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Impact of caregiver overnight stay on postoperative outcomes

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Abstract

Purpose —The purpose of this paper is to determine the impact of having a patient-designated caregiver remain overnight with ambulatory extended recovery patients on early postoperative clinical outcomes.

Design/methodology/approach —This was a retrospective cohort study of patients undergoing surgery requiring overnight stay in a highly resourced free-standing oncology ambulatory surgery center. Postoperative outcomes in patients who had caregivers stay with them overnight were compared with outcomes in those who did not. All other care was standardized. Primary outcomes were postoperative length of stay, hospital readmission rates, urgent care center (UCC) visits within 30 days and perioperative complication rates.

Findings —Among patients staying overnight, 2,462 (57 percent) were accompanied by overnight caregivers. In this group, time to discharge was significantly lower. Readmissions (though rare) were slightly higher, though the difference was not statistically significant ($p =$

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0.059). No difference in early (< 30 day) complications or UCC visits was noted. Presence of a caregiver overnight was not associated with important differences in outcomes, though further research in a less well-structured environment is likely to show a more robust benefit. Caregivers are still recommended to stay overnight if that is their preference as no harm was identified.

Originality/value —This study is unique in its evaluation of the clinical impact of having a caregiver stay overnight with ambulatory surgery patients. Little research has focused on the direct impact of the caregiver on patient outcomes, especially in the ambulatory setting. With increased adoption of minimally invasive surgical techniques and enhanced recovery pathways, a larger number of patients are eligible for short-stay ambulatory surgery. Factors that impact discharge and early postoperative complications are important.

Keywords

Evidence-based practice; Patient safety; Continuous quality improvement; Health and safety; Effectiveness; Clinical effectiveness

Introduction

In recent years, focus on enhanced recovery after surgery (ERAS) pathways has led to demonstrated improvements in many surgical outcome measures, including length of stay (LOS), early complications and patient satisfaction (Ljungqvist *et al.*, 2017; Roulin *et al.*, 2013; Abola *et al.*, 2018). Through advances in minimally invasive techniques and protocolized recovery pathways, many surgical interventions once performed on an inpatient basis have been increasingly performed in ambulatory surgery centers.

Nearly 70 percent of surgeries currently performed in the USA are performed on an ambulatory basis (Hollingsworth *et al.*, 2014). Though ERAS protocols remain effective in improving many immediate postsurgical outcome measures such as LOS, they often do not extend to the care environment at the patient's home. Efforts to improve quality of care during the transition from the ambulatory surgery setting to the home environment must consider the capabilities and limitations of the home-care environment (van der Meij *et al.*, 2018). Comprehensive pre- and perioperative education protocols have been shown to be associated with favorable outcomes and decreased readmission rates among patients undergoing complex oncologic and orthopedic surgeries (Graboyes *et al.*, 2017; McDonald *et al.*, 2014; Jones *et al.*, 2011). However, family caregivers of oncology patients, regardless of the complexity of a surgical or medical intervention, often feel inadequately prepared for their role in facilitating post-discharge care for their loved ones (Bucher *et al.*, 2001). A common complaint from caregivers is that education from the medical team is directed toward the patient, and the caregiver often receives little to no formal guidance (Scherbring, 2002). Breakdown in communicating the plan-of-care to family members at time of discharge is recognized as both a source of frustration to patients and a potential predictor of readmission (Naylor and Berlinger, 2016). Though many providers encourage family member involvement during hospital recovery, the impact of family caregiver participation in early postoperative recovery is not well described in the literature.

The movement for patient-centered care began more than 15 years ago to improve patient outcomes and decrease healthcare expenses and it is expected to revolutionize America's healthcare delivery system (Capko, 2014). Patient- and family-centered care is grounded in the partnerships between patients, families and healthcare providers. Welcoming caregivers into the patient room improves patient safety, improves communication between patients and staff, increases patient satisfaction scores and encourages caregivers to be a part of the healing process (Bell, 2011; Berwick, 2009; Clayman *et al.*, 2005; DiMatteo, 2004). In a Swedish study on registered nurses' views of working with family members of older patients, it was reported that relatives often hold valuable information about that older patient that may assist providers in care planning and treatment (Weman and Fagerberg, 2006). Despite these findings, there is limited research backing up the clinical impact of caregivers.

At a comprehensive cancer center on the East Coast, organizational leadership identified early caregiver involvement as an opportunity to improve patient-centered perioperative care and outcomes at recently constructed free-standing ambulatory surgery center. The center is uniquely designed to handle complex cancer surgery in an ambulatory setting, allowing for patients to stay overnight for one midnight; if more recovery time is needed, transfer to the main hospital is arranged. The facility enables each patient to proceed directly from surgery to their individual room for recovery, where they remain until discharge. This eliminates the necessity of a separate postoperative care unit. Every patient who recovers overnight as a part of the Ambulatory Extended Recovery (AXR) program is provided a private room with the capacity for a patient-designated caregiver to remain in the room with them overnight. The facility is designed to accommodate 28 overnight-stay patients, each with a designated caregiver. Not only do the caregivers have a place to sleep, there is a common lounge and coffee area available to them, and continental breakfast is also available. During preoperative teaching, patient caregivers are encouraged to plan to stay overnight so they can witness the care delivered and participate in the postoperative discussions, instructions and education. The goal of this integration is to facilitate an earlier discharge and a less eventful patient recovery.

For this reason, the researchers were interested in exploring organization-specific recommendations for caregivers to stay overnight with patients. Therefore, to evaluate the impact of early caregiver involvement on postsurgical outcomes, we retrospectively gathered data to assess whether the overnight presence of a caregiver was associated with a change in the risk of transfer from the ambulatory setting to a hospital, an urgent care center (UCC) visit within 30 days, hospital readmission within 30 days or surgical complications within 30 days.

Methods

Study population

A cohort of 4,347 patients underwent surgery with an overnight stay between January 2016 and December 2017. Patients with a preoperative American Society of Anesthesiologists (ASA) score of 4 ($n = 3$) were excluded, leaving 4,344 patients eligible for analysis. All patients understood the one-night stay capacity of the center, and the offer to allow one

patient-designated caregiver to stay overnight was made to each patient. Procedures performed on the AXR service include but are not limited to robotic-assisted/laparoscopic prostatectomy, robotic-assisted/laparoscopic partial or radical nephrectomy, insertion of artificial urinary sphincter, pelvic lymph node dissection, robotic-assisted/laparoscopic hysterectomy, mastectomy with or without reconstruction, partial or complete thyroidectomy, parotidectomy and glossectomy. Approval for this study was obtained from the institutional review board.

Study variables

Our goal was to investigate the impact on postoperative outcomes of having a caregiver stay overnight. We assessed the association between having a caregiver present and the following endpoints: LOS, transfer to the main hospital, UCC visits within 30 days, hospital readmission within 30 days and any surgical complications within 30 days. Visits to outside healthcare facilities were not included in our analysis.

Real-time locating system

The locations of patients and their caregivers are tracked using a real-time locating system (RTLS) (Versus Technology, Midmark-Versus, Traverse City, MI). This system uses infrared and radiofrequency technology to track patient, family member/caregiver and staff movement in real time through sensors positioned throughout the center. The system records time-stamped location information each time an RTLS badge is detected by a sensor and presents this information in floorplan views that visually show the movement of people.

A patient and their designated caregiver are each issued a badge during check-in that remains worn throughout the surgical visit. A link is established within the database between the caregiver and the patient. Data for caregivers whose badge is continuously detected overnight are utilized to identify the presence of the caregiver in the patient's recovery room throughout the night. Caregivers with complete overnight data were included in the analysis.

Postsurgical ambulation distance is recorded by the RTLS beginning when the patient arrives in his or her room after surgery. Total cumulative ambulation in feet is reported at time of discharge. Total ambulation data were available for procedures performed after July 2016. From July 2016 to December 2017, complete ambulation data were not available for 315 patients because of badge loss or system downtime/upgrades; therefore, ambulation data were analyzed for 2,943 patients treated between July 2016 and December 2017.

Statistical analysis

Associations between caregiver stay and outcomes were assessed using multivariable logistic regression, adjusting for age, ASA score and surgical service. Risk differences for the outcomes of transfer to the main hospital, UCC visit, readmission and postoperative complication within 30 days were calculated along with the corresponding 95 percent confidence intervals (CI). We also assessed the association between having a caregiver present and the postoperative LOS, discharge time and total distance ambulated post-surgery using multivariable linear regression, adjusting for age, ASA score, surgical service and operating start time, excluding patients who were transferred to the hospital ($n = 53$).

Rapidity of recovery was assessed by discharge time for patients who had an overnight stay and by postoperative LOS for those without an overnight stay. All analyses were performed using Stata, version 13.0 (StataCorp, College Station and TX).

Results

Among patients treated at the center, 57 percent ($n = 2,462$; 95% CI: 55 percent, 58 percent) had a caregiver present during their overnight stay. Patients were more likely to have a caregiver present overnight if they were younger, had breast rather than gynecologic surgery or had lower ASA scores. Differences between groups were small but highly significant. Median age of patients with an overnight caregiver was 56 years (interquartile range (IQR) 45, 64) and 58 (IQR 48, 66) for those without ($p < 0.001$). The difference in median age between patients with and without caregiver stay was only 2 years ($p < 0.0001$). Presence of overnight caregivers ranged from 49 percent of gynecologic oncology surgery patients to 74 percent of plastic surgery patients. Table I lists patient characteristics stratified by presence or absence of an overnight caregiver.

There were no significant differences between presence or absence of an overnight caregiver and risk of postoperative complications ($p = 0.4$) or UCC visits within 30 days after surgery ($p = 0.4$) on multivariable regression when adjusting for age, ASA score, surgical service and surgical start time. There was an increased rate of readmission with an overnight caregiver present, although this was not statistically significant by conventional definition ($p = 0.059$). The need for transfer to the main hospital was rare in all cases, but rates were significantly lower if a caregiver was present overnight ($p = 0.010$). Risk differences for these postoperative outcomes can be found in Table II.

There were significant associations between caregiver presence and shorter postoperative LOS and earlier discharge time after adjusting for age, surgical service, surgical start time and ASA score, ($p = 0.001$ and $p = 0.048$, respectively). However, the CIs do not suggest a meaningful difference in either metric of rapidity of recovery. For those with a caregiver present, the 95% CI for the decreased postoperative LOS included up to 18 min shorter, and for discharge time, 12 min shorter. No significant associations were observed between caregiver presence and total ambulation distance ($p = 0.4$). Differences for these outcomes can be found in Table III.

Discussion

This study sought to examine the hypothesis that encouraging patient-designated caregivers to remain in the room overnight with the patient would improve patient recovery and increase caregiver confidence in managing postoperative care. The expectation was that patients who had a caregiver stay with them overnight would experience fewer early postoperative complications and meet discharge criteria sooner than those patients who did not have a caregiver with them throughout their early recovery process. This study showed that patients with a caregiver present overnight had a trivially shorter LOS (by 18 min) and earlier discharge time (by 12 min) compared to those without an overnight caregiver. While these differences were statistically significant, the 18- and 12-min advantages unlikely had a

measurable clinical impact on the center. Regardless, timely discharges are important, and any interventions that result in earlier patient discharge and higher quality post-discharge recovery are encouraging.

Rates of early complications and UCC visits were similar, irrespective of caregiver presence. Fewer patients were transferred to the main hospital if a caregiver was present. Although this difference was statistically significant, the overall transfer rate was exceedingly low. Of the 4,344 patients included in the study, only 53 required transfer to the hospital.

While modest improvements in LOS and discharge time, as well as decreased transfer rates, do not appear to be clinically significant, a patient-centered care model allowing for caregivers to remain at the bedside may still be beneficial at the individual level for psychosocial reasons. This study confirmed that there are no negative clinical outcomes associated with having caregivers stay overnight. Continued presence allows caregivers to participate in postoperative education and discussions in their entirety and provides reinforcement for patients. It is also likely that, in addition to receiving educational support themselves, the patient-designated caregivers are able to offer a level of emotional support that clinicians cannot provide.

The early postoperative period and transition from recovery room to home can be a source of anxiety for patients and their families (Edwards and Clarke, 2004). Many patients feel their true recovery phase can only begin at home, while their families commonly experience anxiety about taking on the burden of post-hospital recovery (Vandrevala *et al.*, 2016). Miscommunications or misunderstandings that arise during the transition from hospital to home recovery have been identified as contributing factors to early complications and hospital readmissions (Solan *et al.*, 2015). The administration at the study institution took these factors into consideration during the development and construction of the ambulatory surgery center and made patient-designated caregiver accommodations a central part of the design for each overnight recovery room. To date, this feature of the patient-centered care model at the center has been highly appreciated by both patients and caregivers; they often express compliments about the space and appreciate the inclusion of caregivers in the patient experience.

Welcoming caregivers into the patient room during recovery has been shown to decrease patient falls, improve communication between patients and staff, increase patient satisfaction scores and encourage caregivers to be a part of the healing process, which can facilitate safe and satisfactory patient discharge (Hendrich *et al.*, 2004; Wolff and Roter, 2008). Postoperatively, patients report greater satisfaction with their decision to have surgery when the entire family is involved in a team-based approach to surgical decision-making and recovery (Reynolds *et al.*, 2018). Lack of a caregiver at home may contribute to early readmission (Martin *et al.*, 2011). By involving a caregiver in patient education before discharge, the hospital team can help ensure post-discharge care is available and instructions are clearly understood by the patient and caregivers in the home environment.

Two studies were found looking at ERAS pathway surgical patients and caregivers. A qualitative study done in Denmark of patients on a fast-track colon cancer surgery program

found that interaction with relatives in the postoperative recovery period helped provide patients with the courage needed to leave the hospital (Norlyk and Harder, 2011). Vandrevalla *et al.* (2016) reported that patients recovering from fast-track liver resection surgery felt that family support was a major factor in considering early discharge.

A few studies have examined the impact of caregivers on postoperative outcomes in surgeries requiring a longer hospital stay, and the results did not always show a positive effect. In an Australian study on readmission rates after major abdominal surgery, there was no significant difference in outcomes between patients with and without caregivers, but there was a trend of higher readmission rates in cases in which the caregivers were younger (Martin *et al.*, 2011). In cardiac surgery patients, having a caregiver present was significantly associated with a longer postoperative stay, rehospitalization and death at one year (Mochari-Greenberger *et al.*, 2014). From a psychosocial standpoint, Fekete *et al.* (2006) found that in older adults recovering from knee surgery, influences of spouses may increase health behavior in patients, but it often increases patients' psychological distress; spouse's social control patterns could either motivate or cause pressure and may be emotional or.

Limitations

One limitation of this study is that it was conducted using data from a heavily resourced environment, which likely muted the impact of having family caregivers present during the overnight recovery of patients. Strict standardized pathways are in place at the institution to ensure patients meet prespecified recovery goals. Low nurse-to-patient ratios (1:2) and on-premises advanced practice providers, respiratory therapists, physical therapists and patient-care technicians also contribute to a highly efficient overnight recovery process. In such a highly structured, well-staffed environment, the role of a patient-designated caregiver in patient recovery is less well defined. In a less structured or less-abundantly staffed center, additional personalized care from a caregiver would likely show a more robust benefit. For example, with fewer staff members, the benefit of a family member ambulating with a patient may become more evident.

Another limitation is that patient and caregiver satisfaction was not assessed in this study. Previous studies have noted improved patient satisfaction when caregivers are involved in care (Hendrich *et al.*, 2004; Wolff and Roter, 2008; Reynolds *et al.*, 2018), but this benefit remains untested in the setting of caregivers staying overnight after an ambulatory, short-stay surgery. The goal of this study was to evaluate objective outcomes in terms of overnight caregiver presence or absence, and our cohort size was sufficiently powered to detect meaningful differences in these outcomes. Patient and caregiver satisfaction is the subject of ongoing research at the study institution. Further study of caregiver overnight stays will better describe the expected psychosocial benefit to both the patient and their designated caregiver.

Lastly, outside records were not analyzed, so the lack of hospital readmission data outside of the cancer center's network represents a weakness in the short-term follow-up analysis. Given that the center is a well-regarded specialty urban hospital, the patient population often travels significant distances for treatment. While returning to the center's UCC for management of postoperative complications is always recommended and preferred, it is

reasonable to assume that some patients were treated postoperatively at outside institutions and that these data are missing from the results.

Conclusions

Although no major differences in clinical outcomes were observed, the presence of an overnight caregiver contributed to patients' decreased LOS, earlier discharge times and decreased rates of transfer from ambulatory to inpatient setting. Additionally, caregivers likely provided psychosocial benefit and contributed positively to successful patient education and patient satisfaction. Further studies on the structured integration of caregivers into the recovery process of patients are warranted, to discern the impact of patient-designated caregivers in a variety of clinical settings, as well as the impact on caregivers themselves. With increased adoption of minimally invasive surgical techniques and enhanced recovery pathways, more research is needed to look at all factors that may impact ambulatory discharge and early postoperative complications. Further studies in less-heavily resourced centers, as well as studies on the caregiver impact on patient education and satisfaction, are recommended.

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Table I.

Patient characteristics by overnight caregiver presence. data are presented as median (IQR) or frequency (%)

	No overnight caregiver (<i>n</i> = 1,882; 43%)	Overnight caregiver (<i>n</i> = 2,462; 57%)	<i>P</i> -value [*]
Age at surgery, <i>y</i>	58.0 (48.0, 66.0)	56.0 (45.0, 64.0)	< 0.0001
Surgical start time, h	11.54 a.m. (9:20 a.m., 2.00 p.m.)	11.54 a.m. (9.20 a.m., 2.10 p.m.)	0.9
Male gender	708 (38%)	893 (36%)	0.4
<i>Surgical service</i>			
Breast	756 (40%)	1,082 (44%)	0.001
Gastric mixed tumor	15 (0.8%)	23 (0.9%)	
Gynecology	254 (13%)	239 (10%)	
Head & neck	221 (12%)	281 (11%)	
Plastics	5 (0.3%)	14 (0.6%)	
Urology	631 (34%)	823 (33%)	
<i>ASA score</i>			
1–2	1,043 (55%)	1,460 (59%)	0.010
3	839 (45%)	1,002 (41%)	

Notes: ASA, American Society of Anesthesiologists; IQR, interquartile range,

^{*} *p*-values determined by Wilcoxon Rank Sum for continuous variables and Fisher's exact test for categorical variables

Table II.

Difference in postoperative outcomes by overnight caregiver presence adjusted for age, ASA score and surgical service, represented as the increase with an overnight caregiver

	No overnight caregiver (n = 1,882; 43%)	Overnight caregiver (n = 2,462; 57%)	Percent difference (%)	95% CI	P-value
Readmission	44 (2.3%)	80 (3.3%)	0.95	−0.037%, 1.9%	0.059
UCC visits	111 (5.9%)	128 (5.2%)	−0.63	−2.0%, 0.76%	0.4
Complication	87 (4.6%)	93 (3.8%)	−0.50	−1.7%, 0.69%	0.4
Transfer to main hospital	32 (1.7%)	21 (0.9%)	−0.93	−1.6%, −0.22%	0.010
Postoperative event	191 (10%)	239 (9.7%)	−0.17	−2.0%, 1.6%	0.9

Notes:ASA, American Society of Anesthesiologists; CI, confidence interval; UCC, urgent care center. Number (%) of events and adjusted risk differences are presented. Negative difference shows a better outcome with an overnight caregiver present

Table III.

Difference in postoperative length of stay, discharge time and total ambulation distance by overnight caregiver presence adjusted for age, ASA score, surgical start time and surgical service

	Overnight caregiver (n = 2,441)	No overnight caregiver (n = 1,850)	Difference	95% CI	P-value
Postoperative length of stay, mean (SD), h	19.7 (2.8)	19.9 (2.8)	-0.19	-0.30, -0.082	0.001
Discharge time, mean (SD), h post- midnight	10.8 (1.7)	10.9 (1.7)	-0.099	-0.20, -0.001	0.048
Total ambulation distance, mean (SD), feet *	1,002 (874)	1,044 (846)	-28	-87, 32	0.4

Notes: $n = 2,943$. ASA, American Society of anesthesiologists; CI, confidence interval; SD, standard deviation. Negative difference indicates a better outcome with an overnight caregiver present.

* Total ambulation was available only for patients treated between July 2016 and December 2017