



Early Postoperative Ambulation: Back to Basics

A quality improvement project increases postoperative ambulation and decreases patient complications.

The ambulation of patients soon after surgery, now a fundamental part of nursing care, wasn't common practice until the middle of the past century. In an article published in 1949, D. J. Leithauser, a Detroit surgeon, stated, "Ten years ago early ambulation was considered a 'crackpot' idea. Today, it is recognized and is rapidly approaching a 'must' procedure following a surgical operation."¹ Indeed, the practice of having patients walk as soon as possible after surgery constituted a major change in patient care, based on then new evidence of the benefits of exercise and its positive impact on patient recovery. Since then, facilitating ambulation has been considered an important part of excellent nursing care, particularly in postoperative patients.

Despite the widespread belief that early ambulation promotes surgical recovery, when we attempted to research the subject we found little evidence to support this nursing practice. To our surprise, we found only one published study on the effect of ambulation alone on postoperative ileus, and the findings did not support the use of early ambulation as a means of increasing gut motility.² Early ambulation after surgery has been included as part of multimodal, fast-track, or enhanced recovery after surgery (ERAS) perioperative programs. Although many small studies have reported reduced complication rates or lengths of stay with fast-track programs,³⁻⁵ a recent Cochrane review found that the evidence was not of sufficiently high quality to justify implementing a fast-track or ERAS program as standard care.⁶ (It should be noted that there seems to be no consensus among published studies on the exact definition of early ambulation; in our institution, the term refers to patients getting out of bed and walking on the day of surgery, and patients are told before surgery to expect this.)

As health care has evolved, technology has come to play an ever-greater role in nursing care; as a result, computers are now prominent at the bedside. The current focus on improving outcomes requires not only that nursing care be provided in a timely

manner, but also that it be documented in the medical record as quickly and accurately as possible. However, with decreasing lengths of stay and increasing requirements placed on nurses, time to perform basic nursing care is limited. As Storfjell and colleagues demonstrated, many nurses spend more than half their time in non-direct care activities.⁷

At our institution, there were two problems related to postoperative ambulation. First, patients were informed before surgery that they would be expected to get out of bed and ambulate the day of surgery, but because of other demands on nursing time, nurses and nursing assistants were not always able to accomplish early ambulation. Therefore, some patients who didn't receive the expected assistance in ambulating complained, and physical therapists who received some of these patients' requests for ambulation assistance objected, because this is a standard nursing function. Second, although there were a variety of areas within the nursing documentation system to document ambulation, none was readily viewable by other providers who needed to know this information. We addressed both problems in the quality improvement intervention described here.

Nursing case managers, information technology staff, nursing administrators, and unit leaders agreed to work together to make patient ambulation a higher priority. The project team developed and implemented several information technology strategies, described below, to improve ambulation and its documentation specifically on the colorectal and urologic general surgery units. Administrative data on complications, length of stay, and cost of care were used to evaluate the impact of increased ambulation on surgical recovery.

METHODS

This project employed a variety of strategies to change nursing practice related to early postoperative ambulation and its documentation. The outcomes of this project were identified in the literature on postoperative ambulation and included complications, length of



Table 1. Staff Education Strategies

Educator	Strategy	Timetable
Systems support services representative	Showed nurses where within the nursing record to document ambulation (information entered in this field appears as color-coded indicators on the computer whiteboard, so staff can see ambulation reminders)	1 hour
Systems support services representative	Printed screenshots of PowerPoint slides showing ambulation documentation in the nursing documentation system and posted them on bulletin boards in staff break rooms for reference	1 hour
Physical therapy department	Measured individual distances per unit and put them on small laminated cards applied to computers for reference	3 hours
Electronic medical record programmers	Added ambulation indicator to computerized whiteboard display to allow viewing on all computer screens	1 week
Case managers, systems support services representative	Presented education and project goals to nursing staff at staff meetings	20 minutes per session
Case managers, systems support services representative	Held one-on-one discussions with nursing staff who couldn't attend staff meetings	5–10 minutes per discussion
Case managers, systems support services representative	Repeated rounding to engage nursing staff in project and answer questions as needed	5–10 minutes, 3–4 times per week
Case managers, systems support services representative, unit charge nurses	Organized celebration for staff after completion of project; charge nurses displayed posters and provided candy to all nursing staff on pilot units for one week in recognition of their participation	3 hours for planning and preparation

stay, and cost. The impact of the intervention was examined using a preintervention–postintervention design. Comparisons were also made with control units.

Setting. The project was conducted at Vanderbilt University Medical Center, a 918-bed academic medical center in Nashville, Tennessee, with a commitment to information technology. The intervention was implemented on four surgical units with a total of 60 beds. Evaluation data were obtained from patients with specific diagnosis-related groupings (DRGs) pertaining to colorectal and urologic surgeries, the predominant patient populations on the four intervention units. Patients with the same DRGs who received care on other units served as controls.

Sample. To evaluate the impact of the program, we compared documentation, distance ambulated, and patient outcomes for six months before the intervention (July through December 2008) and six months after (July through December 2009). In January 2009, the intervention strategies were implemented.

There was a six-month “washout” period from January 1 to July 1, 2009 to match study time frames, establish the new nursing practice, and reduce any

possibility of a Hawthorne effect. All patients admitted for colorectal and urologic surgeries without contraindications for progressive ambulation (such as physician-ordered bed rest, paralysis, or spina bifida) were included in the analysis.

Intervention. The interventions used to increase ambulation and improve documentation included revising evidence-based orders, measuring and posting distances on the four general postsurgical nursing units, creating fields in the electronic medical record (EMR) to display ambulation distances, educating staff on the benefits of early ambulation and the necessity of proper documentation, and extending the functionality of an existing dashboard application (known as a whiteboard) that appears on all computer screens and provides easy monitoring of documented patient ambulation.

The team that implemented the intervention consisted of the six nurses who are coauthors of this article. Two RN case managers in the colorectal and urologic surgical units (DEJ, LWA) began the project by enlisting the other providers. In addition to the two case managers, the team included two doctorally prepared nurses (RMH, NLW), an evidence-based medicine specialist (SLJ), and a systems support specialist

(VAK). The systems support specialist assisted nursing staff with computerized documentation systems and worked with all members of the patient care team to increase efficiency and seamlessly incorporate computerized applications into their workflow.

Literature search. The work began with a literature search on the effects of ambulation on postsurgical patient outcomes, using the following PubMed Medical Subject Headings (MeSH) terms: *early ambulation, abdomen/surgery, postoperative care/adverse effects, postoperative complications, ileus/prevention and control, and colorectal surgery*. The literature suggested that ambulation, in conjunction with other postsurgical interventions, may produce positive outcomes. The single study that tested only postoperative ambulation reported no positive effect on recovery of gastric motility in a small sample (N = 34), but still encouraged its use because it helps prevent deep vein thrombosis and muscle atrophy, among other beneficial effects.² Based on the literature, we determined that early postoperative ambulation was a safe practice (none of the studies that examined early ambulation in combination with other strategies to promote postoperative recovery reported any adverse events) and may lead to improved patient outcomes, such as fewer complications, shorter lengths of stay, and lower costs of care.

Documentation of ambulation. The team modified the provider order sets within the computerized provider order entry system to state definitively that nurses must not only ambulate their patients but also accurately document ambulation in measured distances. To achieve this, the physical therapy department measured the distances between common landmarks on the nursing units, such as the distance from a patient's bed to the bathroom, from the bed to the door, and the length of a complete circuit of the unit, and then listed these distances on laminated cards that could be displayed beside the computers used for nurse charting.

The systems support specialist proposed the use of computerized reminders to help nursing staff document ambulation in a consistent manner and collaborated with the facility's EMR programming team to add an ambulation indicator to the existing whiteboard that displays updated patient information from the EMRs, such as new order sets, laboratory test results, Braden Scale scores, and fall risk.⁸ The indicators turn yellow at 7 AM and 7 PM to remind nurses on the new shift that ambulation documentation is needed. A red indicator means that ambulation hasn't been documented since noon or midnight of the previous shift. A green indicator means that ambulation documentation is up to date. There are two versions of the whiteboard: a version that's compliant with the

Health Insurance Portability and Accountability Act that doesn't contain patients' full names and that appears on the computer screen when no one is actively working at a given workstation, and another "authenticated" version with identifying information that appears when a care provider logs in to the system.

Staff education. The case managers and the systems support specialist educated nursing staff on the intervention units using a variety of strategies aimed at encouraging nurses to meet the ambulation standard of care (see Table 1). Staff education included the project objectives (improved patient outcomes and patient involvement in the team-based recovery effort), the benefits of early ambulation (improved circulation and bowel function), and the importance of accurate documentation of distances ambulated to quantify patients' progress. Each educational session lasted no longer than an hour.

The planning, the implementation of technologies, and the initial staff training were completed within three months. Changes to clinical care began in January 2009. After the first hour-long meeting to initiate the intervention, the team met twice more after two and four weeks (days 14 and 28) to discuss feedback from nursing staff and other providers, track progress, identify problems, and develop solutions to keep the project on course. Process questions arose: for example, early in the implementation it was unclear whether the nurse or the nursing assistant was responsible for documenting ambulation (in practice, whoever helps the patient ambulate—usually the nursing assistant—should document it). To help sustain the change in nursing practice, meetings were held as needed to discuss issues that interfered with early ambulation and documentation (we currently

Figure 1. Percentage of Patients with Documented Ambulation on Intervention and Control Units

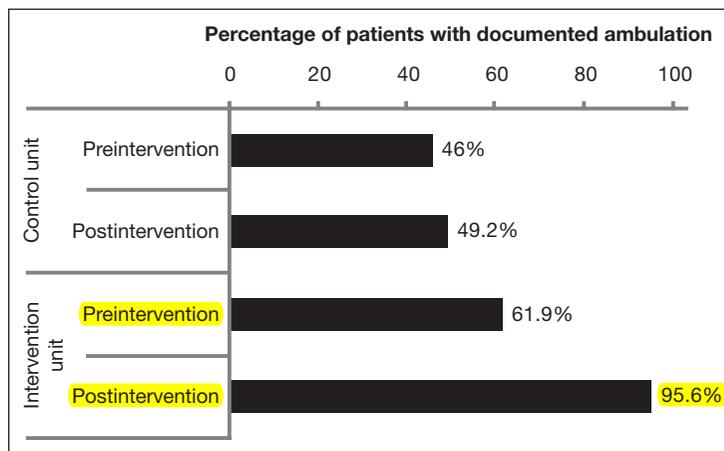
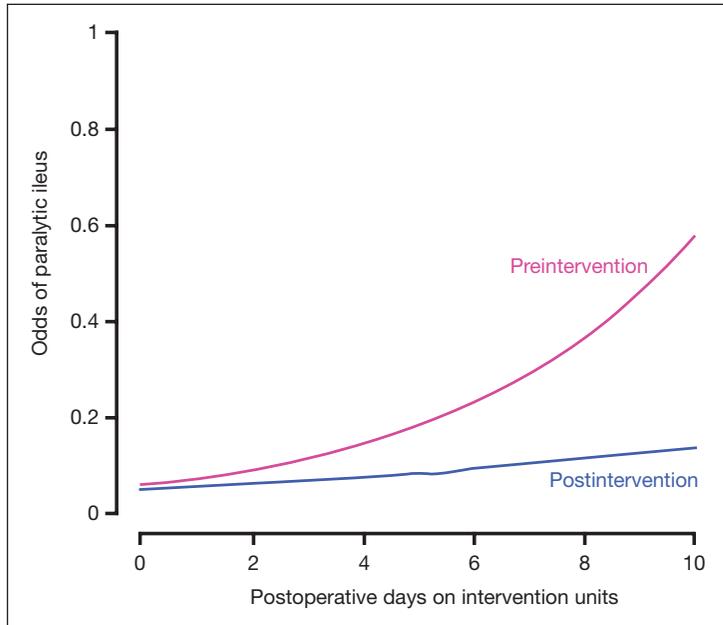




Figure 2. Preintervention and Postintervention Rates of Paralytic Ileus by Number of Postoperative Days on Intervention Units



The number of postoperative days spent on an intervention unit was significantly associated with a decreased risk of paralytic ileus during the postintervention period ($P = 0.003$).

educate new staff members on the process as part of their orientation).

As they had done prior to the intervention, nurses continued to provide preoperative education on early postoperative ambulation to patients in the clinic before admission for surgery and on the colorectal and urologic general surgery units when patients were preparing for surgery.

Evaluation. We compared documented ambulation and outcomes (complications, length of stay, cost) before and after the improvement project to evaluate the impact of the project on nursing practice and patient outcomes. Were nurses more likely to have their patients ambulate after the intervention? Did their patients have better outcomes? Did documentation of ambulation improve?

Nursing documentation of ambulation, patient demographics, diagnosis and procedure codes, cost, and length of stay were abstracted from the EMR and administrative data systems. Estimates of patient acuity (mild, moderate, severe, extreme) and expected hospital lengths of stay were obtained from the University HealthSystem Consortium (www.uhc.edu), which uses administrative data from academic medical centers to produce external benchmarks.

Periodically, we sought comments from project participants, including nurses, nursing assistants, patients, other providers, and administrators to provide

insight into the challenges and benefits of the program.

We used an internal accounting system to compare the costs of care among patients with and without postoperative paralytic ileus. Daily postoperative treatment costs among patients in both groups were similar, but median length of stay was six days longer in those who developed the condition. Postoperative patients with one complication are at increased risk for further complications, and the independent costs of treating isolated paralytic ileus could not be readily extracted. Based on the costs associated with longer lengths of stay, we conservatively estimated the cost of treating a case of paralytic ileus at \$5,800.

Analysis. We used multivariate linear regression analysis to estimate the independent effect of the ambulation intervention on length of stay and cost; we also used logistic regression analysis to estimate the independent effect of the intervention on complications. We included an interaction term to analyze the combined effect of time period (preintervention versus postintervention) and patient unit (intervention group versus control group) on patient outcomes. This method controls for both time period and exposure to the intervention. We further adjusted the model for patient age, sex, acuity, colorectal versus urologic surgery, expected length of stay, unit, and time period. This was an intention-to-treat analysis (all patients who had these surgeries and who were assigned to the participating units were included in the analysis; no patients were eliminated, even if they didn't or couldn't ambulate). Statistical analyses were performed with R statistical software, version 2.11.0. Level of significance was $P \leq 0.05$.

RESULTS

There were 1,878 colorectal and urologic surgery patients in the preintervention period and 1,748 in the postintervention period. Median patient age was 56 years, and 58% of patients had colorectal surgery. More patients in the postintervention period were classified as moderately or severely ill and fewer as mildly or extremely ill (see Table 2). The expected improvement was observed on intervention units, where the proportion of patients with documented ambulation increased from 62% before the intervention to 96% afterward, while documented ambulation on control units remained unchanged (see Figure 1). In the postintervention period, the total documented distance ambulated on the intervention units also increased significantly, from 176 feet per patient day to 264 feet per patient day. Despite the increased ambulation on the intervention units, there was no increase in patient falls reported from the preintervention to the postintervention period.

Overall complication rates in all colorectal and urologic surgical patients decreased from the preintervention to the postintervention period, despite that more patients were considered moderately or severely ill in the postintervention period. However, while we saw declines in complications on both control and intervention units, only the decrease in the rate of paralytic ileus among patients on the intervention units, from 7.3% to 4.6% (a 37% decrease), was statistically significant ($P = 0.04$) (see Table 3). Using a multiple logistic regression model that estimated the independent effect of the intervention on paralytic ileus, time on an intervention unit was significantly associated with a decreased risk of paralytic ileus during the postintervention period ($P = 0.003$) after adjusting for expected hospital length of stay, age, and sex (see Figure 2).

Over the 18-month evaluation period, overall length of stay and cost increased in both the intervention and control units. Cost and hospital length of stay are correlated and skewed; the average hospital cost per patient in this population was \$10,957, while 50% of the cases cost less than \$6,225. Total costs increased 9% on control units and only 3.5% on intervention units; however, this difference was not statistically significant. Decreasing the rate of paralytic ileus by 37% represents potential annual cost savings of \$830,000.

In addition, the new practice patterns established routine clinical updates and discussions between case managers and nursing staff regarding their patients' discharge progress. Nurses and case managers initiated the enhanced communication equally, with a focus on minimizing potential discharge barriers.

Interviews with patients and the health care team after the intervention illustrate the improved culture of team collaboration and positive results. For example, a 79-year-old man who had a radical nephrectomy with a large chevron incision was sent to a control unit following surgery because of bed availability. There, he didn't get out of bed often enough and a physical therapy order was placed, resulting in a recommendation for admission to a skilled nursing facility upon discharge. Subsequently, he was transferred to one of the intervention units, where he was assessed, and the staff nurses and nursing assistants soon had him up and ambulating in the hallway. Based on this well-documented independent ambulation, he was able to go home at discharge.

A physician commenting on the nursing care provided on two of the intervention units stated:

Having a family member post-op on another (control) floor recently, it was very clear that ambulation was not a key goal on that floor, and therefore my relative only walked if she

Table 2. Patient Characteristics

Characteristic	Preintervention (N = 1,878)	Postintervention (N = 1,748)	P Value
Surgery type, n (%)			
Colorectal	1,086 (58)	997 (57)	NS
Urologic	792 (42)	751 (43)	
Sex, n (%)	1,095 (58)	930 (53)	0.002
Male	783 (42)	818 (47)	
Female			
Acuity, n (%)	705 (37)	594 (34)	0.02
Mild	672 (36)	678 (39)	
Moderate			
Severe	287 (15)	310 (18)	
Extreme	214 (11)	166 (9)	
Patients who had one surgical procedure, n (%)	1,671 (89)	1,573 (90)	NS
Patients whose surgery was their primary procedure, n (%)	1,540 (82)	1,433 (82)	NS
Median age, years (IQR)	56.2 (43.8–65.1)	56.6 (44.7–65.7)	NS

IQR = interquartile range; NS = not significant.



Table 3. Number and Prevalence of Complications by Care Unit and Time Period

Complication	Control Units		Intervention Units	
	Preintervention (n = 1,125)	Postintervention (n = 1,047)	Preintervention (n = 753)	Postintervention (n = 701)
Any, n (%)	216 (19.2)	184 (17.6)	62 (8.2)	43 (6.1)
Paralytic ileus, n (%)	148 (13.2)	111 (10.6)	55 (7.3)	32 (4.6) ^a
Surgical digestive complication, n (%)	108 (9.6)	95 (9.1)	41 (5.4)	29 (4.1)
Any digestive complication, n (%)	172 (15.3)	144 (13.7)	59 (7.8)	38 (5.4)
Cost (median hospital cost per patient)	\$7,192	\$7,851	\$5,082	\$5,259
Length of stay (days)	3.7	3.8	1.7	2

^a P = 0.04.

initiated it. . . . I think the program drives home the importance to return to function for patients, improves their motivation, and—as your data show—gets them discharged to the right venue in a timely fashion (as opposed to getting assessed the day before or even of discharge because no one realized the patient couldn't walk).

This example was typical of comments made during staff discussions and rounds, and reflects the change in culture that occurred as a result of the ambulation project.

DISCUSSION

The quality improvement project to increase early ambulation at our hospital was successful; nurses were more likely to document patient ambulation, and patients were less likely to develop paralytic ileus. Moreover, the project has given nurses a way to complete their patient assessments and document the results in measurable terms. Since this new process has been in place, physicians, NPs, physical therapists, and other members of the patient care team now refer to nursing documentation to establish a comprehensive plan of care. Accurately measured ambulated distances assist case managers in establishing criteria for appropriate placements and need for services upon discharge.

Both anecdotal reports and our own observations indicate that the project has also led to stronger nurse–patient relationships. As nurses established daily goals for postoperative ambulation that were consistent with provider orders, they were also able to convey more clearly to patients what the expectations

were for such ambulation, and patients felt more in control of their progress. All members of the health care team agree that consistent, early, and frequent postoperative ambulation improves both patient and provider satisfaction and has decreased postsurgical paralytic ileus, improved patient progress, and facilitated appropriate patient discharges.

Cost and length of stay did not decrease in the postintervention period for patients on the intervention units as compared with the control units. Cost and length of stay increased throughout the hospital as patient acuity increased. In this broadly defined population (all patients on the colorectal and urologic surgical units), cost and length of stay are skewed and highly variable; small changes may be overwhelmed by this variability. These findings are not consistent with results of small trials of fast-track or ERAS programs, where cost⁴ and length of stay^{3,5} were positively affected. However, we had more patients in our sample than did any other study we examined of early postoperative ambulation alone or as part of a multimodal approach; the sample size and the focus on ambulation alone may account for the differences in findings.

We also evaluated the rate of complications, and patients on the intervention units were less likely than those on the control units to develop paralytic ileus. The results of this project suggest that postoperative ambulation does affect gut motility, in contrast to the findings of Waldhausen and Schirmer.² Using internal cost accounting methods, we estimated the average incremental total costs (both direct and indirect) for a case of paralytic ileus at \$5,800, mostly because of increased hospital length of stay. If all colorectal

and urologic surgery patients receive the piloted intervention, the hospital could save roughly \$830,000 annually by preventing approximately 144 cases of paralytic ileus.

This project evaluation was based on nursing documentation of ambulation; however, ambulation can be performed and not documented or vice versa. Nurses are very aware of the importance of accurate charting, and we developed tools to make charting the distance ambulated a simple procedure. Throughout the program, we never observed nurses circumvent the intention of the program by charting nonexistent ambulation. On the intervention units, nurses documented distance ambulated in feet, and on the control units, nurses could chart ambulation by distance or time. For the evaluation, both methods of nurse charting were accepted as evidence that patient ambulation was completed.

While the preintervention–postintervention study design cannot completely control for hospital-wide trends, a randomized trial wasn't within the scope of this quality improvement project. The project evaluation attempted to control for hospital-wide trends by comparing outcomes on intervention units to outcomes on control units in both the preintervention and postintervention periods. The control units included the surgical step-down unit, and acuity was higher in the control population. However, most colorectal and urologic surgery patients are assigned to a postoperative unit based on bed availability. The qualitative analysis of the project would have benefited from more structure, including structured interviews or focus groups and anonymous surveys of nurses and other stakeholders.

This project required no capital investment beyond programming time and data analysis, which were available at our institution. Nontechnologic interventions could be substituted at institutions with fewer information technology resources. For example, no technology is required to measure distances in the patient's environment and set daily distance goals, which can be posted in patient rooms. Goal-setting activities to improve patient outcomes, such as achieving a certain amount of fluid intake per shift or making sure patients turn, cough, and breathe deeply are common in nursing practice. The ambulation goals can be set in collaboration with patients in the same fashion. Depending on each institution's technology infrastructure, other nontechnologic interventions could include changing how physicians order ambulation, modifying nursing care plans, inserting ambulation orders into care organization worksheets, changing how ambulation is documented, and providing education and reminders to nurses by way of staff meetings, posters, and frequent

discussions initiated by nursing leadership during rounds.

In the 26 months since the changes were implemented at our hospital, the documentation of patient ambulation has remained higher on intervention units than on control units (the intervention has not yet been replicated on those units). In the preintervention period, nurses were expected to perform and document patient ambulation, but this was not consistently done. With enhanced tools to focus attention on this important nursing function, nurses were able to improve their practice without feeling overwhelmed by new expectations. While informal anecdotal data suggest that many nurses in our institution feel general documentation requirements allow them less time to devote to direct bedside nursing care, this intervention is an example of how even relatively small technologic changes can help nurses transition “back to the basics.” ▼

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