6	6	7	4	5	4	3	3
17	F	32	Rhabdomyosarcoma	Resection	Mother	62	13	13	9	3	2	8	8	6	2	1
18	F	5	Osteosarcoma	Resection reconstruction	Mother	29	2	1	1	1	1	1	1	1	1	1
19	F	42	Nodular PVNS	Resection	Husband	45	9	13	9	8	4	5	7	5	4	3
20	M	51	Schwannoma	Resection	Son/daughter	31	2	5	3	3	2	1	3	2	2	1
21	M	53	Pleomorphic sarcoma	Resection	Son/daughter	28	10	5	8	2	2	6	4	5	2	1
22	M	65	Lipoma	Resection	Son/daughter	30	6	10	11	6	3	4	6	6	4	2
23	F	41	GCT	Resection reconstruction	Sister	45	4	6	5	6	4	2	4	4	4	2
24	M	44	Pleomorphic sarcoma	Resection	Wife	40	5	11	11	7	4	3	5	5	4	2
25	M	51	Periprosthetic fracture	Resection reconstruction	Son/daughter	33	11	10	7	8	6	6	5	4	4	3
26	F	31	Neurofibromatosis (NF1)	Resection	Husband	41	14	15	6	9	6	7	8	8	4	3
27	M	32	Angiosarcoma	Resection	Father	59	1	3	4	3	1	1	2	2	1	1
28	M	52	Lipoma	Resection	Son/daughter	31	11	13	13	12	8	5	7	7	7	4
29	M	30	Neurofibromatosis (NF1)	Resection	Brother	34	7	11	12	11	3	3	5	5	5	2
30	M	21	Neurofibrosarcoma	Resection	Sister	32	7	12	13	13	11	4	6	5	4	2
Group 2: no SMS																
31	M	13	Osteosarcoma	Resection reconstruction	Mother	46	1	6	10	11	6	2	4	5	7	5

Table 2 (continued)

ID	Patient			Surgery	Participant (family member)			Anxiety Score									
	Sex	Age	Diagnosis		Relationship with patient	Age	HADS					VAS					
							P1	P2	P3	P4	P5	P1	P2	P3	P4	P5	
32	F	64	Pathological fracture	Fracture fixation	Son/daughter	32	10	12	15	10	7	6	7	8	5	4	
33	F	67	Pleomorphic sarcoma	Resection	Others	28	12	13	13	10	7	6	7	7	5	4	
34	F	50	Pathological fracture	Fracture fixation	Son/daughter	30	10	14	17	11	10	6	8	9	5	4	
35	F	26	Schwannoma	Resection	Others	27	6	8	9	5	5	6	7	5	5	3	
36	M	45	Pleomorphic sarcoma	Resection	Wife	44	10	10	14	7	5	6	6	7	3	3	
37	F	31	Pleomorphic sarcoma	Resection reconstruction	Husband	31	17	17	17	12	14	8	8	8	5	5	
38	F	42	Synovial sarcoma	Resection	Son/daughter	22	15	17	17	10	6	8	8	8	5	3	
39	F	19	Ewing sarcoma	Resection	Mother	40	14	14	16	10	6	7	7	8	5	3	
40	M	50	Residual soft tissue lesion	Resection	Son/daughter	26	11	11	11	10	7	6	5	5	4	4	
41	F	71	Lipoma	Resection	Son/daughter	30	10	11	11	10	8	6	8	8	6	6	
42	M	69	Pleomorphic sarcoma	Resection	Son/daughter	38	15	15	15	10	10	8	8	8	5	7	
43	M	70	Pleomorphic sarcoma	Resection	Son/daughter	40	14	15	17	8	10	8	8	8	6	6	
44	M	56	Pleomorphic sarcoma	Resection	Son/daughter	28	13	13	16	10	7	7	7	8	5	4	
45	M	30	Synovial sarcoma	Resection	Sister	28	11	11	15	8	7	6	6	8	6	4	
51	F	17	Osteosarcoma	Resection reconstruction	Mother	51	13	15	20	15	13	7	8	10	8	7	
47	F	9	Haemangioma	Resection	Mother	32	10	15	10	15	8	6	8	6	8	6	
48	F	22	Osteochondroma	Resection reconstruction	Mother	55	6	6	6	5	5	3	3	4	3	3	
49	M	13	Ewing sarcoma	Resection reconstruction	Mother	52	6	7	6	5	3	3	4	3	3	1	
50	M	53	Aseptic loosening	Fracture fixation	Wife	48	16	19	21	11	6	8	9	10	5	4	
51	M	18	Ewing sarcoma	Resection	Mother	41	17	21	21	4	3	8	10	10	3	2	
52	F	82	Pathological fracture	Fracture fixation	Son/daughter	62	6	7	9	8	4	3	4	5	9	2	
53	M	14	Chondroblastoma	Resection	Brother	18	5	8	12	3	3	3	4	6	2	1	
54	M	60	Pleomorphic sarcoma	Resection reconstruction	Son/daughter	29	12	15	13	8	6	6	8	6	4	3	
55	F	33	Synovial sarcoma	Resection	Husband	30	9	13	15	14	9	4	7	8	7	3	
56	F	25	Malignant melanoma	Resection	Sister	20	4	7	10	6	4	2	4	5	4	2	
57	M	52	Pathological fracture	Fracture fixation	Wife	46	3	5	5	4	3	1	3	3	2	1	
58	F	62	Neurofibrosarcoma	Resection	Others	61	1	3	6	3	1	1	2	3	2	1	
59	M	56	Pleomorphic sarcoma	Resection	Son/daughter	25	5	16	16	11	3	3	9	9	7	2	
60	F	7	Spindle cell cancer	Resection	Father	27	3	16	16	11	5	2	8	8	6	4	

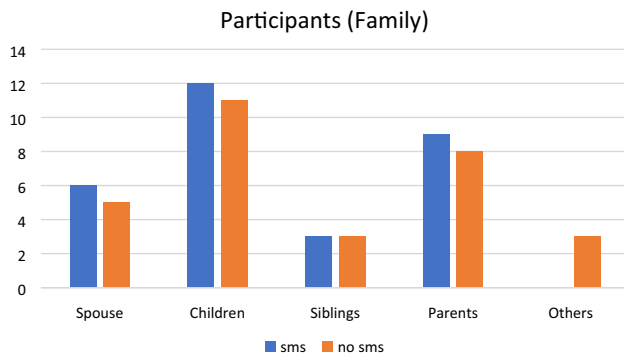


Fig. 1 Shows the relationship of the respondents to the patient

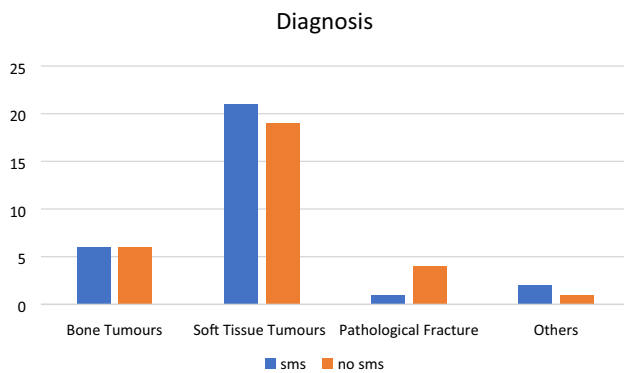


Fig. 2 Shows the types of tumours in both groups

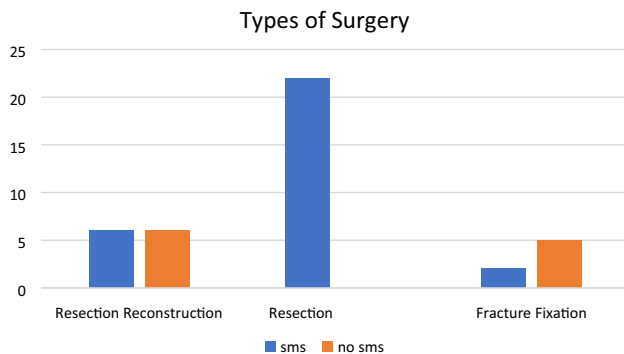


Fig. 3 Types of surgery in both groups of patients

HADS-A scores during separation at operation theatre (P2) (Figs. 4, 5).

For eight patients from Group 1 and six patients from Group 2, the surgery was postponed for 1 week. The anxiety assessment among family members was performed from the perioperative period up to the definitive surgery.

Discussion

Over the lengthy course of treatment, cancer patients are usually dependent on their family members for assistance with activities of daily living, regular hospital visits for treatment, for adherence to medication schedules and psychological as well as financial support. Family members of the patients tend to be drained physically, emotionally, and financially, while taking care of their loved ones. Thus, psychological distress such as anxiety and depression tend to be highly prevalent among these family members [7–9]. Patients' recovery process might be jeopardized if the caregiving family members themselves are unable to function normally. Therefore, pacifying the mental and psychological distress of family members of cancer patients should also be emphasized for a smoother treatment and recovery.

Surgery for musculoskeletal malignancies is usually complex which explains why the family members would be highly anxious during perioperative period. Providing detailed and accurate updates during the perioperative period might help to reduce some of the fears and anxiety faced by them. The waiting period during surgery is the most stressful hospital experience for the family members [10–12]. Family members waiting during surgery would experience an increase in heart rate, increase in blood pressure [11], and emotional disturbances such as restlessness, inability to concentrate, panic reactions, and loss of control [10]. Leske et al. [11] noticed that family members who received informational progress reports during waiting hours felt more assured and experienced lesser fear or anxiety. Besides that, heart rate and mean arterial pressure were also significantly lower for them compared to family members who did not receive any progress report. Kwan et al. [4] reported that intraoperative text messages were an effective intervention to reduce parental anxiety for children undergoing posterior spinal fusion surgery for adolescent idiopathic scoliosis. However, Topp et al. [13] reported that the group which received paging devices during waiting period experienced a greater state of anxiety and greater percentage of time spent outside surgical waiting rooms compared to the group which did not receive paging devices. In another study by Trecartin et al. [14], informational report to family members did not reduce anxiety among the waiting family members. The results from these two researchers contradict with the findings of others. Watching a movie or listening to music has also been shown to reduce stress and anxiety among family members during waiting hours for surgery [15, 16].

Surgical procedures in orthopaedic oncology vary according to the nature of disease, complexity, extensiveness of the tumour, and expected complications and outcomes from the surgery. Therefore, intraoperative anxiety

Table 3 Demographic characteristics of respondent family members, location of tumour, type and duration of surgery performed for the two Groups

	Group 1 (no SMS) <i>n</i> = 30	Group 2 (SMS) <i>n</i> = 30	<i>p</i>
Mean age (years)	38 ± 4.8	40 ± 4.6	0.104
Education			
Level 1 (less than high school)	2	1	0.547
Level 2 (high school)	12	11	
Level 3 (graduation)	13	17	
Level 4 (post-graduation)	3	1	
Working status			
Full time	14	19	0.154
Part time	0	1	
Not working	16	10	
Previous experience waiting for surgery			
Yes	13	19	0.124
No	17	11	
Location of tumor			
Upper extremity	9	7	0.135
Lower extremity	20	17	
Pelvis/axial skeleton	1	6	
Type of surgery			
Resection only	17	21	0.461
Resection + reconstruction	7	4	
Fracture fixation	6	5	
Mean duration for surgery (minutes)	142 ± 36.89	132.83 ± 38.67	0.351

Table 4 Mean VAS-A and HADS-A scores of respondent family members between the two groups

Period	Mean scores	Group 1 (no SMS)	Group 2 (SMS)	<i>p</i>
P1	VAS-A	5.26 ± 2.38	5.2 ± 2.31	0.11
	HADS-A	9.5 ± 4.7	9.7 ± 4.8	0.87
P2	VAS-A	6.5 ± 3.1	5.6 ± 2.0	0.12
	HADS-A	12 ± 4.4	10.4 ± 4.1	0.15
P3	VAS-A	6.8 ± 2.0	5.5 ± 2.3	0.022
	HADS-A	13.3 ± 4.4	10.3 ± 4.4	0.011
P4	VAS-A	5.0 ± 1.8	3.9 ± 1.7	0.023
	HADS-A	10.9 ± 2.8	7.3 ± 3.8	0.0001
P5	VAS-A	3.56 ± 1.7	2.8 ± 1.5	0.07
	HADS-A	6.3 ± 2.9	5.16 ± 3.3	0.11

among family members waiting for different surgeries may vary significantly. In this study, we focused on the assessment of anxiety among family members of patients undergoing surgery for musculoskeletal malignancies.

Various methods have been used to deliver intraoperative information to the waiting family members. Kathol et al. [2] used in person progress report given 30 min after commencement of surgery and post-surgery. Meanwhile, Leske et al. [11] used single 5–10 min in person progress report halfway through the surgery. In another study, Leske et al.

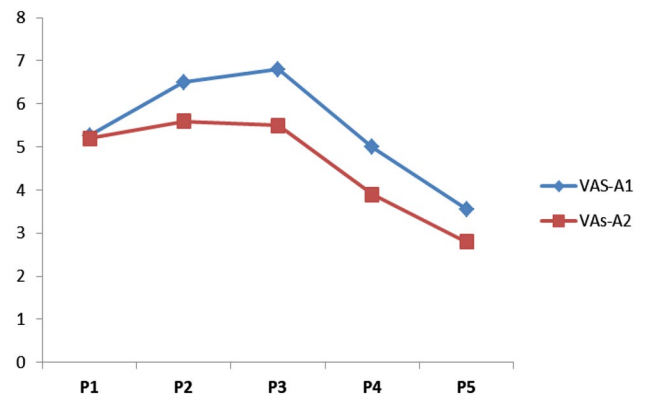


Fig. 4 Mean VAS-A scores (y-axis) for both groups during different periods (x-axis)

[17] compared the effectiveness of progress report via telephone compared to in person progress report and found the latter to be more effective. As noted earlier, Topp et al. [13] used paging devices for delivering progress report. In this study, we used text messages via SMS similar to Kwan et al. [4].

Our results showed that anxiety significantly was less during the P3 and P4 assessment periods in the group that received the SMS notifications, which reflected the psychological status of family members during intraoperative

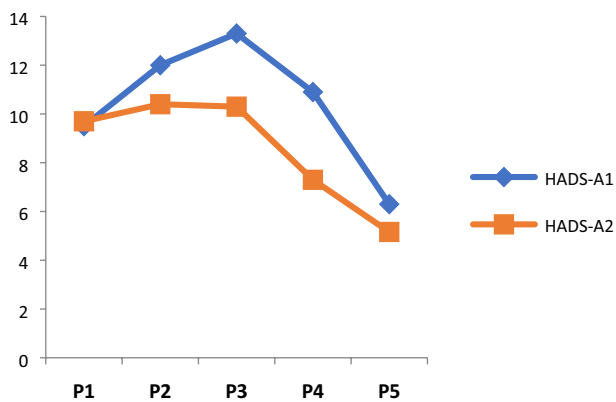


Fig. 5 Mean HADS-A scores (y-axis) for both groups during different periods (x-axis)

period. Demographic parameters, location of tumour, and type and duration of surgery did not show any statistically significant difference for both groups.

Conclusion

Text messages via SMS are one of the simplest and most convenient method of delivering information regarding the status of ongoing surgery to the accompanying family members which effectively reduces their anxiety levels during the perioperative period. This can be performed by a junior member of the surgical team who is not scrubbed up in the particular surgery.

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