ACORN AUSTRALIAN COLLEGE OF PERIOPERATIVE NURSES | JOURNAL OF PERIOPERATIVE NURSING

Volume 36
Issue 1 *Journal of Perioperative Nursing*

Article 2

2-14-2023

Optimising post-operative recovery of elective abdominal surgery patients: A multimodal approach

Recommended Citation

Joseph, Jasmine and Devi, Meinam Deepa (2023) "Optimising post-operative recovery of elective abdominal surgery patients: A multimodal approach," *Journal of Perioperative Nursing*: Vol. 36 : Iss. 1 , Article 2.
Available at: https://doi.org/10.26550/2209-1092.1223

https://www.journal.acorn.org.au/jpn/vol36/iss1/2

Optimising post-operative recovery of elective abdominal surgery patients: A multimodal approach

Cover Page Footnote

The authors express their sincere gratitude to Krupanidhi College of Nursing for all the support during the study and St. Philomina's Hospital for providing permission to conduct this research.

Peer-reviewed article

Authors

Jasmine Joseph
Vydehi Institute of Nursing, Bangalore

Meinam Deepa Devi
Krupanidhi College of Nursing, Bangalore

Corresponding author

Jasmine Joseph
Vydehi Institute of Nursing, Bangalore

Optimising post-operative recovery of elective abdominal surgery patients: A multimodal approach

Abstract

Aim: This study aimed to identify and validate a multimodal approach for optimising post-operative recovery of patients admitted for elective abdominal surgery.

Background: Identifying the risk of post-operative complications after abdominal surgery enables modification of the risk through targeted interventions and enhanced monitoring. Evidence shows that patients suffer needlessly due to inadequate pre-operative preparation and lack of information regarding the post-operative journey.

Methods and materials: The study was conducted using a quasi-experimental, post-test-only, control group design. The sample comprised 60 participants, 30 each in the experimental and control groups. Four aspects of participant recovery were measured – pain (using a numerical pain rating scale), vital signs (temperature, pulse rate, respiratory rate and blood pressure), wound healing (using the Southampton wound grading system) and length of hospital stay (in days).

Results: One third of the experimental group (33.3%) had normal wound healing compared to one tenth of the control group (10%). Mean pain scores of the experimental group were significantly lower than those of the control group on post-operative days 0, 1 and 3 ($p<0.05$). The physical parameters of the experimental and control groups were not found to be significantly different other than the pulse rate on post-operative day 2 and the respiratory rate on post-operative day 0. The difference in length of hospital stay between the experimental and control groups was not found to be significant.

Conclusion: Overall, the study found that the multimodal approach was effective in promoting post-operative recovery in elective abdominal surgery.

Keywords: elective abdominal surgery, deep breathing exercise, splinting, positioning, leg and foot exercises

Introduction

Safe surgery is regarded as a public health priority. However; despite the existence of internationally recognised standards for practice, the rate of post-operative mortality and morbidity is significantly high.[1,2] Every year, 4.2 million people worldwide die within 30 days of surgery[3] and post-operative death was ranked as the third leading cause of death after ischaemic heart disease and stroke.[1,2] A significant proportion of surgery-related deaths are caused by post-operative complications, including surgical site infection (SSI).

In India, SSI ranks among the top causes of morbidity and mortality. The SSI rate varies greatly, from 1.6 to 38 per cent, depending on the type of surgery. This variability can also be due to differences in characteristics of the hospital population, clinical procedures, infection control measures and hospital environment.[4–6]

Proactive patient care and effective surgical nursing care in hospital are valuable solutions to enhance patient safety. Perioperative nurses can reduce the risk of post-operative complications by implementing targeted interventions and improved monitoring when an increased likelihood of post-operative problems following abdominal surgery has been identified.[7] In the past, attempts were made, both before and after surgery, to enhance recovery.[3] Pauwels et al[8] researched the effect of deep breathing and coughing exercises in the recovery process, while Anila et al[9] employed pre-operative education to speed up the recovery and prevent post-operative problems.

Questions about the clinical effects of pre-operative physical optimisation remain, by and large, unanswered[8] due to the absence of high-quality studies that specifically report on the effects of pre-operative care protocols. Reviewing the literature identified the need for a comprehensive study of the effect of a certain combination of strategic interventions at a specific interval for a specified duration. As the demand for surgery increases, an urgent clinical need exists to reduce the risk of surgery by using strategic, evidence-based interventions. To this end, the current study aimed to assess the effectiveness of a multimodal approach for optimising post-operative recovery of patients admitted for elective abdominal surgery in a selected hospital.

Method

Design

This study used a quasi-experimental post-test-only design with a control group.

Sample and setting

The data for the main study was collected from 60 elective abdominal surgery patients during January and February 2020. The participants included both males and females between the ages of 20 and 60 years, selected based on inclusion and exclusion criteria. Informed consent was obtained from participants after the study was explained to them.

The study was carried out at a tertiary care hospital in Bangalore run by Christian missionaries. The hospital offers a wide variety of services, including emergency care, surgery and physiotherapy, and patients are admitted for comprehensive general as well as specialised care. A wide variety of patients come to the hospital for inpatient as well as outpatient services.

Interventions

The multimodal approach had four primary components – exercise, positioning, pre-operative education and post-operative assessments.

The following exercise techniques are designed to enhance post-operative recovery from elective abdominal surgery and prevent possible complications.

- deep breathing (diaphragmatic breathing) and coughing exercise, performed every hour
- splinting the incision, while doing the deep breathing and coughing
- positioning, performed every second hour
- leg and foot exercises – gastrocnemius (calf) pumping, quadriceps (thigh) setting, foot circles, hip and knee movements – performed five times an hour.

Participants in the experimental group received about 15 minutes of education pre-operatively when the deep breathing, coughing, positioning, and leg and foot exercises were demonstrated to them. Return demonstration was taken from the patients to ensure that they had learned the techniques correctly. Participants in the experimental group were instructed to perform the exercises immediately after their transfer from the recovery room to the ward. On the day of surgery (post-operative day 0), participants were permitted to do only the exercises which they were capable of doing. On post-operative days 1 until day of discharge participants were required to perform all four exercise techniques as specified above.

Participants in the control group received routine care.

Data collection and analysis

Four aspects of the post-operative recovery of participants in both groups were assessed.

1. Pain – this was assessed using a numerical pain scale twice a day.
2. Vital signs (temperature, pulse rate, respiration rate and blood pressure) – these were assessed during nursing observations twice a day (morning and afternoon).
3. Wound healing – the researcher checked surgical wound areas daily for any redness or inflammation. The condition of the open wound was assessed using the Southampton wound grading system once before the patient's discharge. The Southampton wound grading

system classifies wound complications into six grades based on levels of bruising or erythema, inflammation, discharge and infection.

4. Length of stay in hospital – the number of days between surgery and discharge was recorded on discharge.

Data were entered into Microsoft Excel and statistically evaluated using SPSS (Statistical Package for Social Sciences) software. The independent variable was the multimodal approach in this analysis, while the dependent variables were pain, vital signs, wound healing and length of stay. Paired t-tests were used to evaluate the data.

Ethical approval

The researcher obtained prior permission from the hospital authority to conduct the study. The research proposal was presented before the institutional ethical committee on 19 March 2019 and ethical clearance was obtained. Formal written permission was obtained from the hospital for conducting the study.

Results

The majority of the participants were female (86% of the experimental group, 100% of the control group) and aged between 20 and 30 years (56.66% of the experimental group, 60% the control group). All the participants in both groups received spinal anaesthesia. Participants underwent lower segment caesarian section, or LSCS (66.6% experimental group, 60% control group), hysterectomy (20% experimental group, 40% control group) or hernia surgery (13.3% experimental group, 0% control group). The majority of participants did not have any co-morbid disease history (60% in the experimental group and 46.66% in the control group); however, some participants had hypothyroidism (33.33% in both groups) and were on thyroid medication (43.33% of the experimental group, 30% of the control group). All participants in both groups received paracetamol after the surgery. Most participants started ambulation on post-operative day 0 (80% in the experimental group and 93.33% in the control group) and the others on day 1.

Table 1: Comparison of average pain levels in experimental and control groups (n=60)

Post-operative day	Difference in mean	t-value (t^{29}=2.462)	p-value	Inference*
Day 0	-0.867	-3.791	0.001	S
Day 1	-1.267	-6.618	0	S
Day 2	1.833	2.549	0.016	S
Day 3	-1	-4.785	0	S

* S = significant, NS = not significant

Pain

Participants' pain levels were assessed twice a day using a numerical pain scale. A paired t-test was used to compute the pain score in experimental and control groups. Table 1 shows the difference in the mean pain scores of the experimental and control groups from post-operative day 0 to day 3. The computed t-value is greater than the table value (t_{29}=2.462, $p<0.05$) on days 1, 2 and 4. Thus it was inferred that the multimodal approach was effective in reducing pain in post-operative patients.

Vital signs

Participants' temperature, pulse rate, respiration rate and blood pressure were assessed during nursing observations twice a day (morning and afternoon). Table 2 shows the differences between the experimental and control groups for the mean values of these four vital signs from post-operative day 0 to day 3.

The computed t-value is less than the table value (t_{29}=2.462, $p<0.05$) on all days for temperature and blood pressure. Thus, it was inferred that the multimodal approach had no significant effect on the temperature and blood pressure of patients. The computed t-value for the pulse rate indicates that the multimodal approach had a significant effect on day 2. Similarly, significant results were obtained for respiratory rate on the day of surgery.

Wound healing

The Southampton wound grading system was used to assess the condition of participants' surgical wounds. Table 3 shows the wound scores of the experimental and control groups.

The data in Table 3 shows that ten participants (33.3%) in the experimental group had normal healing while only three (10%) of the control group had normal healing. Some bruising was observed almost equally across the groups (15 participants (50%) in the experimental group and 17 (56.7%) in the control group), while considerable bruising was higher

Table 2: Comparison of average vital signs values in experimental and control groups (n=60)

Vital sign	Post-operative day	Difference in mean	t-value (t29=2.462)	p-value	Inference*
Temperature	Day 0	-0.167	-1.306	0.202	NS
	Day 1	-0.033	-0.273	0.787	NS
	Day 2	0.1	0.722	0.476	NS
	Day 3	0.1	1	0.326	NS
Pulse	Day 0	-2.367	-1.233	0.227	NS
	Day 1	-3.367	-1.924	0.064	NS
	Day 2	-4.1	-3.019	0.005	S
	Day 3	-2.6	-1.991	0.056	NS
Respiratory rate	Day 0	-1.533	-2.808	0.009	S
	Day 1	-0.367	-0.863	0.395	NS
	Day 2	-0.3	-0.546	0.589	NS
	Day 3	-0.1	-0.231	0.819	NS
Systolic blood pressure	Day 0	-1.5	-0.471	0.641	NS
	Day 1	-27	-1.306	0.202	NS
	Day 2	-3	-1.269	0.214	NS
	Day 3	-2	-1.14	0.264	NS
Diastolic blood pressure	Day 0	0.333	0.186	0.854	NS
	Day 1	-0.5	-0.34	0.736	NS
	Day 2	-3	-1.569	0.127	NS
	Day 3	-0.833	-0.501	0.62	NS

* S = significant, NS = not significant

in the control group (3 participants (10%) in the experimental group and 6 (20%) in the control group). Clear discharge was reported from 1 participant (3.3%) in the experimental group and 2 participants (6.7%) in the control group. None of the participants had pus or severe wound infection.

Length of stay in hospital

Participants were discharged on post-operative days 3, 4 and 5. On day 3, six (20%) of the experimental group were discharged and three (10%) of the control group. On day 4, 23 (76.7%) of the experimental group were discharged and 24 (80%) of the control group. On day 5, one (3.3%) of the experimental group was discharged and three (10%) of the control group. Although the results showed that the control group had a slightly longer length of stay in hospital than the experimental group, this was not significantly different.

Discussion

This study investigated the use of a multimodal approach to optimising post-operative recovery of patients admitted for elective abdominal surgery. The results provide evidence that this approach enabled better surgical wound healing and reduced pain levels in participants in the experimental group compared to the control group. The differences in length of hospital stay and vital signs were not found to be significant.

Table 3: Participants' wound healing

Southampton grade	Condition of wound	Experimental group (n=30)	Control group (n=30)
0 (normal healing)		10 (33.3%)	3 (10%)
I (normal healing with mild erythema)	A: some bruising	15 (50%)	17 (56.7%)
	B: considerable bruising	3 (10%)	6 (20%)
	C: mild erythema	0	0
II (erythema with inflammation)	A: at one point	0	0
	B: around suture	1 (3.3%)	2 (6.7%)
	C: along wound	0	0
	D: around wound	0	0
III (clear discharge)	A: at one point only	1 (3.3%)	2 (6.7%)
	B: along wound	0	0
	C: large Volume	0	0
	D: prolonged	0	0
IV (pus)	A: at one point	0	0
	B: along wound	0	0
V (deep or severe wound infection)		0	0

As in earlier studies,[7] the participants in the present study were mainly females.This may be due to the inclusion of LSCS in abdominal surgery; 38 of the 60 participants in this study underwent LSCS. All participants received parenteral analgesics and started ambulation on post-operative day 0 or day 1.

When compared to patients who mobilise on their own, there is no evidence to suggest that planned mobilisation and exercise programs benefit post-operative recovery.[10] According to findings of previous studies, patients recovering from abdominal surgery care about different things to what is often captured by traditional outcome criteria. The patient-centred recovery assessment was more direct than outcome measures of recovery like length of stay and complication rates.[11] In contrast, a study by Thompson et al. into enhanced recovery after surgery (ERAS) and evidence-based practice for early recovery of abdominal surgery patients found that patients indicated the importance of significantly shorter hospital stays and early recovery.[12] The results of the present study indicate that the length of stay in hospital for the participants in the control group was only slightly longer than that of the experimental group. Nevertheless, given the high cost of surgery and hospitalisation reducing the hospital stay by even one day will be of benefit especially to those who do not have health insurance cover.[13]

Thompson et al[12] revealed that there was no significant difference in the complication rate and body temperature after an ERAS program was implemented for patients undergoing abdominal surgery. This is consistent with the results of our study which found no significant difference between the mean values for temperature, respiratory rate and systolic and diastolic blood pressure of the experimental and control groups. However, we did find a significant difference, only on post-operative day 2, between the mean values for pulse rate between the groups. As a number of factors (e.g. anxiety) can bring about change in the pulse rate, further investigation is needed to determine whether the change was due to the experimental multimodal approach.

In our study, pain levels from post-operative day 0 to day 3 were significantly reduced in participants who received the multimodal approach. This is in contrast to an earlier study that indicated no change in pain levels from using an ERAS program.[1] Pain is a major problem causing discomfort and anxiety to patients and reduction of pain through implementing the multimodal approach has the potential to bring great relief to post-operative patients.

This study found that normal healing of wounds occurred in one third of participants in the experimental group and one tenth of participants in the control group. Perioperative blood loss is considered a predictor of post-operative tissue and wound complications. In our study considerable bruising and erythema with inflammation around the suture were reported in double the

number of participants in the control group than in the experimental group. These findings confirm earlier reports that suggest that hypovolaemia and reduced tissue oxygenation is detrimental to healing and increase the risk of infection and tissue dehiscence.[14]

Earlier studies have reported the positive effects of physiotherapy and short-term pre-operative inspiratory muscle training in reducing post-operative complications.[8] In line with this, we included breathing and coughing exercises in our multimodal approach.

An analysis of the demographic variables of participants in the experimental group of our study revealed only three variables made a significant difference to post-operative recovery, at a 0.05 level of significance; these were habits (p=0.00), co-morbid conditions (p=0.03) and medication taken (p=0.04). Earlier studies have indicated that wound dehiscence is more common in males than females[15]; however, we did not obtain such evidence in our study, probably due to the smaller number of male participants.

Conclusion

The findings of this study reveal that implementing a multimodal approach with elective abdominal surgery patients has a significant positive effect on pain levels and wound healing. Global strategies to improve access to surgical treatment should be given importance and the multimodal approach used in this study can be recommended as evidence-based quality care for patients undergoing elective abdominal surgery.

Conflict of interest and funding statement

The authors have declared no conflict of interest and no financial interest in any element of this study.

Acknowledgements

The authors express their sincere gratitude to Krupanidhi College of Nursing for support during the study and St Philomenas Hospital for providing permission to conduct this research.

References

1. Pearse RM, Clavien PA, Demartines N, Fleisher LA, Grocott M, Haddow J et al. Global patient outcomes after elective surgery: Prospective cohort study in 27 low-, middle- and high-income countries. Br J Anaesth. 2016;117(5):601–9.
2. Cutuli SL, Carelli S, De Pascale G, Antonelli M. Improving the care for elective surgical patients: post-operative ICU admission and outcome. J Thorac Dis. 2018;10(Suppl 9):S1047–9.
3. Nepogodiev D, Martin J, Biccard B, Makupe A, Bhangu A, Ademuyiwa A et al. Global burden of postoperative death. Lancet. 2019;393(10170):401.
4. Thombare D, Joshi D. A study of incidence and risk factors in post operative abdominal wound infection in tertiary care centre. MVP J Med Sci. 2019; 6(June):8–14.
5. Agrawal A, Singh RP. Surgical site infection in abdominal surgeries: A clinical study. J Evol Med Dent Sci. 2022;3(40):10188–93.
6. Patel SM, Patel MH, Patel SD, Soni ST, Kinariwala DM, Vegad MM. Surgical site infections: Incidence and risk factors in a tertiary care hospital, western India. Natl J Community Med. 2012;3(2):193–6.
7. Udomkhwamsuk W, Vuttanon N, Limpakan S. Situational analysis on the recovery of patients who have undergone major abdominal surgery. Nurs Open. 2021;8(1):140–6.
8. Pouwels S, Stokmans RA, Willigendael EM, Nienhuijs SW, Rosman C, van Ramshorst B et al. Preoperative exercise therapy for elective major abdominal surgery: A systematic review [Internet]. Int J Surg. 2014 [cited 2020 Jun];12(2):134–40. DOI: 10.1016/j.ijsu.2013.11.018
9. Anila MP. A study to assess the effectiveness of abdominal exercise on gastric motility among post operative patients in selected hospitals, Erode District, Tamilnadu. IOSR J Sport Phys Educ. 2017;04(03):37–43.
10. Hu Y, McArthur A, Yu Z. Early postoperative mobilization in patients undergoing abdominal surgery: A best practice implementation project. JBI Database System Rev Implement Rep. 2019;17(12):2591–611.
11. Rajabiyazdi F, Alam R, Pal A, Montanez J, Law S, Pecorelli N et al. Understanding the meaning of recovery to patients undergoing abdominal surgery. JAMA Surg. 2021;156(8):758–65.
12. Thompson EGE, Gower ST, Beilby DS, Wallace S, Tomlinson S, Guest GD et al. Enhanced recovery after surgery program for elective abdominal surgery at three Victorian hospitals. Anaesth Intensive Care. 2012;40(3):450–9.
13. Chatterjee S, Laxminarayan R. Costs of surgical procedures in Indian hospitals. BMJ Open. 2013;3(6):e002844.
14. Sørensen LT, Hemmingsen U, Kallehave F, Wille-Jørgensen P, Kjærgaard J, Møller LN et al. Risk factors for tissue and wound complications in gastrointestinal surgery. Ann Surg. 2005;241(4):654–8.
15. Kapoor K, Hassan M. A clinical study of abdominal wound dehiscence with emphasis on surgical management in Bangalore medical college and research institute, Karnataka, India. Int Surg J. 2017;4(1):134–40.