

ORIGINAL ARTICLE

Comparison of life-behavior-promoting mobilization care with walking-only mobilization care in post-gastrointestinal surgery patients: A quasi-experimental study

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Abstract

Aim: This study evaluated the effects of a new form of mobilization care called life-behavior-promotion care by comparing its effectiveness with that of conventional mobilization care, which promotes only walking.

Methods: This was a quasi-experimental study that non-randomly allocated post-gastrointestinal surgery patients from a surgical ward into two groups: conventional care and life-behavior-promotion care. The participants received their respective care from ward nurses for the first 3 postoperative days and were asked to wear a pedometer and answer a self-administered questionnaire concerning these first 3 days. In addition, time to recover gastrointestinal function, time to completion of oxygen administration, and the number of days to achieve discharge criteria were collected from medical records.

Results: Overall, 23 participants in the conventional-care group and 19 in the life-behavior-promotion-care group were analyzed. The latter group performed significantly more types of out-of-bed life behaviors during the 3 postoperative days. Among the questionnaire items concerning awareness of recovery, an interaction between intervention and length of postoperative days was confirmed for items reading “I was interested in surrounding events” and “I could spend a day like myself.” In addition, in the life-behavior-promotion-care group, time to completion of oxygen administration was significantly shorter, and it took fewer days to achieve discharge criteria.

Conclusions: The results of this study suggest that life-behavior-promotion care may promote out-of-bed life behaviors during the early postoperative period, and may improve mental and physical recovery in patients who have undergone gastrointestinal surgery.

Clinical Trial Registration: The study was registered in the UMIN Clinical Trials Registry (trial ID: UMIN000021883).

KEYWORDS

daily life behavior, early ambulation, nursing, perioperative period, treatment outcome

1 | INTRODUCTION

Early postoperative mobilization is an important element of perioperative care. Early mobilization prevents postoperative complications and disuse atrophy and makes early discharge possible (Chandrasekaran, Ariaretnam, Tsung, & Dickison, 2009; Haines, Skinner, & Berney, 2013; Kamel, Iqbal, Mogallapu, Maas, & Hoffmann, 2003; van der Leeden et al., 2016). Early mobilization has a long history. Examples were reported at the end of the 19th century, in which post-vaginal operation patients began walking 24–48 hr after surgery, and were discharged early (Ries, 1899). In Japan in the early 20th century, Tashiro and Arai (1910) reported that implementation of early sitting and walking among laparotomy patients appeared to shorten the length of their hospital stays. Later, in the mid-20th century, Leithauser (1946) reported the physiological effects and safety of early mobilization. The accumulation of research and practice in the following decades have led early mobilization to become recognized as an important element in perioperative care.

In Japanese, the action of leaving one's bed is called “risho”; however, the literal translation of “risho” is restricted to simply “walking in a corridor,” rather than more extensive actions (Katogi et al., 2016). The Japan Academy of Nursing Science has defined support for “risho” as “making it possible for a bedridden person to stably perform a series of actions until they can begin walking” (Nursing Terminology Review Committee of Japan Academy of Nursing Science, 2005). In addition, previous studies (Kaneda et al., 2007; Lee et al., 2011; van der Leeden et al., 2016) on postoperative mobilization have focused on methods of safely reducing the time to being able to walk after surgery. Thus, methods of promoting mobilization after the first time patients achieve walking have been under-investigated. Similarly, nursing textbooks (Hashimoto, 2006; Mori, 2012; Sasaki, 2017) provide instruction regarding “preoperative orientation,” “postoperative pain management,” “observation of hemodynamics,” and “environmental preparation, such as organization of tubes” as methods of mobilization. However, these are practices relating to preparation for mobilization, and methods of promoting or maintaining mobilization are not specifically explained.

Recently, Enhanced Recovery After Surgery (ERAS) protocols, which integrate several evidence-based elements, have been developed in Europe and are becoming more prevalent, particularly in the field of digestive surgery (Fearon et al., 2005). The ERAS guideline published in 2009 (Lassen et al., 2009) recommended early mobilization via “being out of bed for 2 hr on the day of surgery and 6 hr thereafter.” However, the guideline was revised in 2015, and the description of specific mobilization levels was removed (Feldheiser et al., 2015). The stated

reason for this was the small number of evidence-based studies investigating mobilization goals and successful methods of implementation. Research shows the degree of mobilization on postoperative days 1–3 significantly affects the length of postoperative hospital stays (Vlug et al., 2012); however, adherence to early mobilization in ERAS protocol has been quite low (Gustafsson et al., 2011). It is important to study methods of successfully implementing mobilization during the first 3 postoperative days.

As mentioned above, there are many reports of the effects of postoperative mobilization based on physiological outcomes; however, research examining the patient-reported outcomes is limited and frequently suffers from poor quality and inconsistent results (Castelino et al., 2016). In addition, it has been suggested that patients may not realize that postoperative mobilization is effective in preventing postoperative complications, even if nurses do realize this fact (Katogi, 2015). Thus, it is necessary to assess patients' perspectives and subjective experiences of the effects of mobilization.

Based on this goal, previous studies have observed, inductively organized, and reported on the state of digestive surgery patients' postoperative mobilization (Katogi, 2013) and employed interview surveys with patients and nurses to understand the current state of patients' postoperative mobilization (Katogi, 2015). The results indicated that “walking in a corridor” was just one of the actions patients took that involved leaving their bed, and patients left their beds when performing typical daily life actions and behaviors, such as having meals, using the toilet, and doing hobbies (Katogi, 2013). In addition, tools such as books, computers, and hobby items, and seating other than beds, such as chairs and lounges could be provided as sources of encouragement for patients to leave their beds (Katogi, 2013, 2015). Therefore, promoting mobilization may require encouraging patients to perform typical life behaviors in addition to walking, and preparing a hospital bed and environment that accommodates such actions/behaviors.

This study aimed to evaluate the effects of a new form of mobilization care that promotes life behavior (life-behavior-promotion care, LPC), by comparing it with conventional mobilization care that promotes walking alone (walking-promotion care, WPC).

2 | METHODS

2.1 | Design

This study employed a quasi-experimental design with two non-randomly allocated groups. One group received

WPC and the other received LPC. Patients were allocated to the WPC group (consecutive patients undergoing surgery from April to early August 2016) or the LPC group (consecutive patients undergoing surgery from September to mid-December 2016) in the order in which they were hospitalized. During each period, patients were recruited in the order in which they were hospitalized to reduce selection bias.

The conceptual framework of this study is shown in Figure 1. This illustrates the implementation of mobilization care, either WPC or LPC, in adults who have undergone gastrointestinal surgery and its effects on their mobilization and postoperative recovery. This framework was constructed based on the results of previous participant observation studies of postoperative patients (Katogi, 2013) and interview surveys with patients and nurses (Katogi, 2015).

2.2 | Setting and participants

One surgical ward of a general hospital in Tokyo, where WPC was the standard form of care applied, was selected. At this hospital, patients scheduled for gastrointestinal surgery visit the outpatient clinic 1–2 weeks before surgery and are admitted to the ward 1 day before the surgery. Patients return to their hospital room after surgery, spend the day in bed, and then, in the first postoperative morning, receive a complete bed bath and perform their first sitting and walking in the company of a nurse. For most gastrointestinal surgeries in this hospital, it is standard procedure to have patients begin drinking on postoperative day 1, begin a liquid diet on postoperative day 2, and to be discharged on postoperative days 7–9. The participant ward has 35 beds, and the staff station is located in the center of the ward, surrounded by all of the private rooms and the corridor. A 30 × 40 cm whiteboard is hung on the wall of each hospital room, and every day the nurses write the date, daily schedule, and

daily goals for the patients (these are also shared with patients' families).

The participants were adults who had undergone gastrointestinal resection, excluding the esophagus, under general anesthesia, and who had consented to participate in the study. The exclusion criteria were: (a) patients who had preoperative impairment in activities of daily living; (b) patients who could not communicate verbally; (c) patients with disturbances of consciousness; (d) patients who were admitted to the intensive care unit after surgery; and (e) patients who were given activity restrictions after surgery.

Power analysis was conducted to determine the ideal sample size for this examination. Based on the results of previous studies (Hanucharunkui & Vinya-nguag, 1991; Lin et al., 2008; Papaspyros, Uppal, Khan, Paul, & O'Regan, 2008), it was calculated that, for an α value of .05 and a power value of .80, a sample size of 23 participants was required for each group.

2.3 | Intervention

The ward nurses implemented either WPC (walking-only mobilization care) or LPC (life behaviors mobilization care) to participants in their respective groups beginning the day prior to surgery and lasting until postoperative day 3. After data were collected from the WPC group, there was an LPC training period of approximately 3 weeks for all ward nurses, and then data were collected from the LPC group. During the training period, the present author directly explained to all ward nurses the aims and content of LPC by using the LPC practice guidebook. Clarifications were also made about the differences between LPC and conventional care. During the training period, the ward nurses were required to practice LPC for hospitalized patients, and after this period, the author ensured that nurses could practice LPC without difficulty and that the patients and their families found it acceptable.

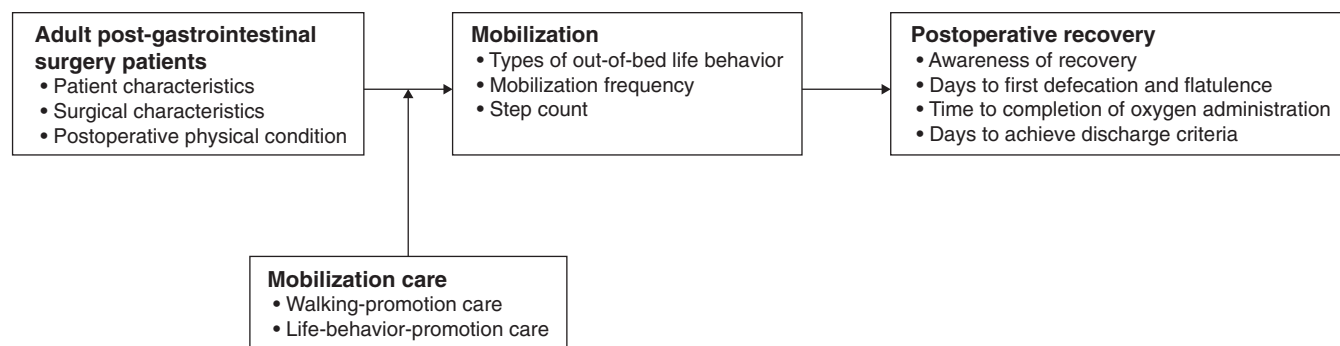


FIGURE 1 Conceptual framework of the study

The intervention contents of WPC and LPC are shown in Table 1. The intervention elements were “preoperative education,” which is implemented before surgery, and “mobilization goal-setting,” which is performed for 3 days, on postoperative days 1–3. Before surgery, the WPC group was encouraged to walk from postoperative day 1; in contrast, the LPC group were encouraged to leave their beds and perform life behaviors; they were also asked to prepare tools necessary for mobilization such as books, computers, and hobby items, and were also told that they could spend time away from their beds, in a chair or at the lounge. Following surgery, nurses set daily mobilization goals based on patients’ conditions. There was a difference between the goals set for the two groups. The goals for the WPC group concerned walking and the goals for the LPC group concerned life behaviors. LPC aims to allow patients to perform life behaviors and expand their mobilization over stages. A poster was distributed to patients during preoperative outpatient visits or after hospitalization and was also displayed on the walls of the hospital rooms. The poster depicted five stages of mobilization in steps from 0 to 4. Each displayed progressive mobility through the performance of life behaviors (Figure 2).

The criteria for cessation of the intervention were not set in advance, and nurses implemented either WPC or LPC based upon their assessment of the participants’ physical and mental condition as of the day prior to surgery to postoperative day 3. The implementation of each

intervention was monitored by the following: (a) the mobilization goal on postoperative days 1–3 set by the nurse who wrote on the whiteboard in the patient’s room; (b) the mobilization goal on postoperative days 1–3 indicated by the patient; and (c) preparation of tools necessary for mobilization such as books, computers, and hobby items.

2.4 | Measurements

2.4.1 | Dependent variables

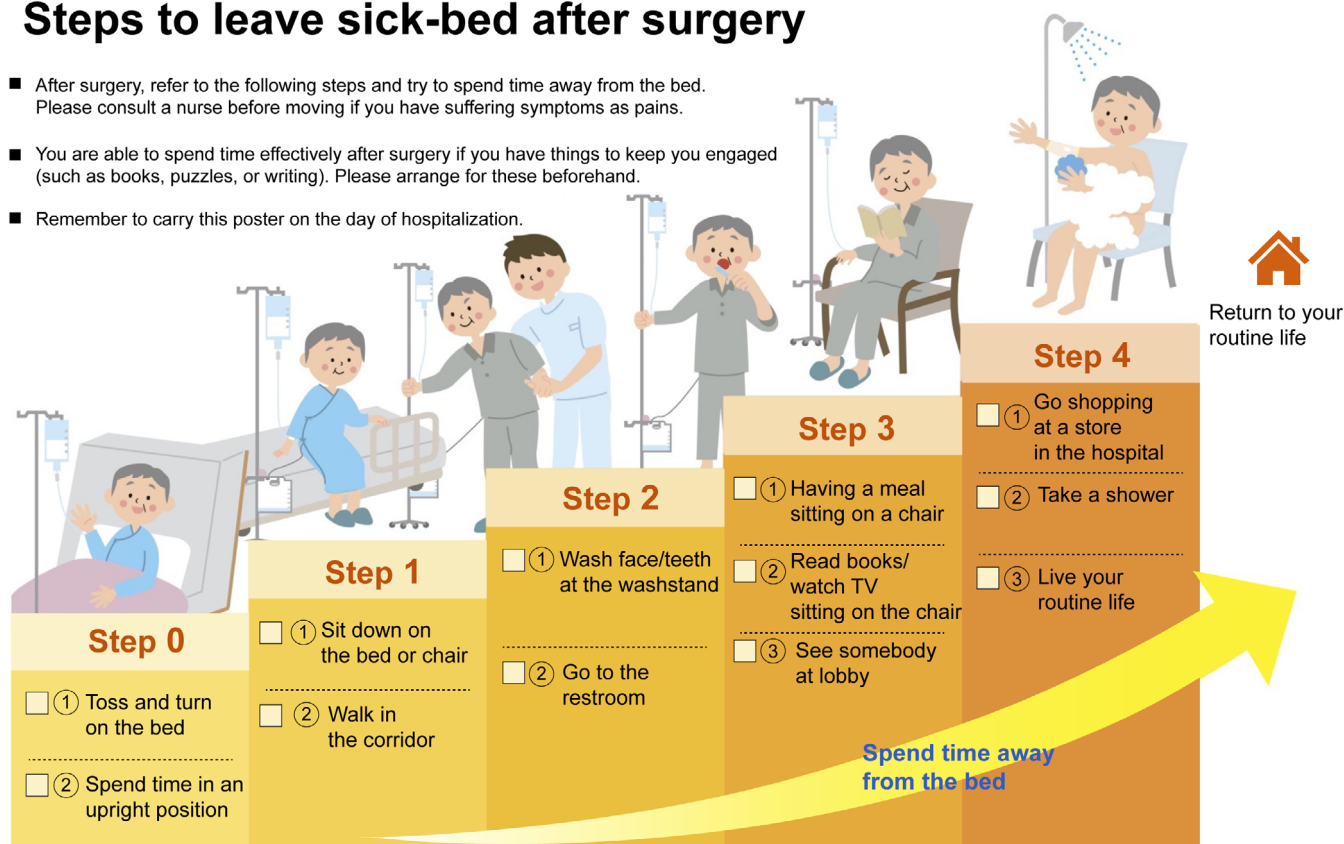
For mobilization, types of out-of-bed life behaviors and mobilization frequency were measured with a questionnaire and step count was measured using a pedometer with an accelerometer (Lifecorder[®] GS, Suzuken; LC). The accelerometer method evaluates step count through continuously measuring gravitational acceleration (Kumahara, Ishii, & Tanaka, 2006). Previous studies have reported that this measurement of step count remains accurate regardless of velocity changes, and does not tend to be affected by factors such as waist circumference, body mass index, and pedometer tilt (Crouter, Schneider, & Bassett Jr., 2005). Schneider, Crouter, and Bassett (2004) and Schneider, Crouter, Lukajic, and Bassett Jr. (2003) have previously reported the reliability of the LC. In this study, it was attached to patients’ waists

TABLE 1 Comparison of intervention contents

Implementation period	Element	Walking-promotion care (WPC)	Life-behavior-promotion care (LPC)
Before surgery	Preoperative education	Explain the treatment process up to surgery, as well as the postoperative course	Explaining the treatment process up to surgery, as well as the postoperative course
		Explain mobilization a) on postoperative day 0, turn over in bed and sit up b) actively walking from postoperative day 1	Explain mobilization using the poster a) on postoperative day 0, turn over in bed and sit up b) actively perform life behaviors, such as defecation in the toilet and having meals, and begin mobilization from postoperative day 1 c) bring from home items that will be used after leaving bed, such as books, computers, and hobby items d) instead of resting in bed, patients may also spend time in the chair in the hospital room, and at the lounge
Postoperative days 1–3	Mobilization goal-setting	Set mobilization goals every morning Set goals related to walking, such as “walk three laps around the corridor” and “walk twice a day”	Set mobilization goals every morning Set goals related to life behavior, such as “defecate in the toilet” and “have meals while seated”

Steps to leave sick-bed after surgery

- After surgery, refer to the following steps and try to spend time away from the bed. Please consult a nurse before moving if you have suffering symptoms as pains.
- You are able to spend time effectively after surgery if you have things to keep you engaged (such as books, puzzles, or writing). Please arrange for these beforehand.
- Remember to carry this poster on the day of hospitalization.



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FIGURE 2 Poster used to illustrate life-behavior-promotion care

from the morning of postoperative day 1 to the morning of postoperative day 4.

To measure awareness of recovery during postoperative recovery, a 12-item questionnaire was administered to patients at approximately 6:00 p.m. on postoperative days 1–3. No simple, validated, and reliable questionnaire for measuring postoperative recovery was currently available, thus an appropriate assessment was created based on the results of the pilot study and previous interview surveys with patients and nurses to understand the patients' outcomes following postoperative mobilization (Katogi, 2015). In the pilot study to evaluate the practicability of this questionnaire for postoperative patients, elderly patients found it difficult to respond to the visual analog scale, which is consistent with previous research (Waltz, Strickland, & Lenz, 2010). Thus, I adopted a four-point Likert scale (1 = "not at all," 4 = "quite a bit") that could be used as an interval scale (Carifio & Perla, 2008). Cronbach's alpha coefficient was .94 in this study. In addition, days to first defecation and flatulence, time to completion of oxygen administration, and days to achieve discharge criteria were confirmed through the patients' medical records. Discharge date may have been postponed due to social reasons or, in cases of colostomy, be affected by care-

acquisition status. Therefore, with reference to previous studies (Fiore Jr., Bialocerkowski, Browning, Faragher, & Denehy, 2012; Ota, Fujie, Fukunaga, Ogino, & Maeura, 2011), discharge criteria were set as: (a) pain management is possible through oral analgesia alone; (b) movement is possible without assistance; (c) ingestion of a solid meal is possible, and intravenous nutrition is not necessary; (d) there has been defecation and flatulence; and (e) there are no severe complications.

2.4.2 | Participant characteristics and factors affecting mobilization

Data on participant characteristics and factors affecting mobilization were collected from medical records and the questionnaire.

- 1 Basic characteristics: age, gender, performance status, American Society of Anesthesiologists' classification, surgical history.
- 2 Surgical characteristics: surgical method, surgery time, infusion volume, bleeding volume, type of postoperative analgesia.

- 3 Postoperative physical conditions: first mobilization time, blood pressure change during mobilization, physical symptoms (pain, nausea, dizziness).

2.4.3 | Nurses' evaluation of LPC

After data collection was completed, ward nurses were asked to complete a questionnaire regarding their understanding of LPC, patients' reactions to LPC, and if this type of care induced changes in their own nursing practices.

2.5 | Data collection

The data collection period lasted from April to December 2016. To address concerns that administering of two types of care in the same surgical ward at the same time could have affected the intervention contents of the care and damaged the internal validity of the results, the data for the LPC group were collected after the data collection for the WPC group had been completed. In addition, as WPC might have been affected if the ward nurses had known the contents of LPC, the detailed contents of LPC were not explained to the ward nurses until the data collection for the WPC group had been completed. Participants were informed that the study compared the effects of two types of mobilization care, but were not provided with an explanation of the specifics of, and differences between, each type.

2.6 | Data analysis

To confirm the homogeneity between the two groups, patient characteristics and effect factors were compared using a χ^2 test, an unpaired t test, and the Mann–Whitney U test. In addition, to evaluate dependent variables, a χ^2 test, an unpaired t test, the Mann–Whitney U test, and a repeated measures two-way analysis of variance with two factors (presence or absence of intervention and length of postoperative days) were performed.

SPSS version 22 J (Windows; SPSS, Tokyo, Japan) was used for data analysis, and the significance level was set at $p < .05$.

2.7 | Ethical considerations

The study was approved by the research ethics committee of St. Luke's International University (Approval number: 15-A090) and was registered in the UMIN Clinical Trials Registry (trial ID: UMIN000021883).

Participants were given written and oral explanations of the aim and methods of the study, the personal data protection applied, the voluntary nature of research participation, and that they were free to withdraw anytime using the research participation declination form. After this information was provided, they were asked to sign a consent form. Keeping in mind that this study involved patients soon after surgery, participants' desires to continue participating in the study were reconfirmed if pain and fatigue were observed.

This paper was written with reference to the Consolidated Standards of Reporting Trials (CONSORT) Statement extension for trials of nonpharmacological treatments (CONSORT NPT extension) (Boutron, Altman, Moher, Schulz, & Ravaud, 2017).

3 | RESULTS

3.1 | Participant characteristics

Overall, 34 patients in the WPC group and 25 patients in the LPC group fulfilled the criteria and of these, 31 and 22 patients, respectively, consented to participate in the study. Five patients (16.1%) in the WPC group and two (9.1%) in the LPC group withdrew during the intervention period, either because of a personal desire to end their participation or because of postoperative complications (three participants in the WPC group with postoperative bleeding on postoperative day 1 and postoperative delirium on postoperative day 2, and one participant in the LPC group with suspected anastomotic leakage on postoperative day 1). Further, three patients in the WPC group and one patient in the LPC group were excluded for giving incomplete responses on the questionnaire. Thus, there were 23 analysis participants in the WPC group and 19 analysis participants in the LPC group. There were no significant differences between the WPC group and the LPC group in terms of participants' basic characteristics and surgical characteristics (Table 2); however, in terms of postoperative physical symptoms, pain on postoperative day 3 was significantly higher in the LPC group ($p = .034$).

3.2 | Implementation of intervention

Nurse-set mobilization goals on postoperative days 1–3 differed significantly between the two groups ($p = .005$, $p = .002$, $p = .009$). Also, patients' self-established mobilization goals on postoperative days 1–3 differed significantly between the two groups ($p = .014$, $p = .012$, $p < .001$). The goals of the WPC group focused on

TABLE 2 Subject characteristics

			Walking-promotion care (WPC) group	Life-behavior-promotion care (LPC) group	
			N = 23	N = 19	<i>p</i>
Basic characteristics					
Age, years		Mean (SD)	65.7 (12.1)	63.2 (13.9)	.524
Gender, male		n (%)	14 (60.9)	9 (47.4)	.382
PS	0	n (%)	19 (82.6)	19 (100.0)	.114
	1		4 (17.4)	0 (0.0)	
ASA classification	I	n (%)	4 (17.4)	5 (26.3)	.742
	II		17 (73.9)	12 (63.2)	
	III		2 (8.7)	2 (10.5)	
Surgical history, none		n (%)	18 (78.3)	14 (73.7)	1.000
Surgical characteristics					
Surgical method	Laparotomy	n (%)	6 (26.1)	1 (5.3)	.105
	Laparoscopic surgery		17 (73.9)	18 (94.7)	
Surgical site	Upper gastrointestinal tract	n (%)	11 (47.8)	10 (52.6)	.757
	Lower gastrointestinal tract		12 (52.2)	9 (47.4)	
Colostomy, yes		n (%)	3 (13.0)	1 (5.3)	.613
Surgery time		Median (min/max)	253 (190/480)	247 (124/380)	.810
Surgery end time	1,200–1,400 hr	n (%)	13 (56.5)	8 (42.1)	.115
	1,400–1,600 hr		7 (30.4)	6 (31.6)	
	1,600–1,800 hr		0 (0.0)	4 (21.1)	
	After 1,800 hr		3 (13.0)	1 (5.3)	
Intraoperative infusion volume		Mean (SD)	2091.2 (565.6)	2,165.6 (1,133.2)	.796
Volume of bleeding		Median (min/max)	25.0 (0/420)	10.0 (5/385)	.576
Type of analgesia	PCEA	n (%)	10 (43.5)	10 (52.6)	.178
	IV-PCA		13 (56.5)	7 (36.8)	
	Oral administration only		0 (0.0)	2 (10.5)	
Postoperative physical symptoms					
Time to first mobilization		Mean (SD)	20:37 (2:42)	20:17 (2:38)	.679
Blood pressure change during first mobilization, yes		n (%)	6 (26.1)	3 (15.8)	.477
Pain ^a	Postoperative day 1	Median (min/max)	2 (1/4)	2 (1/4)	.642
	Postoperative day 2		2 (1/3)	2 (2/4)	.396
	Postoperative day 3		2 (1/3)	2 (1/3)	.034*
Nausea ^a	Postoperative day 1	Median (min/max)	1 (1/3)	1 (1/3)	.823
	Postoperative day 2		1 (1/3)	1 (1/3)	.070
	Postoperative day 3		1 (1/4)	1 (1/4)	.767
Dizziness ^a	Postoperative day 1	Median (min/max)	2 (1/4)	2 (1/3)	.513
	Postoperative day 2		1 (1/3)	1 (1/2)	.846
	Postoperative day 3		1 (1/2)	1 (1/2)	.214

Abbreviations: ASA, American Society of Anesthesiologists; IV-PCA, intravenous patient controlled analgesia; PCEA, patient controlled epidural analgesia; PS, performance status.

^aEach item was scored using a four-point scale comprising – 1: “not at all,” 2: “slightly,” 3: “yes,” 4: “quite a bit.”

**p* < .05 (Mann–Whitney *U* test).

TABLE 3 Comparison of mobilization

		Walking-promotion care (WPC) group (N = 23)		Life-behavior- promotion care (LPC) group (N = 19)		<i>t</i>	df	<i>p</i> (two-sided)
		Mean	SD	Mean	SD			
Type of out-of-bed life behavior	Postoperative day 1	3.74	1.738	4.58	2.694	−1.172	29.64	.250
	Postoperative day 2	6.83	2.741	9.11	3.494	−2.369	40.00	.023*
	Postoperative day 3	9.09	4.481	12.16	3.202	−2.503	40.00	.016*
Step count	Postoperative day 1 ^a	162.95	172.856	209.16	188.438	−0.819	39.00	.418
	Postoperative day 2	563.13	366.268	724.95	531.793	−1.164	40.00	.251
	Postoperative day 3	1,176.65	942.599	1,170.05	1,037.883	0.022	40.00	.983
Mobilization frequency ^b	Postoperative day 1	3.36	1.761	3.14	2.070	0.343	34.00	.734
	Postoperative day 2	7.55	4.217	10.57	7.930	−1.314	17.74	.205
	Postoperative day 3	11.77	7.250	15.43	7.997	−1.417	34.00	.165

Note: Unpaired Student's *t* test.

^aExcluding one subject in the WPC group, who had a defective pedometer.

^bExcluding subjects who reported they rarely stayed in bed (one in the WPC group, five in the LPC group).

**p* < .05.

walking, and the goals of the LPC group focused more on life behavior. The number of participants who brought tools necessary for mobilization such as books, computers, and hobby items was significantly higher in the LPC group on postoperative days 1 and 2 ($p = .001$, $p = .024$).

3.3 | Comparison of outcomes

3.3.1 | Mobilization

Compared to the WPC group, the LPC group performed significantly more types of out-of-bed life behaviors on postoperative days 2 and 3 ($p = .023$, $p = .016$, respectively; Table 3). A comparison of the two groups regarding each type of out-of-bed life behavior performed demonstrated that the proportion of participants who “left the bed and watched TV or a DVD” was significantly higher in the LPC group on postoperative day 1, and that the proportions of participants who “left the bed and used a computer or mobile phone” and who “left the bed to perform a hobby (reading, puzzles, etc.)” in addition to “left the bed and watching TV or a DVD” were also significantly higher in the LPC group ($p = .006$, $p = .026$, respectively) (Table 4). Furthermore, the LPC group also displayed significantly higher proportions of participants who “left the bed and met with visitor(s)” and who “went to the lounge” on postoperative day 3 ($p = .006$, $p = .037$, respectively). Alternatively, on postoperative day

3 significantly more participants in the WPC group “shaved at the washstand” ($p = .027$).

There were no significant differences between the two groups regarding mobilization frequency and step count (Table 3). The number of participants who responded that they did not lie down during the day once they had left their beds in the morning was higher in the LPC group, with three participants in the LPC group reporting this on postoperative day 2, while one participant in the WPC group and five participants in the LPC group reported this on postoperative day 3; however, these differences were not statistically significant.

3.3.2 | Postoperative recovery

Among the 12 questionnaire items concerning awareness of recovery, for the two items of “I was interested in surrounding events” and “I could spend a day like myself,” significant differences were observed in the interaction between the two factors of intervention and number of postoperative days, and the changes were greater in the LPC group (Table 5). These two items were statistically significant even after adjusting for the baseline, and the LPC group scored significantly higher than the WPC group when comparing the increase from postoperative day 1 to day 3 ($p = .09$, $p = .03$ respectively).

There were no significant differences between the two groups in terms of days to first flatulence and days to first defecation (Table 6). However, the time required

TABLE 4 Comparison of the types of out-of-bed life behaviors performed during the first 3 postoperative days

	Postoperative day 1						Postoperative day 2						Postoperative day 3					
	Walking-promotion care (WPC) group (N = 23)			Life-behavior-promotion care (LPC) group (N = 19)			Walking-promotion care (WPC) group (N = 23)			Life-behavior-promotion care (LPC) group (N = 19)			Walking-promotion care (WPC) group (N = 23)			Life-behavior-promotion care (LPC) group (N = 19)		
	n	%	p	n	%	p	n	%	p	n	%	p	n	%	p	n	%	p
1) Walked in the corridor	22	95.7%		17	89.5%	.581	23	100.0%		19	100.0%	-	22	95.7%		19	100.0%	1.000
2) Spent time in the chair in the hospital room	5	21.7%		8	42.1%	.155	13	56.5%		13	68.4%	.429	16	69.6%		16	84.2%	.305
3) Went to the toilet	1	4.3%		1	5.3%	1.000	19	82.6%		18	94.7%	.356	19	82.6%		15	78.9%	1.000
4) Washed my face at the washstand	1	4.3%		0	0.0%	1.000	15	65.2%		11	57.9%	.627	16	69.6%		17	89.5%	.149
5) Brushed my teeth at the washstand	4	17.4%		1	5.3%	.356	16	69.6%		14	73.7%	.769	19	82.6%		17	89.5%	.673
6) Shaved at the washstand	1	4.3%		0	0.0%	1.000	3	13.0%		2	10.5%	1.000	8	34.8%		1	5.3%	.027*
7) Wiped my body (had my body wiped)	21	91.3%		16	84.2%	.644	2	8.7%		2	10.5%	1.000	20	87.0%		12	63.2%	.143
8) Washed my hair (had my hair washed)	0	0.0%		0	0.0%	-	0	0.0%		1	5.3%	.452	1	4.3%		3	15.8%	.313
9) Stood on the weighing scales	21	91.3%		18	94.7%	1.000	20	87.0%		16	84.2%	1.000	21	91.3%		18	94.7%	1.000
10) Underwent examinations, such as X-ray	0	0.0%		0	0.0%	-	3	13.0%		2	10.5%	1.000	0	0.0%		2	10.5%	.199
11) Went to the rehabilitation room	0	0.0%		0	0.0%	-	0	0.0%		0	0.0%	-	0	0.0%		0	0.0%	-
12) Left my bed and performed respiration training	4	17.4%		4	21.1%	1.000	10	43.5%		9	47.4%	.801	10	43.5%		13	68.4%	.106

(Continues)

TABLE 4 (Continued)

	Postoperative day 1						Postoperative day 2						Postoperative day 3					
	Walking-promotion care (WPC) group (N = 23)			Life-behavior-promotion care (LPC) group (N = 19)			Walking-promotion care (WPC) group (N = 23)			Life-behavior-promotion care (LPC) group (N = 19)			Walking-promotion care (WPC) group (N = 23)			Life-behavior-promotion care (LPC) group (N = 19)		
	n	%		n	%	p	n	%		n	%	p	n	%		n	%	p
13) Left my bed and met with visitor(s)	2	8.7%		5	26.3%	.214	6	26.1%		10	52.6%	.078	6	26.1%		13	68.4%	.006*
14) Left my bed and watched TV or a DVD	1	4.3%		6	31.6%	.034*	6	26.1%		12	63.2%	.016*	9	39.1%		15	78.9%	.009*
15) Left my bed and listened to the radio	0	0.0%		0	0.0%	-	0	0.0%		2	10.5%	.199	2	8.7%		2	10.5%	1.000
16) Left my bed and read a newspaper or magazine	1	4.3%		2	10.5%	.581	4	17.4%		7	36.8%	.180	7	30.4%		10	52.6%	.145
17) Left my bed and used a computer or mobile phone	1	4.3%		4	21.1%	.158	4	17.4%		11	57.9%	.006*	6	26.1%		14	73.7%	.002*
18) Left my bed to perform a hobby (reading, puzzles, etc.)	0	0.0%		2	10.5%	.199	2	8.7%		8	42.1%	.026*	2	8.7%		11	57.9%	.001*
19) Went to the lounge	0	0.0%		0	0.0%	-	4	17.4%		6	31.6%	.468	6	26.1%		11	57.9%	.037*
20) Went to buy things at the kiosk	0	0.0%		0	0.0%	-	1	4.3%		0	0.0%	1.000	4	17.4%		4	21.1%	1.000
21) Went to the garden	0	0.0%		0	0.0%	-	0	0.0%		0	0.0%	-	2	8.7%		1	5.3%	1.000
22) Sat down and had meals	0	0.0%		0	0.0%	-	6	26.1%		10	52.6%	.078	10	43.5%		13	68.4%	.106

* $p < .05$ (χ^2 test).

TABLE 5 Awareness of recovery (interaction through two-way analysis of variance)

		Walking-promotion care (WPC) group(N = 23)		Life-behavior- promotion care (LPC) group (N = 19)		Interaction between length of postoperative days and intervention	
		Mean	SD	Mean	SD	F value	p
1) I could breathe easily	Postoperative day 1	1.48	0.846	1.68	0.820	0.66	.519
	Postoperative day 2	2.48	1.123	2.42	1.071		
	Postoperative day 3	2.35	1.071	2.11	1.197		
2) I felt relief in my back and hips	Postoperative day 1	1.70	0.974	1.79	0.976	0.78	.447
	Postoperative day 2	2.22	1.043	2.16	1.068		
	Postoperative day 3	2.00	0.953	2.37	1.165		
3) The pain in the wound area was reduced	Postoperative day 1	1.30	0.635	1.16	0.501	0.14	.869
	Postoperative day 2	1.78	0.902	1.79	0.976		
	Postoperative day 3	2.04	1.022	2.00	1.000		
4) I felt that things were progressing positively	Postoperative day 1	2.22	0.902	2.68	0.671	1.77	.177
	Postoperative day 2	2.74	0.864	2.68	1.057		
	Postoperative day 3	2.70	0.876	3.00	0.745		
5) I felt that my body was healing	Postoperative day 1	2.17	0.887	2.26	0.933	0.12	.891
	Postoperative day 2	2.83	0.937	2.95	0.848		
	Postoperative day 3	2.83	0.937	3.05	0.780		
6) I felt that I was doing well	Postoperative day 1	2.52	0.846	2.42	0.692	0.67	.513
	Postoperative day 2	2.70	0.822	2.84	0.834		
	Postoperative day 3	2.78	0.951	3.00	0.816		
7) I felt relieved	Postoperative day 1	2.74	0.752	2.53	0.612	2.04	.137
	Postoperative day 2	2.74	0.810	2.84	0.765		
	Postoperative day 3	2.70	0.926	3.00	0.816		
8) I had a good appetite	Postoperative day 1	1.96	0.976	1.68	1.003	0.65	.524
	Postoperative day 2	2.30	0.876	2.37	0.955		
	Postoperative day 3	2.70	0.926	2.47	1.124		
9) I felt that I could walk steadily	Postoperative day 1	2.09	1.041	2.32	0.820	0.46	.605
	Postoperative day 2	2.78	0.795	2.95	0.524		
	Postoperative day 3	2.78	1.085	3.21	0.713		
10) I was interested in surrounding events	Postoperative day 1	2.43	0.896	2.26	0.872	4.00	.022*
	Postoperative day 2	2.35	0.885	2.74	0.653		
	Postoperative day 3	2.65	0.935	3.21	0.787		
11) I could spend a day like myself	Postoperative day 1	2.04	1.065	1.53	0.612	4.85	.010*
	Postoperative day 2	2.22	0.951	2.37	0.895		
	Postoperative day 3	2.48	0.947	2.84	0.898		
12) I felt like I could be discharged	Postoperative day 1	1.74	0.915	2.05	0.911	0.01	.987
	Postoperative day 2	2.26	0.964	2.53	0.905		
	Postoperative day 3	2.39	1.118	2.68	1.057		

* $p < .05$ (two-way repeated measures analysis of variance).

TABLE 6 Comparison of physical recovery

	Median (IQR)		Average rank		<i>U</i>	<i>p</i>
	Walking-promotion care (WPC) group (N = 23)	Life-behavior-promotion care (LPC) group (N = 19)	Walking-promotion care (WPC) group	Life-behavior-promotion care (LPC) group		
Days to first flatulence ^a	2(1/2)	2(1/2)	18.75	20.33	165.000	.616
Days to first defecation ^a	3(2.25/4)	2.5(2/4)	21.25	17.56	145.000	.292
Time from surgery end time to completion of oxygen administration	38:16 (17:41/49:40)	14:15 (5:26/21:59)	26.13	15.89	112.000	.007*
Days to achieve discharge criteria	6(6/8)	6(4/7)	24.83	17.47	142.000	.042*

^aAnalysis excludes colostomy patients (WPC Group n = 20, LPC Group n = 18).

**p* < .05 (Mann–Whitney *U* test).

from surgery end time to completion of oxygen administration was significantly shorter in the LPC group (*p* = .007), with a median of 38 hr, 16 min for the WPC group and a median of 14 hr, 15 min for the LPC group. Furthermore, days to achieve discharge criteria were significantly shorter in the LPC group (*p* = .042).

3.4 | Nurses' evaluation of LPC

A questionnaire was distributed to 24 nurses, of whom 20 responded (response rate: 83.3%).

Over 90% of the nurses reported that they could understand or could somewhat understand the aims and practice content of LPC. Fifteen nurses (75%) sensed a difference in patient reaction to the LPC compared to that for the WPC, specifically mentioning that “patients' understanding deepened,” “patients' motivation increased,” “patients gained a sense of achievement,” and “mobilization was promoted.” However, three nurses (15%) did not sense any differences, answering “no idea” or “nothing in particular has changed.” Eleven nurses (55%) reported a change in their own nursing practice after administering LPC, stating that “my knowledge of mobilization changed” and “my goal-setting for patients changed.” Six nurses (30%) did not sense any change, stating that “it is no different from what has been done so far.” Fourteen nurses (70%) responded that they would continue to practice LPC in the future, and none responded that they would not.

4 | DISCUSSION

In this study, LPC was administered to post-gastrointestinal surgery patients until postoperative day

3, and its effects were studied by comparing the patients' progress with that of patients who received WPC. The results suggest that LPC may increase the types of postoperative out-of-bed life behaviors performed and may promote postoperative recovery.

4.1 | Effects on mobilization

Patients who received LPC engaged in a wider variety of out-of-bed life behaviors than did patients who received WPC. A comparison of the types of life behaviors performed indicated that patients' behaviors became more diversified as days after surgery increased. In addition, on postoperative day 3, the proportion of participants who not only performed activities in the hospital room but also spent time at the lounge, was also higher.

The most notable difference between WPC and LPC concerned the daily mobilization goals, which may have caused the above result. In contrast to WPC, which sets only walking-related goals, LPC sets life-behavior-related goals. In addition, while there is little change in the daily WPC goals, the LPC goals change over five stages, from steps 0 to 4. As clearer and more difficult goals are more effective for increasing individual performance (Locke, 1968; Mento, Steel, & Karren, 1987), the difference in goal-setting between the two groups could have caused the observed difference in patient behaviors. Furthermore, the process of gradually reacquiring the ability to perform life behaviors following a period of inability to move due to pain can cause patients to feel a sense of success and increase their sense of self-efficacy (Bandura, 1995). This could have further promoted life behaviors on the following day.

The results indicated that there were no differences between the two groups in terms of step count and

mobilization frequency, which indicates that LPC, despite not specifically promoting “walking,” did not negatively affect step count and mobilization frequency. In other words, this indicates that LPC is not inferior to WPC in terms of mobilization as assessed by step count. Furthermore, compared with a study which set a goal of 3,000 steps per day for colon surgery patients (Matsui, Inaki, Noto, Yamamoto, & Bando, 2018), the step count on the second postoperative day (median 393) and the third postoperative day (median 1,301) was comparable to this study. This suggests that changing mobilization care that focuses on solely walking to mobilization care that promotes life behaviors does not affect patients’ step count.

With regard to factors affecting mobilization, the pain at postoperative day 3 was significantly higher in the LPC group. As for the distribution of the responses, there were no respondents who answered “quite a bit” in both groups, and many answered “not at all” in the WPC group. The participants in the LPC group were able to actively engage in out-of-bed life behaviors even when they experienced pain. It may be possible to engage in a wider variety of life behaviors by adding sufficient pain management techniques.

4.2 | Effects on postoperative recovery

Compared to WPC, LPC significantly shortened postoperative oxygen administration time. Postoperative pulmonary complications are common and a major cause of perioperative morbidity and mortality (Smetana, Lawrence, & Cornell, 2006; Smith et al., 2010), and the results of this study provide pertinent information regarding this issue. Following surgery, shallow breathing and avoidance of deep breaths can occur for reasons such as anesthesia, analgesia, and pain. Further, the decrease in functional residual capacity as a result of long periods in a supine position can cause a mismatch in the ventilation/perfusion ratio of blood flow to the dorsal lung region and ventilation, resulting in hypoxemia (Sakuse & Sakurai, 2004). Alternatively, compared to the supine position, the sitting position has been reported to improve postoperative respiratory function (Nielsen, Holte, & Kehlet, 2003). Compared to the WPC group, the LPC group had more opportunities to perform life behaviors in sitting and standing positions, which consequently could have increased their functional residual capacity and improved their ventilation efficiency, resulting in a shortened oxygen administration period.

Regarding the questionnaire items concerning the awareness of recovery, the LPC group showed greater changes in “I was interested in surrounding events” and

“I could spend a day like myself” during the first 3 postoperative days than did the WPC group. A previous study that examined patients’ postoperative recovery process (Nawa, 2006) reported that as days after surgery increase, patients’ interests transition from their own body to surrounding events and life after discharge. In the present study, patients in the LPC group expanded their interests to surrounding events earlier, which strongly implies that LPC promotes patient recovery. In addition, a study that described the recovery process of patients who had undergone surgery for colon cancer (Taylor, Richardson, & Cowley, 2010) reported that patients experienced a disconnect between their body and mind, and had to regain control of their body in stages. Patients are “beings with a body that does not act as desired” (Nightingale, 1860); they experience a lack of control following surgery, an inability to focus, and tend to isolate themselves from the surrounding world (Jonsson, Stenberg, & Frisman, 2011). For patients whose bodies and minds are divided in such a way, LPC can be effective in helping patients regain their sense of self by encouraging mobilization and the resumption of life behaviors from the early postoperative period.

In the LPC group, the score of “I could spend a day like myself” was lower on the first postoperative day than in the WPC group, and increased significantly on the third postoperative day. This suggests that the difference in preoperative education influenced the perception that patients were capable of spending a day like oneself. In the LPC group, the patient was presented with five steps for mobilization in steps from 0 to 4, so the patient may have been capable of more concretely imagining the contents of “a day like myself” than in the WPC group. Therefore, the evaluation of the achievement level was low on postoperative day 1, and the score may have increased with step-up.

4.3 | The significance of LPC in nursing practice

The results of this study imply that the type of mobilization care provided by nurses affects patients’ postoperative recovery. Among the nurses who practiced LPC, several reported becoming aware of changes in their own nursing practice. Up until the point they introduced LPC, the nurses had been taking the lead in setting mobilization goals, but following the introduction of LPC, this changed, and nurses began to set daily goals based on their understanding of the patients’ lives prior to hospitalization (which they determined through discussions with patients). This partnership between the patients and nurses through the practice of LPC embodies people-

centered care, which is important in the medical field (Kamei et al., 2017), and is an important trait of LPC.

In terms of changes in nursing practice following the introduction of LPC, there were also a small number of nurses who responded that “it is no different from what has been done so far.” The key responsibility of a nurse is to help patients maintain their daily life patterns (Henderson, 1969), so the nurses who observed no difference between the LPC and their usual practice could have considered LPC to merely be a reflection of this responsibility. However, the fact that there were differences between the effects of WPC and LPC suggests the importance of consciously linking life behavior to mobilization. Thus, there is a need to promote a perspective of mobilization care that promotes life-centered behaviors.

5 | LIMITATIONS

This study was a non-randomly allocated quasi-experimental study, the sample size was low, and data collection was performed in a single ward. In addition, quantitative and qualitative differences between the surgical methods used in the study limit the generalizability of the study. The interventions in the two groups were not completely independent, and in particular, some patients and nurses set the mobilization goal as walking in the LPC group, resulting in the contamination of the patient experience also being a limitation. To generalize the results, further studies are necessary.

Moreover, mobilization was not systematically defined in the study, as the indicators attributed to it were not standardized. In future research, it is important to examine strategies for measuring the concept of mobilization.

6 | CONCLUSION

The results of this study suggest that LPC may broaden the types of out-of-bed life behaviors patients perform following surgery. In addition, LPC facilitates expanding interest in the surrounding environment, feelings of returning to oneself during the early postoperative period, and may also reduce the time oxygen administration is needed, and length of hospitalization. These indicate the significance of implementing mobilization care that focuses on life behaviors, rather than one that focuses on only walking.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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