

Enhanced recovery after surgery clinical pathway implementation effect on postoperative ambulation

by

Jennifer L. Zeller

Under Supervision of

Veronica Gutchell

Second Reader

Priscilla Aguirre

A DNP Project Manuscript

Submitted in Partial Fulfillment of the Requirements for the
Doctor of Nursing Practice Degree

University of Maryland School of Nursing

May 2022

Abstract

Problem & Purpose: Enhanced recovery after surgery protocols have been shown to decrease postoperative complications including venous thromboembolism, delayed gastric emptying, and ileus. In a surgical telemetry unit in a suburban community hospital, the average time to first ambulation for patients undergoing pancreatectomy is postoperative day three. Barriers to early ambulation include lack of patient education and lack of standardized goals. Although early postoperative mobility is a vital aspect of postoperative care, enhanced recovery guidelines have limited information about specific protocols or daily goals. The purpose of this project is to implement preoperative patient education and a clinical pathway to encourage early ambulation in patients undergoing pancreatic resection. **Methods:** Implementation started in September 2021 and continued for 15 weeks. Preoperative education was provided in both verbal and written formats for those patients who met the inclusion criteria. In the surgical unit, the nursing staff received education on the clinical pathway and standardized documentation. The nursing staff then utilized the clinical pathway tool daily to encourage ambulation. Data was collected from the electronic health record on pre-operative education, date of first ambulation, and length of stay. **Results:** Pre-implementation data showed that while the average time to first ambulation was postoperative day three, there was a wide variation from postoperative day one to postoperative day eight. After the implementation phase, seven patients met inclusion criteria. Four patients received verbal and written education. All seven patients ambulated for the first time by post-operative day two, and length of stay for all patients was at or under seven days. **Conclusions:** Based on the post-implementation data, patients undergoing pancreatic resection ambulated earlier after surgery and had decreased length of stay.

Enhanced recovery after surgery clinical pathway implementation effect on postoperative ambulation

Enhanced recovery after surgery (ERAS) protocols have been utilized across surgical specialties for many years to decrease postoperative complications and improve patient outcomes (Melloul et al., 2020). Successful programs in colorectal surgery and cardiac surgery have influenced new protocol development for other subspecialties including hepatopancreatobiliary (HPB) surgery. The ERAS Society first published their guidelines for perioperative care for pancreatic surgery in 2012, and recently updated them in 2020. Two important interventions in all ERAS guidelines are pre-operative counseling and early postoperative mobility (Melloul et al., 2020).

For decades surgeons ordered strict bed rest for patients after abdominal surgery. However, this can lead to adverse outcomes such as pulmonary complications, venous thromboembolism (VTE), delayed return of bowel function or ileus (Havey et al., 2013). The most common post-operative complications after pancreatic surgery are those related to return of bowel function, including delayed gastric emptying and ileus (18-33%), followed by pneumonia (5.5-10%), with VTE being least prevalent (<1%) (Cusworth et al., 2027; Saree et al., 2015). Although early postoperative mobility is a vital aspect of postoperative care to prevent these complications, ERAS guidelines have limited information about specific protocols or daily goals (Melloul et al., 2020).

At the project site, a suburban community hospital, patients who have undergone pancreatic resection and are admitted to the surgical telemetry unit, are not ambulating for the first time until post-operative day three on average (Campbell, M, personal communication, January 12, 2021). This delay in ambulation is attributed to barriers including a lack of standardized patient education about what to expect after surgery, patient anxiety about

ambulation, and a lack of standards for how often the patients should be ambulating (see Appendix A). The purpose of this project is to implement preoperative patient education and a clinical pathway to encourage early ambulation, by post-operative day two, in patients undergoing pancreatic resection (see Appendix B).

Evidence Review

Enhanced recovery protocol use in HPB surgery is the focus of this evidence review. The review (Table 1) will begin with evidence supporting the use of a defined clinical pathway and pre-operative patient and caregiver education. This review will conclude with a discussion of the clinical guideline recommendations from the ERAS Society.

Pindea-Solis et al. (2020), Hampton et al. (2019) and Tang et al. (2020) all studied hospital length of stay in their retrospective and process improvement studies. Pindea-Solis et al. (2020) and Hampton et al. (2019) found that use of, and high compliance with, enhanced recovery protocols resulted in a shorter length of stay. One of the barriers to early post-operative ambulation was a lack of defined parameters. By creating a defined clinical pathway for patients to follow after surgery, they were able to increase early mobilization after HPB surgery from 23% to 78.9% (Tang et al., 2020). Hampton et al. (2019) determined that the patient's frailty index was not a factor in length of stay if the patient was highly compliant with the enhanced recovery pathway. They noted that patients with high frailty index scores but were "high compliers" with the pathway were more likely to ambulate by post-operative day two.

Forsmo et al. (2018) and Tang et al. (2020) found that perioperative education of patients and their caregivers that focuses on specific aspects of ERAS protocols, like the benefits of early post-operative mobility, are associated with a significantly shorter length of stay. Forsmo et al.

(2018) also noted that patients who received extended perioperative counseling had significantly earlier and longer periods of mobility than the control group.

In their practice improvement project, Tang and colleagues (2020), observed that patients who underwent pre-operative counseling and had a defined clinical pathway for early post-operative ambulation had limited post-operative complications, including no patients with post-operative falls, tube dislodgement, or deep vein thrombosis.

The ERAS Society released updated clinical guidelines for ERAS protocols for patients undergoing pancreatoduodenectomy in 2020. The systematic review was led by Melloul and colleagues (2020) and utilized an exhaustive search of the literature to determine that a well-implemented ERAS protocol with good patient compliance is associated with a decrease in post-operative complications and length of stay. One of the 27 recommendations with a moderate level of evidence is pre-operative counseling. This should include both verbal discussion and written instructions. Additionally, early and scheduled post-operative mobilization is strongly recommended, although the evidence level is low. While there is no evidence for a specific protocol for post-operative ambulation for this patient population, their recommendation is that it should be encouraged as early as post-operative day zero (Melloul, 2020).

Each of these studies and reviews depict that while ERAS protocols are utilized in many surgical specialties, it is important to empower the patient and their caregivers with knowledge before they enter the hospital on the benefits of ERAS, including early mobilization, and encourage high compliance with the ERAS clinical pathway following surgery.

Theoretical Framework

King's theory of goal attainment (see Figure 1) is derived from King's conceptual framework stating human beings are open systems that are constantly interacting with their

surroundings (King, 1992). The key concepts include communication, perceptions of and interactions between the nurse and client. During these interactions, goals are set and attained by educating the client to make informed decisions. This theory makes assumptions that individuals are social, perceiving, action-oriented beings (King, 1992). Patients and their caregivers want to participate in their care and have the right to do so with information from their health care team (Butts & Rich, 2019; King, 1992). These concepts can be used by all health care professions. Ongoing transactions allow for mutual goal development and attainment, ultimately leading to improved patient outcomes and satisfaction.

King's (1992) theory helps define the problem associated with early ambulation because recovery is when the patient is most engaged in their care. The patient and their caregiver are vital members of the health care team. Nurses and the surgical team should strive to develop these relationships with the patient and their caregiver early, at the pre-operative appointment, to educate them on what to expect after surgery and develop goals for their recovery. This education, along with continued use of the clinical pathway tool while they are inpatient, will keep them be engaged in their care and motivated to attain their goals.

This project will utilize the Framework for Complex Innovations described by Helfrich et al (2007). This framework works for this project because the innovations will be utilized by multiple healthcare team members. This organization focuses on evidence-based practice and zero patient harm, leading to improved patient satisfaction. Through local nursing and physician leadership support and the executive team's commitment to quality improvement, there is a culture of excitement around implementing innovative interventions. Change champions will support the implementation. Additionally, the transformation department will ensure consistency, effectiveness, and sustainability of the intervention after completion.

Methods

The project site was a suburban community hospital with an HPB surgery service. The population of interest was patients undergoing elective pancreatic resection. To increase post-operative mobility in this patient population the intervention was two-fold. Patients received standardized pre-operative education focusing on the importance of early ambulation after surgery and a clinical pathway that was used to develop goals for each post-operative day. For any patient whose preferred language was not English a hospital provided tele-interpreter was utilized for pre-operative education and for ongoing use of the ERAS clinical pathway. One tactic to ensure patients remained engaged in their care was to involve their family or caregivers. Patients were encouraged to bring a family member or friend to their pre-operative appointment as well as have them visit in the hospital, barring any COVID related restrictions.

Pre-operative education was created with the HPB surgeons and focused on what to expect after surgery, including expectations for early post-operative ambulation (see Appendix C). The clinical pathway mapped the patients' post-operative course and goals for each day in their recovery (see Appendix D). The goal was for patients to ambulate by the second post-operative day. In addition to the surgeons, the implementation team consisted of bedside nursing staff, nursing leadership, the surgery advanced practice providers, and the informatics team.

The initial strategies for implementation included educating the nursing staff on the use of the clinical pathway and utilizing the surgery advanced practice provider team to provide pre-operative education in both written and verbal format to the patients during their pre-operative appointments. Additionally, the nursing staff documented the use of the clinical pathway via a smart phrase note in the EHR and documented each ambulation in the mobility flowsheet. Senior

nursing staff and unit exercise technicians were engaged as change champions early in the implementation phase to support the nursing staff.

Results

The purpose of this project was to have patients undergoing pancreatic resection ambulate by POD two and this goal was met with all seven patients (see Figure 2). Additionally, all seven patients were discharged on or before POD seven (see Figure 3). However, only 57% of patients received both written and verbal pre-operative patient education. Due to communication failures about patient appointments and delays in patient flow, the process for providing the pre-operative education was refined. The implementation team discovered that patients were getting duplicate information in a document that was sent to them prior to their pre-operative appointment. The two documents were combined and emailed to the patient ahead of their appointment so that questions could be asked when they met with the surgeon. Additionally, contact information was provided if questions remained.

It was also noted that documentation of the clinical pathway was not consistently completed due to time constraints and competing priorities with other required documentation. Nurses requested a flowsheet change for documentation. However, this would require multiple levels of approval and an informatics build to complete. Although the documentation was not always completed, discussions with the nursing staff and the exercise technician revealed that they were discussing the clinical pathway and setting goals with the patient as noted on the white boards in the patient rooms.

Additional barriers include staffing issues throughout the hospital at the beginning of the implementation period as well as closure of the original implementation unit. The patients were assigned to a different floor with a limited number of educated nursing staff. This required

additional education through one-on-one sessions and small group sessions. The implementation team also created tip sheets to keep on the unit for any staff that did not receive training.

Discussion

This quality improvement project offers support for standardized pre-operative education for patients and their care givers as well as the utilization of a clinical pathway in the post-operative period. The results were similar to Tang et al. (2020) as we found that the combination of pre-operative education and clinical pathway use decreased length of stay. No patients during this implementation phase developed complications related to gastrointestinal motility or VTE. One facilitator in this project was clearly defining early ambulation as on or before POD two. This was standard across all patients and the staff understood the goal. Additionally, despite barriers to getting patients written education materials, the verbal education from the surgical team improved time to first ambulation in this patient population.

Sample size was a limitation in this project as there were only seven patients that met the inclusion criteria. This low sample was due to decreased surgeries being performed due to COVID restrictions and due to not including patients where the intended surgery was aborted. The staff were enthusiastic about this project, particularly the exercise technicians. That combined with a low number of eligible patients could have created bias in that they prioritized this patient population for ambulation. However, the exercise technicians are only staffed during the week, so those patients that were operated on later in the week may have ambulated with a tech or nurse over the weekend and still managed to ambulate on or before POD two.

Conclusion

In a time when patient outcomes and throughput are important, metrics in health care quality improvement initiatives that demonstrate positive changes are necessary. This project

shows that patient outcomes improved by utilizing a combination of preoperative education and a clinical pathway, and the effectiveness of a multidisciplinary team approach to reduce the time to first ambulation for patients undergoing pancreatic surgery. To sustain this innovation, utilizing the feedback from the nursing staff to embed the clinical pathway in their daily documentation should be strongly considered. Additionally, adding education pertaining to ERAS clinical pathways to new employee orientation and annual competencies will aid in not only continuing this work but in expanding it to other surgical service lines. Another recommendation to streamline the preoperative education would be to leverage technology and create videos for patients to watch with their caregivers along with written handouts, giving the opportunity for repeated views prior to surgery. These videos could include the surgical team members and nursing staff which would allow patients to recognize them when they are in the hospital. Engaging patients and their care givers as part of the care team through education and goal setting can improve outcomes.

References

- Butts, J. B. & Rich, K. L. (2018). *Philosophies and Theories for advanced nursing practice* (3rd ed). Jones & Bartlett Learning.
- Cusworth, B. M., Krasnick, B. A., Nywening, T. M., Woolsey, C. A., Fields, R. C., Doyle, M. M., Liu, J., & Hawkins, W.G. (2017). Whipple-specific complications result in prolonged length of stay not accounted for in ACS-NSQIP surgical risk calculator. *HPB*, 19, (2), 147-153. <https://doi.org/10.1016/j.hpb.2016.10.015>
- Forsmo, H. M., Erichsen, C., Rasdal, A., Tvinnereim, J. M., Korner, H., & Pfeffer, F. (2018). Randomized controlled trial of extended perioperative counseling in enhanced recovery after colorectal surgery. *Diseases of the Colon & Rectum*, 61 (6), 724-732. <https://doi.org/10.1097/DCR.0000000000001007>
- Hampton, J. P., Owodunni, O. P., Bettick, D., Chen, S. Y., Magnuson, T., & Gearhart, S. L. (2019). Compliance to an enhanced recovery pathway among patients with a high frailty index after major abdominal gastrointestinal surgery results in improved 30-day outcomes. *Surgery*, 166, 75-81. <https://doi.org/10.1016/j.surg.2019.01.027>
- Havey, R., Herriman, E., & O'Brien, D. (2013). Guarding the gut. *Critical Care Nursing Quarterly*, 36, 1, 63-72. <https://doi.org/10.1097/CNQ.0b013e3182753237>
- Helfrich, C.D., Weiner, B.J., McKinney, M.M. & Minasian. L. (2007). Determinants of implementation effectiveness adapting a framework for complex innovations. *Medical Care Research and Review*, 64(3), 279-303. <https://www.doi.org/10.1177/1077558707299887>
- King, I. M. (1992). King's theory of goal attainment. *Nursing Science Quarterly*, 5(1), 19-26.
- Melloul, E., Lassen, K., Roulin, D., Grass, F., Perinel, J., Adham, M., Wellge, E. B., Kunzler, F., Besselink, M. G., Asbun, H., Scott, M. J., Dejong, C. H. C., Vrochides, D., Aloia, T.,

- Izbicki, J. R., & Demartines, N. (2020). Guidelines for perioperative care for pancreatoduodenectomy: Enhanced recovery after surgery (ERAS) recommendations. *World Journal of Surgery*, 44, 2056-2084. <https://doi.org/10.1007/s00268-020-05462-w>
- Pineda-Solis, K., Burchard, P. R., Ruffolo, L. I., Schoeniger, L. O., Linehan, D. C., Moalem, J., & Galka, E. (2020). Early prediction of length of stay after pancreaticoduodenectomy. *Journal of Surgical Research*, 1-7. <https://doi.org/10.1016/j.jss.2020.11.060>
- Saraee, A., Vahedian-Ardakani, J., Saraee, E., Pakzad, R., & Wadji, M. (2015). Whipple procedure: A review of a 7-year clinical experience in a referral center for hepatobiliary and pancreas diseases. *World Journal of Surgical Oncology*, 13, 1-5. <https://doi.org/10.1186/s12957-015-0523-8>
- Tang, J.H., Wang, B., Chow, J.J., Joseph, P.M., Chan, J.Y., Rahman, N.A., Low, Y.H., Tan, Y.P., & Shelat, V.G. (2020). Improving postoperative mobilization rates in patients undergoing elective major hepatopancreatobiliary surgery. *Postgraduate Medical Journal*, 0, 1-9. <https://doi.org/10.1136/postgradmedj-2020-138650>

Tables

Table 1a

University of Maryland School of Nursing - Evidence Review Table

Citation: Melloul, E., Lassen, K., Roulin, D., Grass, F., Perinel, J., Adham, M., Wellge, E. B., Kunzler, F., Besselink, M. G., Asbun, H., Scott, M. J., Dejong, C. H. C., Vrochides, D., Aloia, T., Izbicki, J. R., & Demartines, N. (2020). Guidelines for perioperative care for pancreatoduodenectomy: Enhanced recovery after surgery (ERAS) recommendations. <i>World Journal of Surgery</i> , 44, 2056-2084. https://doi.org/10.1007/s00268-020-05462-w					Level (Melnyk): I
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
“This study presents the updated ERAS recommendations for pancreatoduodenectomy (PD) based on the best available evidence and on expert consensus.”	Systematic review conducted in three databases (Embase, Medline Ovid, Cochrane Library Wiley). The Delphi method was used to validate the final recommendations.	Search Strategy: Systematic review conducted in three databases (Embase, Medline Ovid, Cochrane Library Wiley) for the 27 developed ERAS items. Eligible Studies: Meta-analyses, randomized controlled trials or prospective cohort studies with control group. Retrospective studies were only included if better quality data was unavailable. If there was no data available for an item as it relates to pancreatic	Control: No pathway use Intervention: Enhanced Recovery Pathway items Intervention fidelity (describe the protocol): Not applicable to SR critique	Dependent Variable: A systematic literature search was completed for the 27 developed ERAS items. Measurement tool (reliability), time, procedure: Quality of randomized controlled trials were assessed using the Consolidated Standards of Reporting Trials checklist. Level of evidence for each item was determined using the Grading of Recommendations Assessment Development and Evaluation system	Statistical Procedures(s) and Results: The modified Delphi process was utilized to gain consensus for these guidelines, a three-round process was completed. Recommendations were made for 27 developed ERAS items. The review confirms the value of ERAS pathways in pancreatic resection patients due to the reduction in post-operative complications, length of stay and overall cost.

		<p>Excluded: Duplicate studies, clinical outcome not addressed, inadequate control/no control, mixed surgical procedure</p> <p>Included: 314 full text articles</p> <p>Power Analysis: Not applicable to SR critique</p>			
<p>Citation: Hampton, J. P., Owodunni, O. P., Bettick, D., Chen, S. Y., Magnuson, T., & Gearhart, S. L. (2019). Compliance to an enhanced recovery pathway among patients with a high frailty index after major abdominal gastrointestinal surgery results in improved 30-day outcomes. <i>Surgery, 166</i>, 75-81. https://doi.org/10.1016/j.surg.2019.01.027</p>					Level (Melnyk): IV
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
<p>“We sought to determine whether patients with a high frailty score comply with and ERP [enhanced recovery pathway] and whether compliance among this population of patient independently improves post-operative outcomes.”</p>	Retrospective	<p>Sampling Technique: Convenience – ACS NSQIP data</p> <p># Eligible: 711 (patient from Johns Hopkins Hospital or Johns Hopkins Bayview that underwent major gastrointestinal surgery between 12/15/2014 – 6/15/2017). # Accepted: 711 # Control: 65</p>	<p>Control: Before initiation of ERP</p> <p>Intervention: After initiation of ERP</p> <p>Intervention fidelity (describe the protocol): Retrospective data reviewed from Johns Hopkins Hospital and Johns Hopkins Bayview. Procedures were defined by the current procedural terminology (CPT) codes and All Patients Refined Diagnosis Related Groups</p>	<p>DV: Compliance with ERP (high vs low) effect on 30-day postoperative outcomes</p> <p>Measurement tool (reliability), time, procedure: Modified Frailty Score</p> <p>30-Day post-operative outcomes: Length of stay, major complications, and rate of readmission</p>	<p>Statistical Procedures(s) and Results:</p> <p>Patient level characteristics and compliance rates were compared using the Student <i>t</i> test for means, Mann-Whitney U test for medians, and Chi-Square and Fisher exact tests for continuous and categorical variables. These analyses were</p>

		<p># Intervention: 646</p> <p>Power analysis: None reported</p> <p>Group Homogeneity: Intervention and Control groups determined to be primarily homogeneous based on non-significant <i>p</i> values in demographic and clinical information except in operative approach and procedure type</p>	<p>220-221 for major abdominal procedures. For comparison, a group of patients were reviewed from before the initiation of the ERP protocol.</p> <p>The ERP protocol was developed in collaboration with specific enhanced recovery standards outlined in ACS-NSQIP.</p> <p>To quantify compliance with the ERP the ERIN (Enhanced Recovery in NSQIP) standard was utilized and defined as the percentage of the 14 ERIN standards that were successfully completed.</p>		<p>risk adjusted. Univariate logistic regression was used to identify patient-level characteristics of compliance with ERP (reported as odds ratios and 95% confidence intervals).</p> <p>30-day postoperative outcomes were assessed using the Poisson regressions with quasi likelihood – presented as incidence rate ratios and odds ratios with 95% confidence intervals.</p>
<p>Citation: Forsmo, H. M., Erichsen, C., Rasdal, A., Tvinnereim, J. M., Korner, H., & Pfeffer, F. (2018). Randomized controlled trial of extended perioperative counseling in enhanced recovery after colorectal surgery. <i>Diseases of the Colon & Rectum</i>, 61 (6), 724-732. https://doi.org/10.1097/DCR.0000000000001007</p>					<p>Level (Melnyk): II</p>
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
<p>“Our aim was to determine whether counseling alone was associated with decreased total length of hospital stay.”</p>	<p>Randomized Controlled Trial</p>	<p>Sampling Technique: Randomization with an allocation ration of 1:1 was generated with random block sizes of 10, an independent statistician prepared</p>	<p>Control: Standard preoperative counseling</p> <p>Intervention: Extended preoperative counseling (1-2 additional counseling session with a dedicated ERAS nurse who underwent training)</p>	<p>DV: Total length of hospital stay – defined as the number days of postoperative hospital stay plus any additional hospitalization if readmission was necessary within the</p>	<p>Statistical Procedures(s) and Results: Chi-Square to compare discrete variable, independent-sample <i>t</i> test for continuous, normally distributed variables,</p>

		<p>the sequence in advance.</p> <p># Eligible: 416 – Patient > 18 years of age undergoing elective laparoscopic or open colorectal surgery for malignant or benign disease, with or without stoma.</p> <p># Accepted: 164</p> <p># Control: 84</p> <p># Intervention: 80</p> <p>Power analysis: 0.8, significance level <0.05</p> <p>Study met the criterion for termination of the study and was concluded for analysis.</p> <p>Group Homogeneity: Intervention and Control groups determined to be primarily homogeneous based on non-significant <i>p</i> values in demographic and clinical information.</p>	<p>Intervention fidelity (describe the protocol):</p> <p>Extended counseling sessions were completed by a dedicated ERAS nurse. Each consultation lasted 30-45 minutes. RN and patient discussed postoperative course and expectations as well as pain management.</p> <p>Both groups were treated according to the ERAS protocol described in the Enhanced Recovery after Surgery Society Guidelines.</p>	<p>first 30 days after surgery.</p> <p>Measurement tool (reliability), time, procedure:</p> <p>Number of hospital days during primary admission and any subsequent readmissions within 30 days after surgery.</p>	<p>and Mann-Whitney U test for continuous, non-normally distributed variable.</p> <p>Total length of hospital stay was significantly shorter among patients in the extended counseling group (median 5 days vs 7 days – <i>p</i> <0.001). The extended counseling group also had earlier and more frequent mobilization that the control group (24 hrs after surgery <i>p</i> <0.001; POD 2 <i>p</i> <0.001; POD 3 <i>p</i> <0.001). Also significant was the patients in the extended counseling group had pain control earlier with oral pain medication (<i>p</i> 0.005).</p>
Citation:					Level (Melnyk): IV

Pineda-Solis, K., Burchard, P. R., Ruffolo, L. I., Schoeniger, L. O., Linehan, D. C., Moalem, J., & Galka, E. (2020). Early prediction of length of stay after pancreaticoduodenectomy. <i>Journal of Surgical Research</i> , 1-7. https://doi.org/10.1016/j.jss.2020.11.060					
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
“The aim of this study was to evaluate the effectiveness of [ERAS] pathway in reducing length of stay after [pancreaticoduodenectomy (PD)]”	Retrospective	<p>Sampling Technique: Convenience</p> <p># Eligible: 191 (all patients that underwent PD from 1/2014 – 6/2018). # Accepted: 104 # Control: 56 # Intervention: 48</p> <p>Power analysis: None reported</p> <p>Significance: $p < 0.05$</p> <p>Group Homogeneity: There was no difference in distribution of patient characteristics</p>	<p>Control: Pre-ERAS implementation</p> <p>Intervention: Post-ERAS implementation</p> <p>Intervention fidelity (describe the protocol): A clinical care pathway for all patients undergoing pancreaticoduodenectomy was instituted in 2016 adopting 25/27 elements from the 2012 ERAS society guidelines.</p>	<p>DV: Length of stay – defined by number of days from operation to discharge.</p> <p>Measurement tool (reliability), time, procedure: Electronic health record</p>	<p>Statistical Procedures(s) and Results: Differences between groups were assessed using the Student <i>t</i> test or Mann-Whitney U test for continuous variable and the chi-squared test for categorical variables.</p> <p>The median length of stay was 3.5 days shorter in the ERAS group ($p < 0.001$) with no difference in readmission rates.</p>
<p>Citation: Tang, J.H., Wang, B., Chow, J.J., Joseph, P.M., Chan, J.Y., Rahman, N.A., Low, Y.H., Tan, Y.P., & Shelat, V.G. (2020). Improving postoperative mobilization rates in patients undergoing elective major hepatopancreatobiliary surgery. <i>Postgraduate Medical Journal</i>, 0, 1-9. https://doi.org/10.1136/postgradmedj-2020-138650</p>					Level (Melnyk): IV
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results

<p>“The primary objective was to increase postoperative (POD) 2 mobilization rate from 23% to 75% in patients undergoing elective major hepatopancreatobiliary (HPB) surgery within 6 months.”</p>	<p>Clinical practice improvement project</p>	<p>Sampling Technique: Convenience</p> <p># Eligible: 88 patients who underwent elective major HPB surgery</p> <p># Accepted: 76</p>	<p>Control: Pre-implementation data.</p> <p>Intervention: Early mobilization defined as sitting out of bed for greater than 6 hours on POD and ambulating greater than 30 meters on POD 2.</p> <p>Patients and care givers received preoperative counseling emphasizing the benefits of early mobilization.</p>	<p>DV: Early post-operative mobilization, post-operative falls, pneumonia, & VTE, and cost</p> <p>Measurement Tool:</p> <p>Electronic Health Record</p>	<p>Results: 78.9% of the patients ambulated more than 30 meters on POD 2. No patients had a post-operative fall, DVT or tube dislodgement. 5.3% of patients did have pneumonia post-operatively. Average length of stay pre-intervention was 8 days, post-intervention was 6 days with a potential cost savings of \$2228 per hospitalization.</p>
--	--	---	---	---	---

Table 1b*University of Maryland School of Nursing - Synthesis Table*

Evidence Based Practice Question (PICO): Does pre-operative patient education and institution of an enhanced recovery clinical pathway increase early ambulation in pancreatic resection patients in the immediate post-operative period?			
Level of Evidence	# Of Studies	Summary of Findings	Overall Quality
I	1	Melloul et al. (2020) completed a systematic literature search in three databases using the 27 enhanced recovery after surgery items. After removing studies that were not appropriate or duplicate studies they had 314 articles that included meta-analyses, randomized controlled trials, prospective cohort studies with a control group. They determined that a well-implemented ERAS protocol with good patient compliance is associated with a decrease in postoperative complications and length of stay. They state these updated recommendations for pancreatoduodenectomy are based on the best evidence and they encourage high quality prospective studies to confirm the benefits discussed.	High (A) – This systematic review discusses their exhaustive search strategies using 3 databases to obtain studies. They only included those with article with high levels of evidence. They also utilized a three-round Delphi approach to gain consensus amongst the experts. Their recommendations regarding each of the 27 ERAS items discusses the level of evidence and the grade of the recommendation.
II	1	Forsmo et al. (2018) found that enhanced perioperative education of patients focusing on the important aspects of ERAS protocols are associated with a significantly shorter length of stay. They also noted that patients who received extended perioperative counseling had significantly earlier and longer periods of mobility that then control group.	Good (B) – This sufficiently powered randomized control trial utilized a specialized ERAS nurse to provide extended ERAS perioperative education. Patients who underwent surgery during July and August were not included due to study surgeons and ERAS RN vacations, however, the authors noted that there were no statistically significant differences between the patients that were included and those excluded from the study.
IV	2	Pindea-Solis et al. (2020), Hampton et al. (2019) and Tang et al. (2020) all looked at hospital length of stay in their retrospective studies and found that use of and high compliance with enhanced recovery protocol, particularly early ambulation, resulted in shorter length of stay. Hampton et al. (2019) determined the patient's frailty index and their compliance with	Good (B) – All of these studies utilized retroactive patient data from their institutions; however, Tang et al (2020) also implemented an intervention from the literature to increase early post-operative mobilization. None of the studies discussed power analysis. Pineda-Solis et al. (2020) utilized the National Surgical Quality Improvement Program hepato-pancreato-biliary collaborative database to gather data. Hampton et al. (2019) used the ACS-NSQIP database.

		<p>the enhanced recovery pathway. They noted that patients with high frailty index score but were “high compliers” with the pathway were more likely to ambulate the day of surgery or postoperative days 1 and 2.</p>	<p>Both groups utilized patients from prior to the initiation of the ERAS pathways as “control” groups. Tang et al (2020) utilized prior patients who underwent similar surgeries for their “control” group and then post-intervention patients to compare their data. Their recommendations are consistent with recent guidelines and recommendations.</p>
--	--	--	---

Figures

Figure 1

King's Theory of Goal Attainment, Adapted

Figure 1. Diagram of King's Goal Attainment Theory adapted for patient education transactions



Adapted from King (1992). King's theory of goal attainment. *Nursing Science Quarterly*, 5(1), 19-26.

Figure 2

Time to First Ambulation

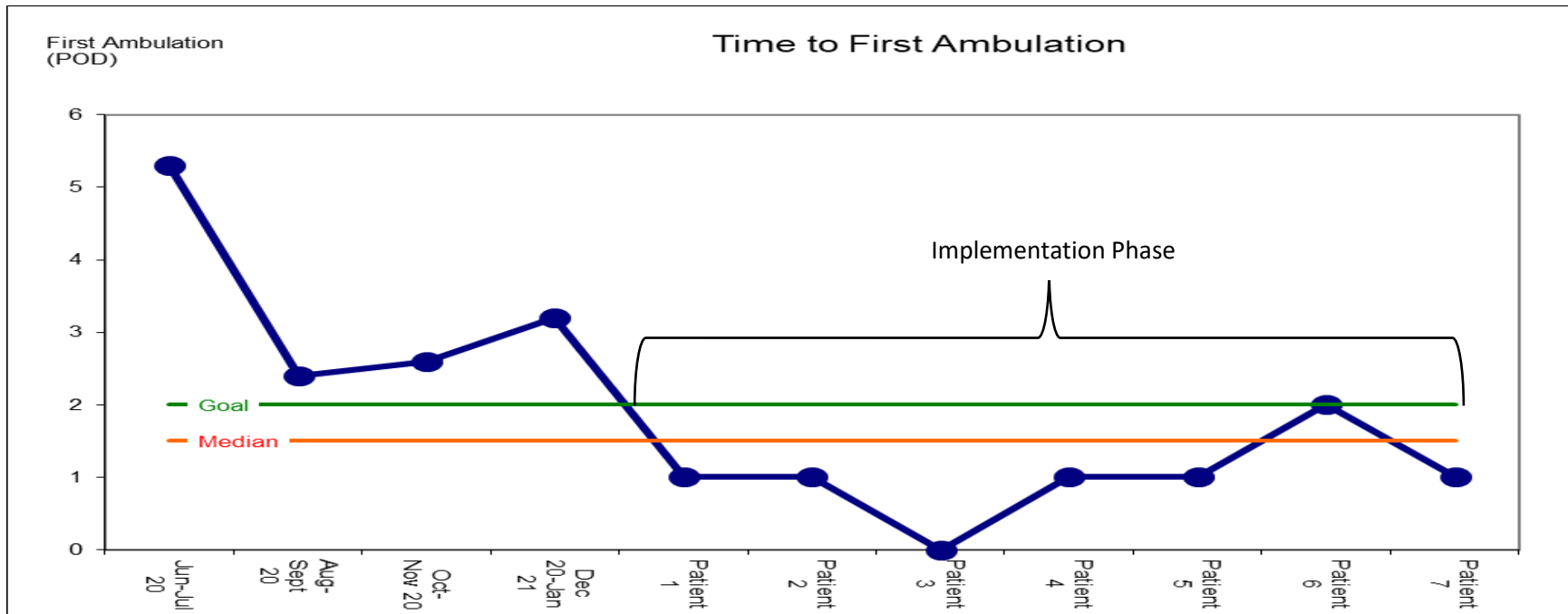
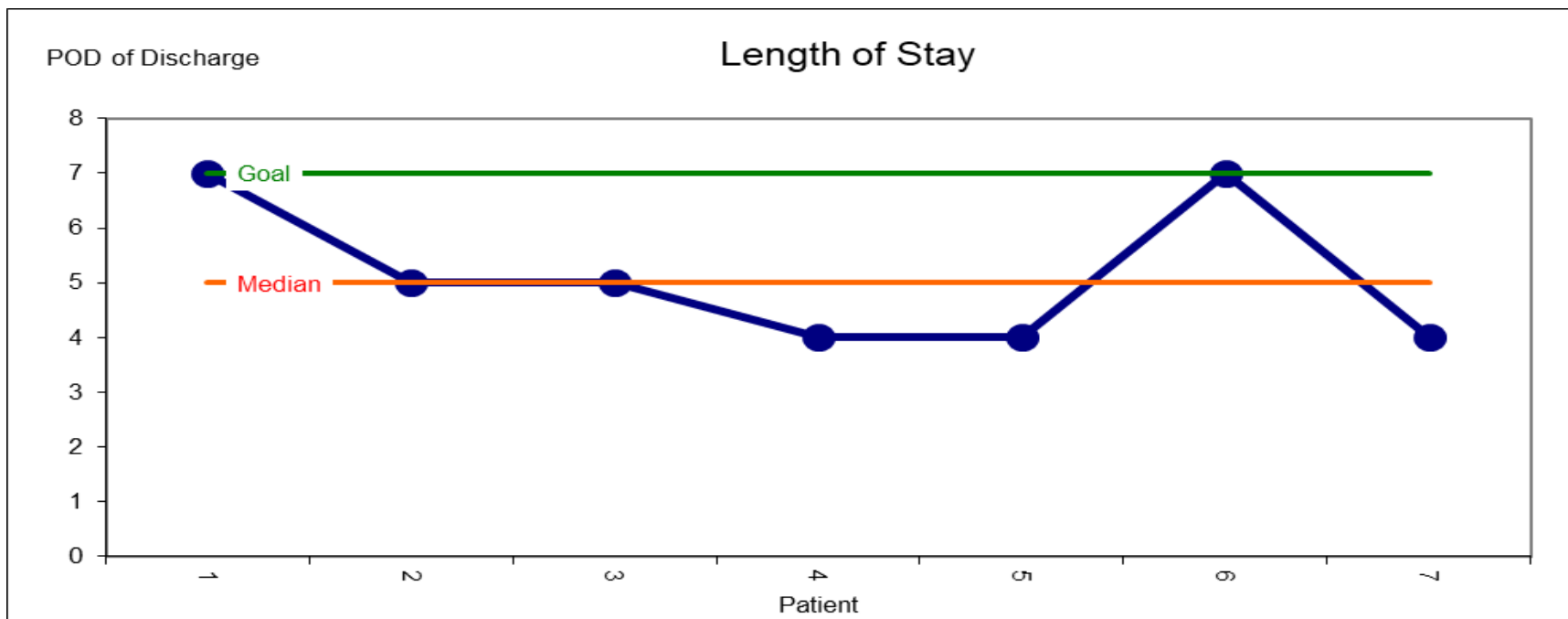


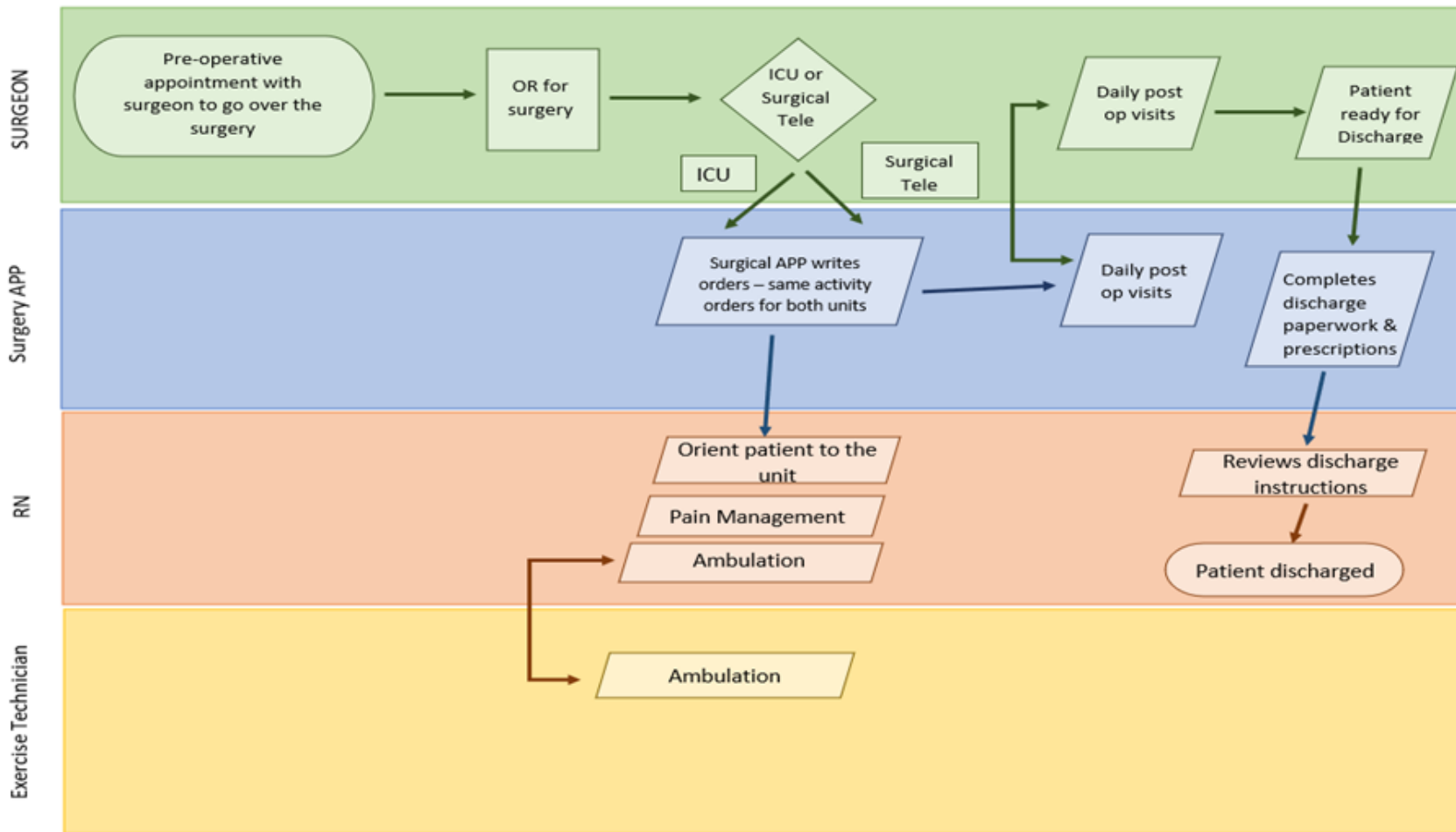
Figure 3

Length of Stay



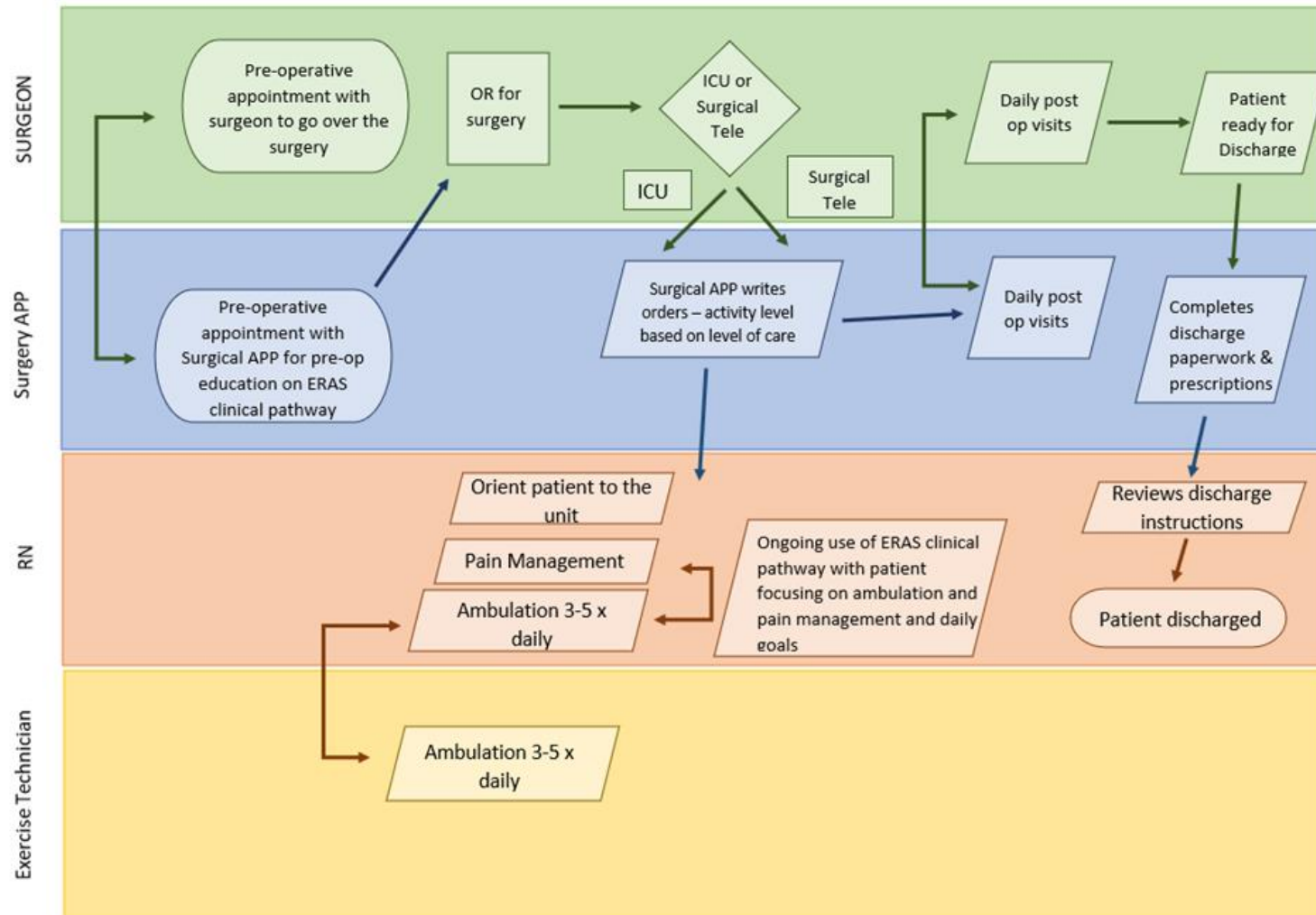
Appendix

Appendix A – Pre-intervention Process for Pancreatic Resection Patients from the office to discharge



Current process for Pancreatic Resection Patients from the office to discharge

Appendix B – Post-Intervention Process for Pancreatic Resection Patients from the office to discharge



Proposed process for Pancreatic Resection Patients from the office to discharge

Appendix C – *Tools/Aides Utilized – Pre-operative education table of contents*



Patient Education

Perioperative Information for Distal Pancreatectomy Procedure

Included in this education packet:

- About your Surgery
- Preparation for Surgery
- Day of Surgery
- Recovery After Surgery
- Home Care
- Additional Information
 - Breathing Exercises Using the Incentive Spirometer

Appendix D – Tools/Aids utilized – Clinical Pathway

Pancreatic Resection Clinical Pathway Tool

	Day of Surgery	POD 1-2	POD 3-4
Location	ICU/IMC or 4 East	4 East	4 East
Oxygen & Pulmonary Treatments	You may need oxygen after surgery while you are still recovering. Use your Incentive Spirometer every hour.	You will wear oxygen to help you breathe better, this will be weaned off as you continue to progress. You need to use the Incentive Spirometer 10 times every hour. Doing this helps your lungs to get stronger.	Continue to use your Incentive Spirometer 10 times every hour. How high can you reach?
Pain Management	Your nurse will always ask you if you are having pain. Report pain on a scale of 0-10 and point to the area that hurts. Your nurse will give you pain medication.	Remember to tell your nurse when you are having pain. Pain medication allows you to use the Incentive Spirometer more effectively and to get out of bed and walk.	Tell your nurse when you are having pain. Pain medication helps when you use your Incentive Spirometer and to rest between activities.
Diet	You may wake up with a tube in your nose that extends down to your stomach (NGT). You will not be able to eat or drink until this tube is removed.	Your NGT will remain in place until you start to have some bowel sounds/function. If you do not have an NGT tube, you may start clear liquids. Take it easy when you start to drink – DON'T drink too much – and NO SODA!	If you have a tube, it may get removed and start on clear liquids. Take it easy when you start to drink – DON'T drink too much – and NO SODA!
Activity	You will likely remain in bed the night of surgery.	Today you will sit in a chair and the team will help you walk in the halls. Each time you walk you will get stronger. Your team will keep a record of each walk and the distance you travel.	Today you can bathe in the bathroom. You will wash with a special soap that help prevent infections. Walk 3-5 times. You will get stronger with each journey in the hall.
Incision(s)	You may have at 1 - 2 drains in your abdomen.	Your incision is covered with a special bandage. You will wear a heart monitor. A team is watching your heart rhythm day and night.	
Teaching & Discharge	Your family will visit with you today.	Your case manager will talk to you and your family about any care that you will need when you go home.	

	POD 5-6	POD 7
Location	4 East	Today you may go home
Oxygen & Pulmonary Treatments	Use your Incentive Spirometer 10 times every hour. What is your goal today?	Use your Incentive Spirometer today and for 2 more weeks after you go home. Your lungs are stronger.
Pain Management	Tell your nurse <i>if</i> you are having pain.	
Diet	Your doctor wants you to eat your meals while you are sitting in the chair. This is very important for you. Tell you nurse when you pass gas or have a bowel movement.	
Activity	You need to bathe with the soap that helps prevent infection. Walk in the hall 4-5 times.	Continue to walk when you go home. You can take a shower when you get home.
Incision(s)		Call your doctor if your incision becomes reddened or if there is drainage from the incision.
Teaching & Discharge		Your nurse will give you your discharge instructions and prescriptions for all of the medications that you will need. Thank you for allowing us to support you during your Road to Recovery .

Appendix E – Data Collection Form

De-identified Patient ID	Date of Pre-op Visit	Verbal Education Provided (1=yes, 0=no)	Written Education Provided (1=yes, 0=no)	Smart Phrase Used (1=yes, 0=no)	Date of Surgery	Date/POD of Transfer to 2C	Date/POD of First Ambulation	Clinical Pathway Used with Patient (1=yes, 0=no)	Smart Phrase Used Each Day (1=yes, 0=no)	Length of Stay (ICU/Total)
1	9/7/2021	1	0	0	9/9/2021	DOS	9/10/2021 (POD 1)	1	0	7 (0 ICU days)
2	10/12/2021	1	1	1	10/14/2021	DOS	10/15/2021 (POD 1)	1	1	5 (0 ICU days)
3	10/20/2021	1	1	0	10/25/2021	DOS	10/25/2021 (POD 0)	1	0	5 (0 ICU days)
4	10/27/2021	1	0	0	10/29/2021	DOS	10/30/2021 (POD1)	0	0	4 (0 ICU Days)
5	11/3/2021	1	1	0	11/8/2021	DOS	11/19/2021 (POD 1)	0	0	4 (0 ICU days)
6	11/9/2021	1	0	0	11/11/2021	DOS	11/13/2021 (POD 2)	0	0	7 (0 ICU days)
7	11/16/2021	1	0	1	11/18/2021	DOS	11/19/2021 (POD 1)	1	0	4 (0 ICU days)