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RESEARCH ARTICLE

DOES INCREASED PERI-OPERATIVE COMMUNICATION IMPROVE PATIENT SATISFACTION AFTER TOTAL JOINT ARTHROPLASTY? A RANDOMISED CONTROLLED TRIAL

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ABSTRACT

Aim: To determine whether peri-operative cell phone massaging patients undergoing Total Joint Arthroplasty improves the satisfaction rate. Methods: We conducted a RCT of 90 patients and were left with 80 patients at final analysis, 40 participants in each group. ***Results:*** In the study group, 57.5% were satisfied, 22.5% very satisfied, 12.5% indifferent and 7.5% were dissatisfied versus the control group's 77.5% satisfied, 17.5% indifferent and 5% dissatisfied. Asked if they would recommend TJA at our hospital to their family 80% answered yes, 12.5% unlikely and 7.5% were indifferent in the control group. In the study group 57.5 % answered yes, 20% highly recommend it, 15% were indifferent and 7.5% unlikely. There was no statistically significant difference in pre-operative HHS and post-operative HHS i.e., between the groups. There was statistical significance in pre-operative OKS between the two groups i.e., p -value = 0.00000032 and for post-operative OKS i.e., p -value = 0.00086. ***Conclusion:*** The satisfaction rate of patients receiving SMSs is equivalent and comparable to that of patients using traditional forms of communication. The quality of the satisfaction is superior for SMS patients. Patients receiving peri-operative SMSs while undergoing TKA do functionally better. Peri-operative SMSs are beneficial for patients undergoing TJA.

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INTRODUCTION

Over 700 000 Total Joint Arthroplasties (TJAs) were performed in the United States of America (USA) in 2014 and these numbers are projected to increase in the coming decades (1). More than 63 000 hip replacements and 75 000 knee replacements were performed in Canada in 2019 – 2020 (2). An increase of 2.4% for hips and a decrease of 0.4% for knees compared with the previous year. The relatively stable volumes are likely due to the beginning of the pandemic in March 2020 (2).

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In South Africa (SA), a country with 11 official languages, communication between doctors and their patients remains particularly imperative but also difficult. Day et al. in their 2017 paper reported that 87% of the participants felt that messages helped them be better prepared for surgery and 100% were better informed (3). In a study by Gwam et al., the authors explored what factors influenced patients with clinical depression in their rating of their hospital stay following TJA. The only factor found to be statistically significant was the patients' communication with the nursing staff (4). Over 40 000 digital mobile applications focus on healthcare but still do not cater for both doctor and patient interactions (5). Effective communication between physicians and patients lays the

foundation for an optimal patient experience with a high satisfaction rate (1). Face to face interaction between in-patients and treating surgeons on a constant basis is near impossible. Implementing the use of cell phone messaging as a tool for doctors to communicate with their patients on a routine basis also has its challenges. Bishop et al. reported that some physicians felt this was more work for them, and the lack of payment for such services was cited as a barrier (6). Despite this, the advantages gained from using cell phones to communicate with patients outweighed the disadvantages. Only 33% of physicians were rated as excellent for their communication behaviour and as low as 16% communicating via email with their patients (7). Validity of the tools used to assess patient satisfaction has little impact. Most institutions utilise internally developed instruments for outpatient satisfaction and choose to use private vendor's instruments for inpatient satisfaction (7). Stretching the use of electronic/digital modalities for doctors to communicate with their patients was also examined in a study by Vardanian et al. The authors investigated the use of social media in medical practice by plastic surgeons and reported that 50.4% of them used social media in their medical practice (8). Furthermore 49.0% of the surgeons felt it provided them with a platform for education, 52.1% used it as a marketing/advertising tool, while 56.7% felt that incorporating social media in their medical practice was inevitable. Patient satisfaction is strongly linked to good communication and a well outlined follow-up plan (9). In a study involving 1 541 patients, it was found that patients did not recommend surgeons based on several factors, the most cited reasons being failure to communicate the patients' medical condition and answer questions thereafter (10).

METHODS

We conducted a RCT looking at the benefits concerning patient satisfaction of increased communication in the peri-operative period for patients admitted for TJA. This study focused on TKA and THA patients. Communication was done through standardised cellphone messages to the study group. The messages were sent from a day before surgery to day 3 post-surgery, then from week 1 to week 6 post-operatively. The messages required no response from the patients and therefore, no added cost was incurred. Ethical approval was granted from the human research ethics committee (HREC) of the university (HREC number: M181199) before recruiting the first patient. The trial was registered with the Pan African Clinical Trial Registry (PACTR202207569764052). Written informed consent was obtained from all participants. Recruitment of patients was done by orthopaedic trainees, with surgeries planned for the rest of the week. Upon confirmation of meeting all the inclusion criteria, patients were recruited and randomised. Randomisation was done through sealed envelopes labelled with either "Control" or "Study" inside, patients would pick this out of a box and allocated to whichever group they picked. This method is simple, cost-effective and all patients stand an equal chance of being allocated to either group. Allocation concealment was established for the outcome assessors and only the principal investigator (PI) had knowledge of group allocation. Outcome assessment was done at 6 weeks after surgery. This included completion of a questionnaire and functional scoring using either the Harris hip score (HHS) or the Oxford knee score (OKS) for patients who had THA and TKA, respectively. The scores are also routinely evaluated pre-operatively. Blinding of patients was not done in this study as this would be difficult in a case where one group would have to receive cell-phone messages. Demographic data of each patient was collected. This was later kept under an allocated study number. Personal identifying data were kept to a minimum and were always protected. There were no added risks to patients and no costs incurred while conducting this trial. Potential benefits included improved compliance, enhanced understanding, and better clinical and functional outcomes.

- All primary TKA/THA patients
- Patients 18 years of age and older
- All patients who own cell phones

Exclusion criteria

- Patients requiring revision surgery
- Trauma patients (Neck of femur fractures-NOF)
- Patients who did not consent for enrolment into the study

Data Analysis: Differences between the group of patients who received a message and those who did not was evaluated using the Pearson's chi-squared test. An independent sample t-test was also used to analyse continuous variables e.g., patient's age, body mass index (BMI) etc. The level of significance was set at $p < 0.05$. All statistical analyses was conducted using IBM SPSS, version 23. Below is the Consolidated Standards of Reporting Trials (Consort) diagram showing progression of participants in the trial (see Figure 2.1).

RESULTS

A total of 90 patients were enrolled to the study with 11% (n = 10) patients lost to follow-up, five patients from each group. This left us with 40 patients on each group. Sixty six percent (n= 53) were females and 34% (n = 27) were males.

In the control group: Thirty percent (n = 12) were males and 70% (n = 28) females. The average age was 59.2 years (26 – 81 years). Of this group 65% (n = 26) lived in a normal house, 25% (n = 10) in a flat and 5% (n = 2) in informal settlements. Fifty percent of patients were pensioners while 32% (n =13) were unemployed but on a disability grant. Majority of patients in this group (65% (n =26)) were admitted for THA and the remaining 35% (n = 14) had TKA. Twenty five percent (n = 10) had had previous arthroplasty in the contra-lateral knee or hip. The average pre-operative Harris hip score (HHS-1) was 45.2 ± 13.1 (range 10 – 64, median 47) and post-operatively (HHS-2) was 92 ± 8.4 (range 69 – 99, median 95). For the TKA patients, the average pre-operative Oxford knee score (OKS-1) was 21.4 ± 5.5 (range 15 – 28, median 22) while post-operatively (OKS-2) it was 44.8 ± 3.5 (range 39 – 48, median 46). When asked about the care they received in the hospital, 77.5% (n = 31) were satisfied, 17.5% (n = 7) were indifferent and 5% (n = 2) were dissatisfied Patients were then asked if they would recommend having TJA at CMJAH to their family and/or friends. Eighty percent (n = 32) answered yes, 12.5% (n = 5) said unlikely and 7.5% (n = 3) were indifferent. Seventy five percent (n = 30) felt that their hospital stay was easier than expected, 10% (n = 4) felt it was worse and the remaining 15% (n = 6) thought it was unaffected.

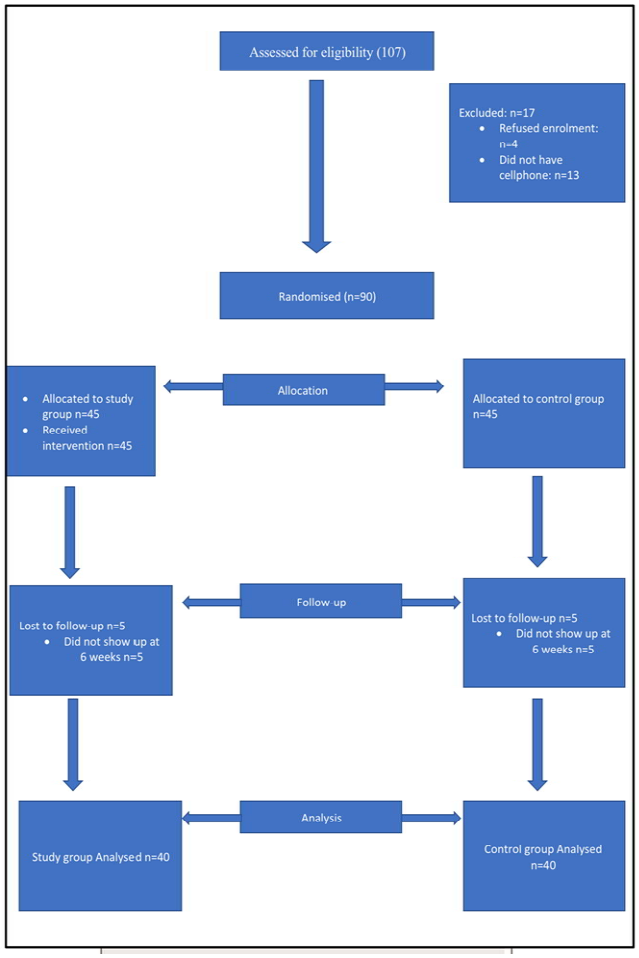

Figure 1.1. Consort diagram for our study participants

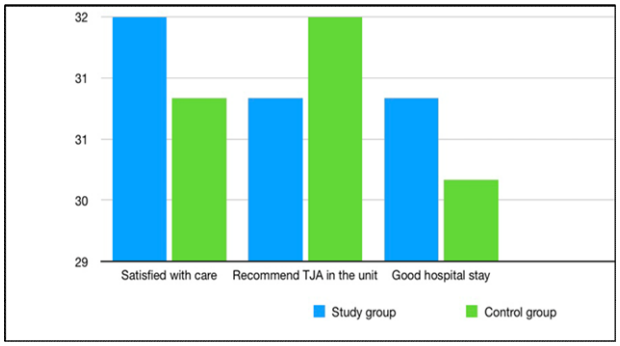

Figure 1.2. Illustration of the absolute number of patients that were satisfied with care, recommend TJA in the unit for other patients and patients who had a good hospital stay. Each group had 40 patients

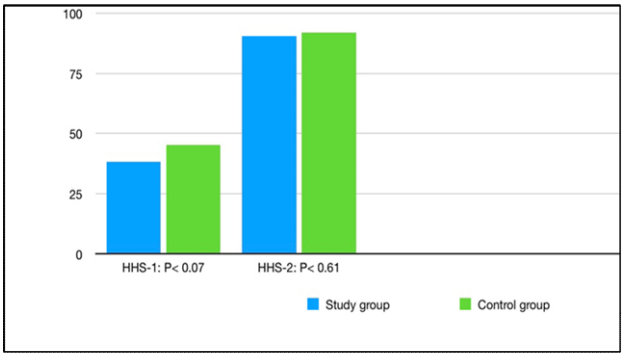

Figure 1.3. Illustration of the pre-operative HHS-1 and the post-operative HHS-2 between the 2 groups

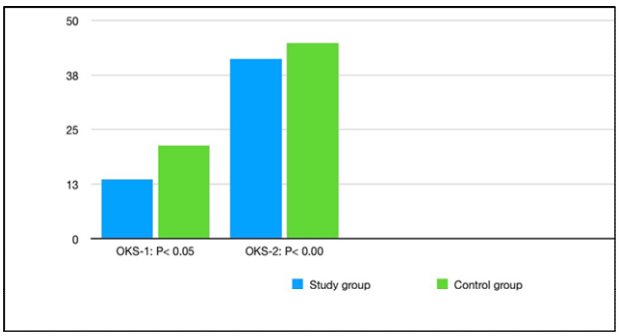

Figure 1.4. Illustration of the pre-operative OKS-1 and the post-operative OKS-2 between the two groups

Subjective evaluation of post-operative pain saw 57.5% (n = 23) of patients feeling that it was better than expected, 12.5% (n = 5) thinking it was worse than expected and 30% (n = 12) felt it was as expected. When asked how they felt about their everyday functioning after the operation, 87.5% (n = 35) said it had improved and 12.5% (n = 5) said it was unchanged. None of the patients said that it had worsened.

Table 2.1. Baseline Patient Demographic and Clinical Characteristics for the 2 groups

		Study group	Control group
Gender:	Male	37.5% (*n*=15)	30% (*n*=12)
	Female	62.5% (*n*=25)	70% (*n*=28)
Age		63.8 (32 – 81)	59.2 (26 – 81)
Total Hip Arthroplasty		65% (*n*=26)	65% (*n*=26)
Total Knee Arthroplasty		35% (*n*=14)	35% (*n*=14)
Comorbidities	1	50% (*n*=20)	32.5% (*n*=13)
	2	5% (*n*=2)	5% (*n*=2)

In the study group

In this group, 37.5% (n = 15) were males and 62.5% (n = 25) females. The average age was 63.8 years (32 – 81). Seventy three percent (72.5%) (n = 29) lived in a normal house, 15% (n = 6) in a flat and 12.5% (n = 5) in informal settlements. Fifty five percent (n = 22) of patients were pensioners while 22.5% (n = 9) were unemployed but on a disability grant. Similarly, to the control group, majority of patients in this group (65% (n = 26)) were admitted for THA and the remaining 35% (n = 14) had TKA. Thirty three percent (32.5%) (n = 13) previously had arthroplasty in the contra-lateral knee or hip.

The average HHS-1 was 38.3 ± 11.9 (range 14 – 58, Median 41) and HHS-2 went up to 90.5 ± 9.9 (range 66–99, Median 95). For the TKA patients, the OKS-1 was 13 ± 6.3 (range 0 – 22, Median 13) while OKS-2 was 41.2 ± 6.4 (range 30 – 48, Median 43). When asked about the care they received in the hospital, 57.5% (n = 23) were satisfied, 22.5% (n = 9) very satisfied, 12.5% (n = 5) indifferent and 7.5% (n = 3) were dissatisfied. Eighty percent (12/15) of males were satisfied (30% (12/40)) compared to a similar 80% (20/25) of females (50% (20/40)). Of the 13 patients without comorbidities, 11 (84%) were satisfied (27% (11/40)), like 84% (21/25) of patients with comorbidities (52% (21/40)). Eighty one percent (18/22) of pensioners (45% (18/40)), 77% (7/9) of patients on a disability grant (17% (7/40)), 50% (3/6) of unemployed patients (7.5% (3/40)) and 100% (3/3) of employed patients (7.5% (3/40)) were satisfied. Patients were then asked if they would recommend having TJA at our institution to their family and/or friends.

Fifty eight percent (57.5%) (n = 23) answered yes, 20% (n = 8) said highly recommend it, 15% (n = 6) were indifferent and 7.5% (n = 3) said unlikely. Seventy eight percent (77.5%) (n = 31) felt that their hospital stay was easier than expected, 22.5% (n = 9) felt it was unaffected. No patient felt it was worse. Ninety percent (n = 36) of patients found the messages assisted them with rehabilitation. Subjective evaluation of post- operative pain revealed 72.5% (n = 29) of patients feeling that it was better than expected, 20% (n = 8) thinking it was as expected and 7.5% (n = 3) felt it was worse than expected. When asked how they felt about their everyday functioning after the operation, 92.5% (n = 37) said it had improved and 7.5% (n = 3) said it was unchanged. None of the patients said that it had worsened. Majority of the patients (87.5% (n = 35)) received all 10 messages whilst 12.5% (n= 5) received less than 10 of the messages. 52.5% (n = 21) were happy most of the time with receiving the messages, 25% (n = 10) all the time, 15% (n = 6) some of the time, 5% (n = 2) were indifferent and 2.5% (n = 1) were not at all happy to receive the messages.

In this group, 55% (n = 22) found the messages very helpful while 25% (n = 10) found them extremely helpful. To 5% (n = 2) of the patients they made no difference and 15% (n = 6) were undecided. The messages were easy to understand in 95% (n = 38) of the study group and only 5% (n = 2) admitted to not understanding them well. Twenty five patients (62.5%) were accepting of having the messages in English, 15% (n = 6) in isiZulu and the 22.5% (n = 9) was shared between Pedi, Sotho, and Xhosa. Patients were asked if the messages helped with rehabilitation. Ninety percent (n = 36) believed they were helpful and only 10% (n = 4) answered no. Concerning wound care, 62.5% (n = 25) said the messages assisted with wound care and 37.5% (n = 15) found no benefit in that regard. Overall, 52.5% (n = 22) said yes, they would recommend the messages for other fellow patients, 25% (n = 10) would highly recommend them whilst 12.5% (n = 5) and 10% (n = 4) were "indifferent" and "unlikely to", respectively. Demographic data are as shown in Table 3.1.

Study group versus control group: Paired samples t-test indicated that mean difference of paired observations of the HHS- 1 between control group and study group was not statistically significant ($p > 0.05$) i.e., p- value = 0.07. On reviewing HHS-2 between the groups, the Paired samples t-test indicated that mean difference of paired observations of the HHS-2 between control group and study group was not statistically significant ($p > 0.05$) i.e., p-value = 0.61. Of note, the Paired samples t-test indicated that mean difference of paired observations of the OKS-1 between control group and study group was statistically significant ($p < 0.05$) i.e., p-value = 0.00000032. More interestingly perhaps, the Paired samples t-test indicated that mean difference of paired observations of the OKS-2 between control group and study group was statistically significant ($p < 0.05$) i.e., p-value = 0.00086. There was no statistically significant difference between Hospital stay experience of patients in the control group and the Hospital Stay experience of the Study group, p-value > 0.05 i.e., p = 0.10. This was also true for post- operative pain between the 2 groups, p-value > 0.05 i.e., p = 0.37. There was no statistically significant difference between the patients' subjective post-operative everyday function in the control group and that of the Study group, p-value > 0.05 i.e., p = 0.46.

Figure 1.2 demonstrates the outcome for the responses on hospital care if they would recommend the unit for TJA and hospital stay. These displayed no statistical difference. Figures 1.3 and 1.4 demonstrate the pre-operative and post-operative HHS and OKS between the two groups, respectively.

DISCUSSION

We undertook this study to determine whether peri-operative cell phone massaging patients undergoing TJA at an urban South African public hospital helps improve the satisfaction rate six weeks post-operatively. This further evaluated their impression of the care received and functional scoring. The era of arthroplasty thrives on value-based reimbursement and high-volume surgical procedures, and thus patient experience is increasingly important (11). A more sophisticated method in a form of downloadable apps could have been used however, a simpler and a more affordable method was chosen in the hope to enhance compliance and reduce cost to patients. This becomes very important considering the patient demographics of the study, largely older patients living on pension money.

More patients in the study group were satisfied with the care received than those in the control group (see Figure 1.2). However, this did not meet statistical significance, p-value > 0.05 i.e., p = 0.76. A more detailed look into this however does reveal that the study group had a higher quality of satisfaction with 9 patients in the study group being "very satisfied" with the care received versus none in the control group. The text messages played a positive role in these patients. A systematic review came to a similar conclusion as our study, that patient satisfaction was equivalent in both groups (12). Patient satisfaction is not simple to measure and has multifactorial factors. Statistically significant factors also include the patients' communication with the nursing staff (4). This can explain why this intervention was not outrightly superior to routine practice. Some patients perhaps would do better with a more interactive platform than just standard messages that they cannot respond to For the most part our results seem to show dissimilar outcomes to what is published by Campbell et al. (11). Their trial showed the intervention group to outrightly do better than the control group. The Harris hip scores of the 2 groups were very similar (see Figure 1.3). These did not display any statistically significant difference. The groups essentially started off with very similar disability levels. Both groups improved remarkably but unsurprisingly, there was no statistically significant difference in their post-operative Harris hip scores. Generally, THA patients are better functionally than TKA patients (1). Of note however, the Paired samples t-test indicated that mean difference of paired observations of the OKS-2 between the groups is statistically significant ($p < 0.05$) i.e., p-value = 0.00086 favouring the control group (see Figure 1.4). It must be noted however that the study group started off with a statistically significantly lower Oxford knee score pre-operatively. On average, the change in OKS was by 23.4 points for the control group and by 28 points for the study group. Literature shows that patients on the intervention group exercise 8.6 minutes more than the control group and have a better knee range of motion (ROM) at 3 weeks (11). This effect is however non-existent at 6 weeks and the groups have a similar ROM (11). Non-modifiable patient factors were very similar between the groups as shown in Table 2.1. In absolute numbers more patients in the control group responded positively to the question of recommending the unit to their family/friends (see Figure 1.2).

However, not reflected on the graph is that 8 patients in the study group would "highly recommend" having a TJA in the institution versus none in the control group. This is an important finding but very difficult to attribute to the intervention. Worth acknowledging, nonetheless. Bishop et al., found that even with brief lapses in communication, "word-of-mouth" recommendation was reduced (5). Contrary to routine practice, the intervention provided patients with weekly instructions for the first 6 weeks post-operatively. This certainly bridged these potential lapses and might be responsible for the experienced differences amongst the groups. Hospital stay was similar for both groups (see Figure 1.2). The Chi-squared test indicated no statistically significant difference, p-value > 0.05 i.e., p = 0.10 for this parameter. Evaluation of subjective parameters such as this one is difficult with just quantitative methods. An in- depth engagement using qualitative methods might yield more valuable results. The use of the intervention was extended to the rehabilitation period. Our study had 90% of the intervention group admitting that the text messages helped with rehabilitation. In a systematic review, Mckeon et al., concluded that Telerehabilitation following lower-extremity joint replacement is less expensive compared with in-person physical therapy, with equivalent outcomes and patient satisfaction (12). Our results are in keeping with this finding. Similar work done in the first world yielded largely positive results (11). To a degree this examines this method in a third world context. Eighty three percent of the studies report more than 80% satisfaction rate for TKA and up to 90% satisfaction rate for THA in separate studies (1). While an improvement in both these statistics is the goal, it is much more important for TKA patients. This trial has shown this group of patients to have been the ones that benefited the most from this intervention. Surgeons might be anxious about limited physical post-operative clinic visits for TJA patients. The anxiety might be brought up by the potential of not picking up complications early enough or not spending the desired amount of time pre-operatively counselling patients. The intervention employed in this trial certainly added no harm to patients and even though not formally evaluated, no peculiar complications were attached to it. In a society that is moving towards less physical contact because of the Covid-19 pandemic, such measures are worth exploring. The methodology used in our study allowed us to determine if the patient received correspondence from the investigators, however, patients being able to reply to that correspondence in real time was beyond the scope of this project. The mode of communication employed in this study is not peculiar to arthroplasty nor is it to the field of orthopaedics. We chose it for its simplicity and accessibility to many patients. To the best of our knowledge, this has not been conducted locally in SA. Published literature examines this question largely in the first world. Our institution treats patients from different linguistic backgrounds. In a country like South Africa with 11 official languages, many instructions can be lost in translation as not every patient is fluent in English. Majority of the patients (62.5%) were happy to keep the messages in English. This is not particularly surprising. Our institution is situated in urban Johannesburg and our drainage areas are more contemporary. The outcome might have been different for the rural parts of SA where the population is older and with little formal education. This trial is not without limitations. The sample size is one of those. Perhaps a future trial can be designed to include a larger sample. Importantly, allocation concealment and patient blinding were not done because of the nature of the intervention. This does introduce selection bias which has a significant impact on the results. This exaggerates the estimate of the effect size of interventions (13). The follow-up period is short and perhaps longer follow-up time might reveal different findings. The trial was registered after inception.

CONCLUSION

The satisfaction rate of patients that received short text messages to their cell phones is equivalent and comparable to that of patients using traditional forms of communication. The quality of the satisfaction is superior for SMS patients than it is for their counterparts. Patients receiving peri-operative SMSs while undergoing TKA display a greater improvement (OKS) functionally. The function of patients that received peri-operative SMSs while undergoing THA is equivalent to the patients using traditional forms of communication. The use of SMSs as a tool for increased peri-operative communication is safe for patients undergoing TJA, surgeons and patients need not have anxiety about using this platform. It is simple, convenient and patients find it easy to understand and it also limits physical contact. Peri-operative cell-phone SMSs are beneficial for patients undergoing TJA.

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Appendices

Appendix A: Content of short text messages

Peri-operative day (Hip)	Message content
Day before surgery	-Good afternoon, tomorrow is your surgery day. -Please kindly do not eat from 22h00 tonight -After the operation you will be transferred back to ward 374 and a Dr will see you in the afternoon -Should you feel unbearable pain please inform our kind nursing staff
D1 post-operative	-Good morning, today you are expected to be able to walk 10 metres with a frame and sit in a chair. -Please kindly keep the wound dressing dry and inform staff if at all worried -Pain is expected to improve today and please request clexane (blood thinner) from nursing staff
D2 post-operative	-Good morning, today you are expected to be able to walk to the toilet with crutches and improve thigh muscle strength -Greater improvement to your pain is expected today -Kindly inform our staff members with any concern
D3 post-operative	-Good morning, today you are expected to be able to walk around the ward alone with crutches - You will be taken to walk stairs -Please inspect your wound dressing that it's clean and dry -You are getting closer to your day of discharge.

Peri-operative day (knee)	Message content
Day before surgery	-Good afternoon, tomorrow is your surgery day. -Please kindly do not eat from 22h00 tonight -After the operation you will be transferred back to ward 374 and a Dr will see you in the afternoon -Should you feel unbearable pain please inform our kind nursing staff
D1 post-operative	-Good morning, today you are expected to be able to walk 10 metres with a frame, sit in a chair and bend your knee to a sitting position with assistance -Please kindly keep the wound dressing dry and inform staff if at all worried -Pain is expected to improve today and please request clexane (blood thinner) from nursing staff
D2 post-operative	-Good morning, today you are expected to be able to walk to the toilet with little help. -Improve thigh muscle strength and bend your knee to sitting position without assistance -Greater improvement to your pain is expected today -Kindly inform our staff members with any concern
D3 post-operative	-Good morning, today you are expected to be able to walk around the ward alone with crutches and on the stairs -Please inspect your wound dressing that it's clean and dry -You are getting closer to your day of discharge.
1st week post-operative	-Please continue to mobilise as per physiotherapist's instruction -Pain should be much reduced now -When you undress, remove clothes from your surgery side last. -Sit in a firm chair with a straight back and armrests. Avoid soft chairs, rocking chairs, stools, or sofas.
2nd week post-operative	-Kindly monitor that your wound dressing remains dry -DO NOT cross your legs. -Do not sit in the same position for more than 30 to 40 minutes at a time -Keep your feet and knees pointed straight ahead, not turned in or out.
3rd week post-operative	-Please remember to present to your local clinic to have skin staples removed -Avoid chairs that are too low -You may stand in the shower if you like. -Do not dress standing up. Sit on a chair or the edge of your bed if it is stable
4th week post-operative	-This is your last week of the clexane injection -When you are going up the stairs, step first with your leg on the side that did not have surgery. -When you are going down, step first with your leg on the side that had surgery. -Do not bend too far forward from your waist or pull your leg up past your waist.
5th week post-operative	-Please remember to take cautions as instructed by the physiotherapist -Use your crutches or walker until your doctor tells you it is OK to stop using them. -Take small steps when you are turning -Use an elevated toilet seat to keep your knees lower than your hips
6th week post-operative	-A friendly reminder that you are due for a clinic review at CMJAH this week -Do not drive yourself. -Break up long car trips. Stop, get out, and walk about every 2 hours -Car seats should not be too low. Sit on a pillow if you need to.

Messages from the 1st week to the 6th week post-operatively apply to both Total Knee Replacement and Total Hip Replacement patients

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