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Preoperative Patient Education on Length of Stay of Patients Undergoing Orthopedic Surgeries: A Pilot Randomized Controlled Trial

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Abstract

Hip and knee replacement surgeries are complex procedures with many risks and complications post-surgery. Patient education preoperatively has shown to limit some of these complications but nothing is reported on the effect of preoperative education on the length of stay in Lebanon. The aim of this paper is to evaluate the effect of a structured preoperative education to patients undergoing selected orthopedic surgeries. A pilot study for a randomized controlled trials (RCT).The study was conducted at Al Zahraa Hospital and Rafic Hariri University Hospital (RHUH). The study was introduced to potential participants, baseline data was collected and then patients were randomized to the intervention and the usual care groups. The intervention group was given the education by one of the five nursing students that were conducting this study. The education included items on pain management, wound care, physical activity and diet; and took place one day before the surgery. The educational material was unified for all patients to assure consistency. A total of 10 patients were enrolled into this pilot study. Mean age was 68 years and 70% were females. There was no significant difference between the groups in pain reduction or in post-operative complications. The study highlights the need of well-designed methodology of an educational intervention for patients undergoing selected orthopedic surgeries and its effect on the length of stay.

Keywords

education; nursing; preoperative; patient care and length of stay

1. INTRODUCTION

Osteoarthritis, the inflammation of the joints, is a frequent debilitating condition of the elderly population (Anna et al., 2013). The knees and hips are the most affected joints where the functional restrictions and impairment in geriatrics are the major results of arthritic knee and hips joints (Huang et al., 2012). The basic necessity of orthopedic surgery is recognized as an indication of extreme illness (Abe et al., 2017). Orthopedic surgeries include hip and knee replacement surgeries; arthroplasty which cause the patients and their families serious physical and psychological disturbances (Johansson et al., 2005). Patients undergoing such surgeries are at risk of several postoperative complications. Such complications are related to the patients' health conditions and demographic statuses (comorbidities, age) (Michel et al., 2002), hospital related complications (nosocomial infections) (Whitehouse et al., 2015) and surgery related such as hemorrhage, dislocation, excessive wound drainage and infection, nerve damage and pain and increased length of hospital stay (LOS) (Husted et al., 2008). Length of stay is a term that describes the hospital admission period. The average length of stay for patients undergoing hip or knee replacement is 8 days (Foote et al., 2009). There are several variables associated with increased length of stay such as sex, advanced age, obesity, multiple medical co- morbidities, and the period between surgery and mobilization, in addition to the American Society of Anesthesiologists (ASA) score (Husted et al., 2008). The ASA scale was used to indicate the risk of complications for patients undergoing surgeries. The higher the score of ASA (3 or more) the higher the rate of increased LOS and complications (Michel et al., 2002). It consists of 5 categories which are (I) healthy patient, (II) patient with mild systemic disease, (III) patient with severe non-incapacitating systemic disease, (IV) patient with incapacitating systemic disease, and (V) moribund patient; who is a patient at the point of death (Michel et al., 2002). Many steps are undertaken to avoid postoperative complications, among which are the administration of antibiotic therapy, aseptic techniques during and post surgeries, in addition to patient monitoring, early ambulation, pain control and patient education (Stenvall et al., 2012). Preoperative education refers to any educational intervention delivered before surgery (Johansson et al., 2005). The aim of this education is to improve people's knowledge, health behaviors and health outcomes. It should be initiated preoperatively and should include items that if followed may prevent post-operative complications (Kennedy et al., 2017). It often includes the discussion of presurgical procedures, the actual steps of the surgery, postoperative care, potential surgical and non-surgical complications, postoperative pain management and arrangements to avoid post-surgical complications. It also includes steps to undertake for the first ambulation, use of elastic stockings, and range of motion exercises (McDonald et al., 2014). This is supported by the findings of a Cochrane review evaluating the effect of preoperative education on patient outcomes postoperatively such as pain. The review included a total of 18 studies with 1463 study participants undergoing hip (73%), knee (3%) and hip and knee replacement surgeries together (2%). A multidisciplinary team including physiotherapists, nurses and physicians administered the education on pain management before the surgery. The results came back showing a significant reduction in pain scores from 3.1 points in the usual care group to 0.34 in the intervention group when assessment was done on a 1 to 10 point scale (0 being no pain and 10 being maximum pain) (McDonald et al., 2014). Therefore, this study aimed to evaluate the effect of a structured preoperative education to patients undergoing selected orthopedic surgeries; knee and hip replacement on the length of hospital stay.

2. MATERIALS AND METHODS

2.1. Study Design

A pilot for a multi-site randomised controlled trial; evaluating the feasibility of the study.

2.2. Participants

Eligibility criteria were adult patients (age > 18 years) with an indication for knee or hip replacement surgeries admitted to Al Zahraa Hospital and Rafic Hariri University Hospital (RHUH). Surgeries were either elective or emergent and patients had to be willing to participate. Exclusion criteria were non-adult patients and those who were unwilling to participate.

2.3. Settings

This study took place at Al Zahraa Hospital and Rafic Hariri University Hospital in Beirut, Lebanon. Al Zahraa hospital is a large university hospital that can accommodate patients for medical

and surgical therapies. Patients are cared for by orthopaedists and registered nurses. RHUH is a governmental hospital that consists of 2 orthopaedic surgery units that accommodate patients for hip and knee replacement surgeries.

2.4. Procedure

The study was introduced to potential participants, baseline data was collected and then patients were randomised to the intervention and the usual care groups. The intervention group was given the education by one of the five nursing students that conducted this study. To achieve consistency in delivering the intervention, a training session was held ahead of the study. An information tool with a checklist was used to assure that all contents of the information material were covered. The student researchers administered the education and the baseline questionnaires 1 day before surgery. Ethical approval was secured from the study sites and from Beirut Arab University Institutional Review Board in addition to the administration's approval of all the included sites. Enrolled patients signed a consent form before data collection.

2.5. Intervention

Nursing students performing their senior project developed a small booklet with the educational material. The material included in the booklet were all derived from the literature and the education was delivered by those students. The intervention was delivered one day before the surgery when the patients were convinced of the need of the surgery and were not anxious.

The education included the patients and their family caregivers to assure understanding of the delivered information. The educational material included information on wound care, physical activity, assistive device use, pain management and nutrition. The educational intervention was not expected to last more than 30 minutes.

2.6. Sample Size Calculation

No sample size was calculated as this was a pilot study that aimed to check the feasibility of the intervention rather than the effect of the intervention.

2.7. Randomisation

A randomized control trial was conducted to assume equality in the groups and reduce the risk of having bias. Every participant was allocated with a unique code for de-identifying the data. A list of random numbers (codes) was generated using random number generator by Statistical Product and Service Solution (SPSS) and participants were allocated to a usual care and an intervention group. The list of random allocations was kept with a researcher not involved in the data collection to assure confidentiality and the students conducting the baseline data collection were not aware of the allocation until after data collection to avoid selection bias.

2.8. Instrument

A questionnaire was specifically designed for the present study using questions derived from previous studies. The questionnaire was administered in an interview format using the patients tongue language, Arabic. In this questionnaire, sociodemographic data, past medical and surgical history were collected, in addition to the physical assessment and laboratory findings. A final section included the discharge status of the patient, length of stay and discharge medication. The detailed information covered in this questionnaire were divided into sections as below:

a. Sociodemographic data: gender, age, marital status, level of education, caregiver, occupation, smoking status, and the physical activity.

b. Current admission condition, including the current cause of admission; diagnosis, cause of condition (fall, osteoarthritis, etc.) and planned surgery (knee replacement, hip replacement or both).

c. Past medical and surgical history including home medications, comorbidities and past surgical history.

d. Physical examination including vital signs, pain assessment laboratory findings indicative of infection, inflammation or anaemia, assessment of the involved extremity and activity tolerance.

e. Discharge status including the vital sign, pain assessment and management, discharge medication, discharge educations as part of usual care, length of stay (whether extended due to surgery complications or not), and presence of any complications.

2.9. Statistical Analysis

Data were analysed using the Statistical Product and Service Solution (SPSS) version 24. P value was set to < 0.05. For univariate analysis, the categorical variables were presented as frequencies and percentages, continuous variables were presented as means and standard deviations**.** For the bivariate analysis, comparison was made using chi square and fisher exact test, Mann Whitney test (non-parametric testing) since the sample size was small.

3. RESULTS

3.1. Feasibility of the Educational Randomized Controlled Trial

Conducting the trial was faced with many challenges in terms of approval, processing and conduct. Securing approvals from the study hospitals was a lengthy process due to lack of specialized staff in approving such trials and the absence of replacements for the unavailable staff members. The educational material did not completely match that provided by the governmental hospital whom had their own personnel to conduct preoperative education for the surgical patients. This did not only cause repetition for the intervention group but it also diluted the findings since the usual care group were provided with education.

The study participants were very accepting of the education and the attention provided to them by nursing students and appreciated the time and efforts paid for the study conduct. The education for each participant lasted to a mean of 30 minutes and was provided to the patients and their caregivers whenever they were present.

3.2. Demographic Characteristics of the Study Participants

Data collection took place between January and April 2019. A total of 10 participants were found eligible for this study during the study period. Therefore, only 10 patients were enrolled and randomized to the intervention and the usual care group. Figure 1 outlines the enrollment and randomization process of the study participants. The mean age of the participants was 68 (SD=12) years, the majority were female 70% and married (80%). Only 10% were illiterate and the majority were Lebanese (80%). All the patients were cared for by a family member; 60% spouse and 40% child and most were retired (70%). Slightly over half of the patients were smokers and only 40% were physically active. Table 1 outlines the detailed demographic characteristics of the study sample.

Table 1: Demographic characteristics of the study participants (N=10)

Variable	Total n (%)	Intervention group n (%)	Control group	P-Value
Age*	68 (12)	76 (9)	58 (5)	0.007
Sex • Male	3 (30)	3 (100)	0 (0)	0.20
Social status • Married • Single/Widow/Divorced	8 (80) 2(20)	5 (83) 1 (17)	3 (75) 1 (25)	0.33
Level of education • At least primary • Illiterate	9(90) 1(10)	5(84) 1(16)	4(100) 0(0)	0.67
Nationality • Lebanese • Other	8(80) 2(20)	6(100) 0(0)	2(50) 2(50)	0.13
Occupation • Currently working • Not working/ retired	3(30) 7(70)	2(33.3) 4(66.7)	1(25) 3(75)	0.77
Care giver • Husband/wife • Son/ daughter	6(60) 4(40)	2(33) 4(67)	3(75) 1(25)	0.52
Smoker • Yes • No	6(60) 4(40)	4(67) 2(33)	2(50) 2(50)	0.59
Physically active	4(40)	3(75)	1(25)	0.42

Continue Table 1

Cause of condition • Fall • Osteoarthritis • Rheumatoid arthritis • others	 4(40) 3(30) 1(10) 2(20)	 2(33) 2(33) 1(17) 1(17)	 2(50) 1(25) 0(0) 1(25)	 0.80
Planned surgery • knee replacement • Hip replacement	 4(40) 6(60)	 3(50) 3(50)	 1(25) 3(75)	 0.42
Home medication • Corticosteroids • Opioids • Antibiotics • Anti-inflammatory	 1(10) 0(0) 1(10) 1(10)	 0(0) 0(0) 0(0) 0(0)	 1(25) 0(0) 1(25) 1(25)	 0.4 - 0.4 0.4
Comorbidities • CHF • HTN • DM • DLP • ACS • PVD • CVA	 1(10) 5(50) 4(40) 2(20) 1(10) 0(0) 0(0)	 0(0) 3(50) 2(33) 1(17) 0(0) 0(0) 0(0)	 1(10) 2(50) 2(50) 1(25) 1(25) 0(0) 0(0)	 0.19 1 1 1 0.4
Past surgical history	5(50)	3(50)	2(50)	1
Vital signs • Temperature • Blood pressure • Pulse • Respiratory	 37(0.16)* 12(0.8)* 77(5.4)* 19(2)*	 37(0.2) 18(2.3) 78(5.3) 11(0.9)	 37(0.13) 19(1.7) 76(5.8) 12(0.7)	 0.81 0.73 0.52 0.73
Present pain • Yes • No	 7(70) 3(30)	 4(67) 2(33)	 3(75) 1(25)	 0.77
Increasing factor • Physical activity • Position • Stress	 9(90) 9(90) 3(30)	 5(83) 6(100) 2(33)	 4(100) 3(75) 1(25)	 1 0.4 1
Decreasing factor • Application of ice • Medication • Position • Support	 2(20) 8(80) 7(70) 3(30)	 1(17) 5(83) 4(67) 2(33)	 1(25) 3(75) 3(75) 1(25)	 1 1 1 1
LOS*	4(1)	4(1)	5(1)	
Blood analysis Hgb WBC RBC Platelets HCT ESR C reactive protein	 11(1.5)* 7880 (2538)* 5 (1)* 199702(8629 9)* 30(11)* 0(0) 0.07(0.22)*	 11(1.5) 6 (5) 4 (1) 231000(64788) 28(14) 0(0) 0(0)	 11(1.7) 1 (3) 5 (0.2) 152756(10222 0) 33(5) 0(0) 0.18(0.3)	 0.80 0.17 0.44 0.17 0.51 - 0.24

LEGEND: CHF: congestive heart failure; HTN: hypertension; DM: diabetes mellitus; DLP: dyslipidemia; ACS: acute coronary syndrome; PVD: peripheral vascular disease; CVA: cerebral vascular accident; LOS: length of hospital stay; hgb: hemoglobin; hct: hematocrit; RBC: red blood cell; WBC: white blood cell; ESR: erythrocyte sedimentation rate; NSAIDS: nonsteroidal anti- inflammatory drugs; ATB: antibiotics; VS: vital sign; *continuous variables reported in mean and standard deviation.

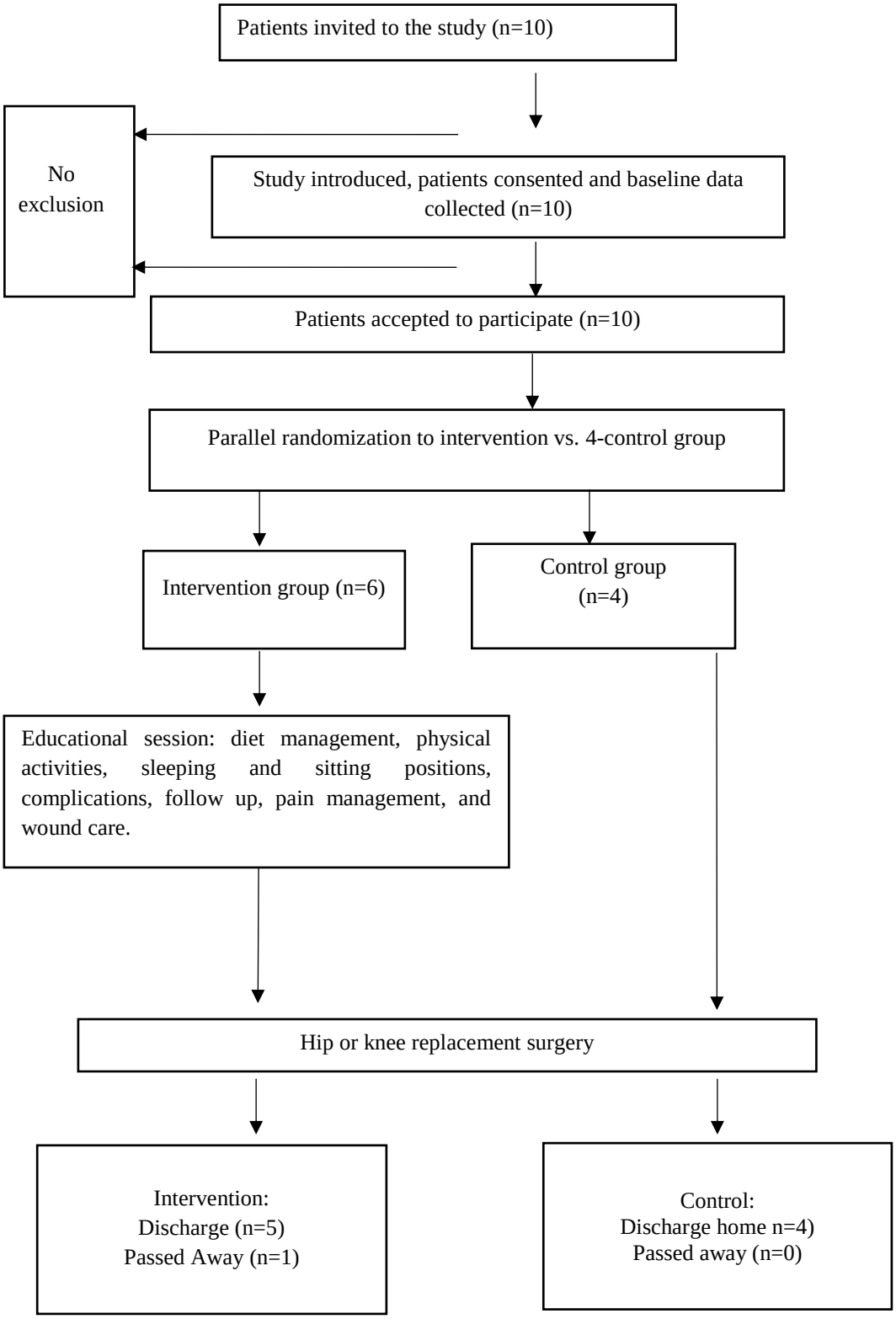

Fig.1: The enrollment, allocation and participation of study participant

3.3. Clinical demography of the participants

The main cause of joint dislocation was fall (40%), followed by osteoarthritis (30%). More than half of the patients (60%) were planned for hip replacement, the rest were planned for knee replacement and none for both surgeries together. Most of the participants (70%) were in pain which was increased by physical activity (70%) and alleviated by pain killers (80%). Half of the study participants were hypertensive, a high percentage (40%) had diabetes and only 20% had hypercholesterolemia. Blood values and vital signs were mostly within normal ranges and are

presented in Table 1. There was no difference between the groups in any of the variables other than age which was controlled for statistically.

When looking at the discharge profile, it was found that all participants were discharged with controlled blood pressure (BP) with a mean discharge systolic BP of 12 mm Hg. Some participants (22%) had severe pain requiring potent pain killers, despite that only 11% were discharged on Tramal while the rest were discharged on non-steroidal anti-inflammatory drugs (NSAIDs) (33%) and even on paracetamol (55%). The reports of pain were divided equally between the intervention and the usual care group. In terms of discharge planning, 56% of the study participants were provided with education before discharge. The educational material included the importance of regular check-ups (22%), medications (67%), positioning (56%), long travel avoidance (44%), diet (22%), use of assistive devices (22%) and pain control (11%). The majority were discharged home following their hospital stay while only one patient (10%) passed away following surgery while still hospitalized.

3.4. Length of stay between the groups

The mean length of stay was 4 (SD=1) days with no significant difference between the intervention groups (Median=4) and the control group (Median= 6), U=5.5, p=0.24. Out of the whole sample, only 22% had extended length of stay that was due to post-operative complications. These complications were Hemorrhage (11%) and uncontrolled pain (11%). There was no significant difference between the groups in reported post-operative complications.

4. DISCUSSION

This study describes the result of the impact of preoperative education on the patient length of stay of patients undergoing selected orthopedic surgeries, evaluated in a randomized controlled trial. The pilot study was conducted to evaluate the feasibility of randomized trials in Lebanese hospitals by senior nursing students. Feasibility studies are conducted at smaller range than the full RCTs, which are considered as a plan for the future research (Eldridge et al, 2016), thus explaining and justifying the small sample size. While the findings showed no improvement in Lengths of stay between the study groups, these findings should be evaluated with caution due to the small sample size yielded. This sample size can be attributed to the settings of the hospitals, the healthcare professionals in the hospitals and the ethics culture of workers in these study sites.

Although no difference was seen in the length of hospital stay between the study groups. However, the average length of stay was shorter than that provided in the literature (4 vs. 8 days). Therefore, the educational program was effective at helping patients achieve an earlier discharge from the hospital (Jones et al., 2010). In terms of complications, our sample reported one case (11%) of hemorrhage which delayed their hospital discharge. This was seen previously with similar surgeries where 27% of cases had hemorrhage leading to the need of blood transfusion (Willhuber GC et al., 2018). Another reported complication was pain, which was reported in all the cases before discharge however, one required an extended length of stay for its management. Surprisingly, only one third of those reporting the worst possible pain were discharged on potent painkillers. These findings were different from those reported by previous studies were the preoperative education showed significant improvement on the pain scale from 3.1 points to 0.34 points (McDonald et al., 2014). The difference between the groups can be further evaluated in future studies with larger sample sizes to validate the findings.

The timing of the education preoperatively was optimal before the patients were subjected to the physiological shock; surgery. This had been addressed previously where the outcomes post operatively were greatly improved due to this timing of education. Such education decreased the risk of falls, pain and even cost in addition to other reported complications (Clarke et al, 2012; Louw et al, 2013). This had also been greatly appreciated by the study participants who were distracted from the surgery by this education and decreased their preoperative anxiety. Additionally, the friendly teaching strategy adopted was greatly valued by the older adult sample of this study group. The investigators introduced themselves as nursing students which gave the participants a friendly impact and welcomed their non-superiority and friendliness. Since the population was older adult population, the researchers used many repetitions to the same education content to assure understanding. This goes in line with what was reported by Friedman et al (2011) who also reported using multiple teaching strategies to assure understanding. Also other methods that were found effective was empowering patients and encouraging self-care as compared to traditional teaching methods (Pellino et al., 1998). In consideration of the collectivist culture the study took place in, the researchers opted

to include the family caregivers in the education and cared to allow the patient to identify their usual caregiver. This came in accordance to our assumptions that all patients had a significant other or a child who cared for them and resided in the same household. This was supported by Anderson et al (2014) who reported that the education should be provided to the patients and their caregiver for optimal outcomes and structured care (Anderson et al., 2014). Despite these reports, future studies should aim for a multiple approach intervention to assure understanding of the content by predominantly older adult population.

In future trials, longer follow-up periods are necessary to evaluate the long term effect of the intervention especially on other outcomes such as infection and pain.

5. LIMITATIONS

Despite going to two study sites for data collection, the sample size was very small accounting for 10 patients only. This was greatly due to the limited time of the study conduct and the financial turbulence of the study sites and the country. Future studies should account for such factors when planning the study time interval. Additionally, the small sample size was the cause of the significant difference between the groups in terms of age. This was not controlled for statistically in the analysis since it gave the same results with and without control and this is largely due to the small sample size. Another limitation was the conflict between the education provided by this study and that provided by the study hospitals. This can have been dealt with by unifying the material. However, one study hospital insisted on using their material and on providing the education to all their patients regardless of our allocation. This diluted the findings and yielded no significant difference between the groups. Future studies should be conducted in hospitals that do not have their education material and would find this intervention of value for their quality improvement. Nevertheless, this study adds important information to the available literature on its feasibility and the importance of the intervention.

6. CONCLUSION

The study highlights the need of well designed methodology of an educational intervention for patients undergoing selected orthopedic surgeries and its effect on the length of stay. This educational approach was given to help patients benefit from it by knowing how to care for themselves after the surgery. Assessment was done pre and post surgery for participant variables and characteristics. As shown, similar results were seen in both groups due to many factors, among which is the small sample size. However, a significant finding was the reduced LOS as compared to those reported by international studies (no national studies available). Future studies should reach out to hospitals in need for this quality improvement initiative and include a larger sample size.

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