Implementing a Mobility Scale to Increase Postoperative Mobility Levels

by

Mary C. Marasa

Under Supervision of

Elaine Bundy

Second Reader

Crystal DeVance-Wilson

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Abstract

Problem: Gynecologic oncology treatment plans often involve invasive surgeries that put patients at risk for complications and long hospital admissions. Enhanced Recovery After Surgery protocols improves outcomes for gynecologic oncology patients, especially when patients are compliant with getting out of bed on postoperative day zero. At an urban Mid-Atlantic hospital, 3% of gynecologic oncology patients got out of bed on postoperative day zero and the average length of stay was 2 days between February 2018 and January 2020. Delaying postoperative mobility increases the risk for longer hospital stays.

Purpose: The purpose of this quality improvement project is to implement the Johns Hopkins Highest Level of Mobility (JH-HLM) scale with defined goals to increase postoperative mobility levels and decrease the length of hospital stay for postoperative gynecologic oncology patients.

Methods: Quantifiable mobility goals were defined for postoperative patients based on the JH-HLM scale. The nursing staff was educated about the mobility goals and JH-HLM scale through unit presentations, email communication, and annual competencies. Mobility documentation was standardized in the electronic health record. Education materials were disseminated to the inpatient oncology unit, post-anesthesia care unit, rehabilitation department, and patients. Patient age, diagnosis, type of surgery, mobility levels, and length of stay were collected through chart reviews for 3 weeks before implementation and during the 12-week implementation period. Run charts were used to analyze the data.

Results: Results showed that average mobility documentation increased (10% to 46%). There was an increase in mobility levels on postoperative day zero (6% to 33%) and by discharge (13% to 45%). The average length of stay during the 3-week pre-implementation period was 1.6 days and after implementation it was 1.8 days. These results were not statistically significant.

Conclusion: Findings suggest that quantifying and standardizing mobility goals may increase postoperative mobility levels. However, more investigation is needed to demonstrate statistical significance. Length of stay was not decreased and was likely impacted by a variety of factors. Further investigation of improving mobility documentation, decreasing data variability, and increasing compliance is warranted.

Introduction

Gynecologic oncology treatment plans often include invasive surgeries that put women at risk for postoperative complications and long hospital admissions. Postoperative complication rates can be as high as 44% from cytoreductive surgeries which can result in a delay of adjunctive treatment plans which impacts survival rates (Wright et al., 2011). Nationally institutions are implementing Enhanced Recovery After Surgery (ERAS) protocols to improve outcomes for surgical gynecologic oncology patients (Bergstrom et al., 2017; Bisch et al., 2018). One element of the ERAS protocol is early postoperative mobilization, which is defined as getting out of bed to ambulate on postoperative day zero and it is the only ERAS protocol element that has a statistically significant impact on decreasing length of stay and postoperative complications (Wijk et al., 2019). National studies show that up to 50% of patients do not meet the ERAS protocol early mobilization criteria (Grass et al., 2018; Wijk et al., 2019).

An urban Mid-Atlantic teaching hospital implemented the ERAS protocol for gynecologic oncology surgical patients in February of 2018. From February 2018 to January 2020 only 3.16% of patients got out of bed and ambulated on postoperative day zero. Delaying getting out of bed and ambulating until postoperative day one puts patients at a higher risk for postoperative complications and longer hospital stays. Reasons for delayed mobility include perceived barriers from nursing staff, safety concerns, no standardized mobility protocols, and lack of clear mobility goals (Barber & Van Le, 2015, Klein et al., 2018; Wolk et al., 2016). The purpose of this quality improvement (QI) project was to implement the Johns Hopkins Highest Level of Mobility (JH-HLM) scale with defined goals for surgical gynecologic oncology patients. See Appendix A for the JH-HLM scale. The anticipated outcomes of this practice change were to increase the number of patients who ambulate on post-operative day zero and decrease length of hospital stay.

Literature Review

The following literature review will provide a synthesis of the evidence to support implementing the Johns Hopkins Highest Level of Mobility (JH-HLM) scale with defined goals as a QI project. The review includes evidence from eight different articles that support identifying mobility goals, making those mobility goals quantifiable, and using the JH-HLM scale to increase mobility levels and decrease length of hospital stay. Melnyk and Fineout-Overholt's (2014) level of evidence rating system and Newhouse's (2006) Johns Hopkins Evidence-Based Practice Rating Scale was used to determine the quality of evidence (Tables 1 & 2). The evidence found has varying levels (II-VI) and quality (B-C). Six out of eight of the articles were QI projects which is considered low level and low-quality evidence, however there was low risk and high benefit potential associated with the suggested practice change.

A common theme in the evidence was the clear identification of a mobility goal can increase the mobility of patients and decrease the amount of time spent in the hospital (Dewitt et al., 2019; Khandhar et al., 2018; Klein et al., 2018; Schaller et al., 2016; Wolk et al., 2019). Dewitt et al. (2019), Schaller et al. (2016), and Klein et al. (2018) used mobility goals that were determine by a patient's baseline mobility assessment. Khandhar et al. (2018) and Wolk et al. (2019) worked with postoperative patients on a medical surgical floor and had specific mobility goals based on the type of surgery that was performed. Klein et al. (2018) and Wolk et al. (2019) also gave verbal feedback to patients about their mobility level and how it compared to their identified goal. Schaller et al. (2016) and Wolk et al. (2019) both conducted randomized control trials with surgical patients. The evidence to support having a clearly identified goal had moderate to weak evidence level (II-VI) and quality (B-C) (Tables 1 & 2).

The evidence also supports that patients with a quantifiable goal move more frequently and spent less time in the acute care settings (Khandhar et al., 2018; Klein et al., 2018; Wolk et al., 2019). Khandhar et al. (2018) and Wolk et al. (2019) worked with postoperative patients on a medical/surgical unit and gave a measurable goal of ambulating 250 feet one hour after thoracic surgery or reaching a specific step goal measured by a step counter after major visceral surgery, respectively. Klein et al. (2018) implemented measurable mobility goals defined by a mobility calculator on a medical/surgical floor with a neurology specialty. Klein et al. (2018) and Wolk et al. (2019) both had a control group to compare to the intervention group, unlike Khandhar et al. (2018) who conducted a quality improvement project. Moderate to low level (II-VI) and quality (B-C) of evidence was found to support having a quantifiable mobility goal (Tables 1 & 2).

The Johns Hopkins Highest Level of Mobility (JH-HLM) scale is a valid and reliable scale that has been used to standardize mobility documentation and increase mobility levels (Hoyer et al., 2016; Hoyer et al., 2018; Kappel et al., 2018; Klein et al., 2018). Hoyer et al. (2016), Kappel et al. (2018), and Klein et al. (2018) all conducted quality improvement projects that had nurses document a patient's mobility level using the JH-HLM scale in the electronic health record and it resulted in higher mobility levels. Hoyer et al. (2018) and Kappel et al. (2018) evaluated the reliability and validity of the JH-HLM scale and found that it had test-retest reliability with an interclass correlation coefficient (ICC) of 0.94, interrater reliability with an ICC of 0.99, overall reliability with an ICC of 0.99, and construct validity with a Spearman correlation coefficient ranging between 0.25 and 0.65. These QI projects were implemented in various clinical settings including a medical unit, orthopedic unit, and a medical/surgical neurological unit. Overall, these articles had low level (III-VI) and low quality (C) evidence ratings (Table 1 & 2).

Theoretical Framework

Kurt Lewin's Change Theory was selected to guide the implementation of this quality improvement project. Lewin's Change Theory has three phases which includes unfreezing, change, and refreezing. In these phases the need for change is identified, a new practice is implemented, and then the new practice becomes the standard. These three phases helped guide the project's implementation to successfully change the previous mobility practice.

During the unfreezing stage, the goal was to produce a driving force and motivation for changing current mobility practices. Unfreezing was accomplished after the healthcare providers receive education on the definition of early postoperative mobilization, benefits of early postoperative mobilization, the importance of standardizing mobility documentation, and challenging perceived barriers to early postoperative mobilization. During the change phase new postoperative mobility expectations were put into practice. This included prescribed postoperative mobility goals, nursing staff documentation of the patient's highest level of mobility, and increased patient mobility. After successfully implementing the practice change, refreezing included continued communication about the importance of early mobility, mobility documentation audits, and yearly competencies about documentation of a patient's mobility level. This resulted in early postoperative mobility becoming sustainable and the new standard of care. Lewin's Change Theory provided a framework to guide the knowledge, attitudes, and beliefs of postoperative mobility in promoting the best postoperative outcomes for gynecologic oncology patients.

Methods

This QI project was implemented at an urban Mid-Atlantic teaching hospital on a 32-bed inpatient oncology unit. It included patients who had a planned laparoscopic or open laparotomy surgery with the gynecologic oncology surgical team, were admitted to the inpatient oncology unit directly after surgery and could ambulate 250 feet independently preoperatively. Through collaborating with the clinical site representative, the institution's Uterine and Ovarian Cancer Committee, and the inpatient oncology nursing manager, quantifiable postoperative mobility goals were identified that aligned with implementation of the JH-HLM scale. The nursing director, medical director, gynecologic oncology surgical team, and the JH-HLM scale creators gave the approval (Appendix B) to move forward with implementing the QI project. Nursing informatics and information technology (IT) services were consulted to incorporate the JH-HLM scale into the electronic health record (EHR) to standardize mobility documentation. Change champions from the inpatient oncology unit were identified to help promote the practice change and disseminate educational materials to the inpatient oncology unit, post-anesthesia care unit, rehabilitation department, and patients to successfully implement this project.

To track implementation progress and assess the impact of the intervention, specific structure, process, and outcome measures were identified. One structure measure included educating the inpatient oncology staff on the practice change components of the project. Specific strategies used to educate staff were presentations during unit governance meetings and staff emails. During annual unit competencies a mobility education station was set up with a poster board (Appendix C), mobility reminder badge cards (Appendix D), and post mobility education knowledge check (Appendix E). The other structure measure was incorporating the JH-HLM scale into the EHR. This was done by modifying postoperative mobility orders to align with the

JH-HLM scale, adding the scale into the daily care flowsheet, and incorporating prompts to document mobility on nurse's task list.

Process measures for this project were nursing staff mobility documentation compliance and the number of patients who ambulated on postoperative day zero. The strategies and tactics used to reach these measures included posting documentation reminders of the JH-HLM scale on computers (Appendix F), and providing education to the post-anesthesia care unit staff who transport patients to the inpatient units (Appendix G). When mobility documentation compliance rates were noted to be below 50%, incentives of bi-weekly prizes were initiated for the person who most frequently documented mobility levels. The mobility level on the day of discharge and the average length of stay in the hospital were assessed as outcome measures. To help promote the standardization of interdisciplinary mobility communication, inpatient rehabilitation staff received education about the QI project goals and how they could contribute to its success (Appendix H). Another strategy to increase these outcome measures included preparing patients to become active participants in early mobilization. The Mobility Map (Appendix I) and After Surgery To-Do List (Appendix J) were created and placed in postoperative inpatient rooms to promote patient participation and awareness of the importance of increasing postoperative mobility levels.

All data collected from the outcome measures were openly shared with the inpatient unit staff regarding project updates and the progress towards meeting project goals. Data was collected on a weekly basis via chart audits using the Postoperative Mobility Scale Chart Audit Tool (Appendix K). The percentages of the number of staff educated, compliance with mobility documentation, ambulation on postoperative day zero, mobility level at discharge, and average length of stay were calculated and placed in run charts to identify and analyze trends. To protect the confidentiality and privacy of individuals, each patient was assigned a unique identification number and no personal identifiers were included on the chart audit tool. This tool was completed by the project leader, stored in locked cabinet, and destroyed at the end of the project. Prior to implementation, the project was submitted to the Human Research Protections Office at the University of Maryland and to the Hospital's Institutional Review Board and received a non-human research determination.

Results

There was a total of 42 nursing staff members employed on the inpatient oncology unit during the implementation of this QI project. All (100%) received education about the importance of early postoperative mobility, postoperative ambulation goals, proper utilization of the JH-HLM scale, and how to document mobility levels in the electronic health record by the third week of project implementation. Of the 42 staff members, 29 (69%) were registered nurses and 13 (31%) were nursing support technicians. The structure measure of incorporating the JH-HLM scale into the electronic health record was initially delayed but was implemented during the 8th week of the project implementation phase.

Descriptive statistics were used to analyze the sample of patients (n = 162) that met the inclusion criteria during QI project implementation (See Table 3). Most patients were between the ages 51-60 (44%), had laparoscopic surgery (62%) and had a preoperative diagnosis of leiomyoma (38%). During the 3-week pre-implementation period 31 patients met inclusion criteria, three (10%) of patients had their mobility documented in a nursing note, and two (6%) of patients ambulated 10 steps or more on postoperative day zero. During implementation, the process measures mobility documentation compliance and postoperative day zero ambulation were tracked using run charts (See Figures 1 and 2). During the 12-week implementation period, the mean mobility documentation compliance increased to 46%, with an upper limit of 100% and a lower limit of 26%. The mean percentage of patients who ambulated at least 10 steps on postoperative day zero was 33%, with an upper limit of 66% and a lower limit of 10%. This was an increase from the initial internal data that showed 3% and pre-implementation data that showed 6% of patients ambulated on postoperative day zero (See Figures 1 & 2). In both run charts, there were 12 data points and frequent variability, making the findings not statistically significant.

The outcome measure of mobility level at discharge during the 12-week implementation period was also tracked using a run chart (See Figure 3). A mean of 45% of patients ambulated at least 250 feet by the day they were discharged, with an upper limit of 80% and a lower limit of 0%. This was an increase from the three-week pre-implementation period where four (13%) of patients ambulated 250 feet or more before discharge. Due to the limited data points and variability, these findings were not statistically significant. During the 3 weeks before the implementation of this project, the mean length of stay was 1.6 days and 68% of patients were discharged within 48 hours. The mean length of stay in the hospital for patients during the implementation period was 1.8 days and 67% of patients were discharged within 48 hours, which shows no decrease. However, this was a decrease from the internal data collected by the hospital before the start of this project which showed a 2-day average length of stay.

Throughout implementation, there were no reports of adverse events, such as falls or an increase in readmission rates, related to the interventions of this project. A total of 11 (7%) of patients had a documented barrier to reaching postoperative mobility goals. These barriers included nausea, pain, low blood pressure, drowsiness, or patient refusal. There were three (2%) of patients who received care from a flex pool nurse who did not receive the project education.

Informal reports of time constraints, patient to nurse ratio, staff burnout, and patient reluctance to leave hospital room due to the COVID 19 pandemic were also noted to be barriers to achieving mobility goals. After the implementation of the JH-HLM scale into the electronic health record on week 8, it was discovered that some patient’s charts did not have the correct mobility orders and associated documentation reminders. This problem was brought to the attention of IT services and a coding error was discovered. This error was corrected after the 12-week implementation phase of this project.

Discussion

Despite the lack of statistically significant results, this QI project shows support for implementing the JH-HLM scale with defined goals to increase postoperative day zero ambulation, increase mobility level at discharge, and decrease hospital length of stay. The increase from 3% to 33% of patients ambulating on postoperative day zero, increase from 13% to 45% of patients ambulating 250 feet before discharge, and decrease in hospital length of stay from 2 days to 1.8 days aligns with publications previously discussed in the literature review. However, the publications from Dewitt et al. (2019), Khandhar et al. (2018), Klein et al. (2018), and Wolk et al. (2019) showed a statistically significant increase in patient mobility levels and decrease in hospital length of stay, where this QI project did not.

Inconsistent documentation compliance is a possible reason for the lack of a significant increase in postoperative day zero ambulation and mobility levels on discharge. There was an increase from 10% to 46% of patients having their mobility level documented on postoperative day zero, but this leaves most of the patients without any mobility level documentation. This can be attributed to the delay in the JH-LM scale being incorporated into the electronic health record, the change in how mobility levels were documented on week eight of implementation, and the coding error that created inconsistent documentation prompts. The low compliance of 33% of patients ambulating on postoperative day zero is a possible reason why there was not a statistically significant increase in discharge mobility level and decrease in the average length of stay. If more patients met their initial mobility goal on postoperative day zero, they possibly would have reached a higher mobility level on subsequent postoperative days and may have been discharged from the hospital sooner.

Variations in the data collected also contributed to the differences between the observed and anticipated outcomes of this QI project. Each week there were variations in the number of patients who had surgery, number of laparoscopic versus open laparotomy surgeries, documentation compliance, and patient mobility levels. Some of these variations were likely related to the changes in mobility documentation during the project, perceived staff barriers, and impacts of the COVID 19 pandemic. To decrease variability and improve compliance rates it would be beneficial to include all patients on the identified unit and establish electronic health record changes before implementation. By doing this and collecting additional data points before and after project implementation, it would be more likely to identify statistically significant trends that align with previous publications.

There were limitations in the generalizability of the findings of this QI project. One limitation is the specific patient population of women under the care of a gynecology oncology surgeon. Most patients included in the sample had a preoperative diagnosis of benign leiomyoma and were included in the project because of their surgeon and postoperative pathways. However, this may impact the generalizability of results to patients with a malignant condition. Another limitation of this project is the baseline mobility requirement of being able to able 250 feet preoperatively and the subsequent focus on the three highest mobility levels on the JH-HLM scale. This limits the generalizability of the project to those with lower baseline mobility levels who may benefit from mobility goals that do not include steps or feet ambulated. The patients included in the QI project were also following other guidelines of the ERAS protocol. This may influence their ability to meet their postoperative mobility goals and limit the generalizability to surgical populations who do not follow ERAS protocol guidelines.

Conclusion

The purpose of this QI project was to implement the JH-HLM scale with defined goals for postoperative gynecologic oncology patients to increase mobility documentation, increase mobility levels, and decrease hospital length of stay. Despite the lack of statistically significant evidence, the results are relevant for improving the quality of postoperative care and the outcomes of gynecologic oncology patients. Overall, this project can be used to support the standardization of mobility documentation and identification of quantifiable mobility goals for patients. This practice change will be sustained in the future due to the successful implementation of the JH-HLM scale into the electronic health record with an associated mobility order and documentation reminder. The importance of early postoperative mobility and how to use the JH-HLM scale will also be incorporated into annual competencies and new hire orientation for postoperative staff. The results of the project will be disseminated within the organization and to outside organizations with podium and poster presentations.

The implications of this project for clinical practice are to document mobility levels in a standardized way, establish quantifiable mobility goals, and promote compliance to increase postoperative mobility levels and decrease the length of stay in the hospital. Additional QI projects should take place to confirm the significance of these interventions in practice. Implications for future QI projects include implementing these interventions in expanded surgical and medical populations, improving compliance with meeting mobility goals, and standardizing preoperative mobility education. It would also be beneficial to evaluate what impact compliance with other elements of the ERAS protocol have on achieving postoperative mobility goals. With a continued dedication to quality improvement, gynecologic oncology patients will have the opportunity to meet all their postoperative goals and improve their outcomes.

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Table 1

Evidence Review Table: Implementation of Early Postoperative Mobility Tool

Citation: Dewitt, K., Coto, J. A., Carr, L., Ondrey, M., & Petkunas, H. (2019). Ambulation Programs: Decreasing Length of Stay and Improving Outcomes. *MEDSURG Nursing*, 28(5), 293–302. Retrieved from http://web.a.ebscohost.com.proxy-hs.researchport.umd.edu/ehost/pdfviewer/pdfviewer?vid=4&sid=3e891118-5d6d-43e3-ad7b-4a3ac255952f%40sessionmgr4006					Level VI
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
"Team members wanted to develop a mobility program that could be hardwired on the medical-surgical unit to improve patient quality of care and shorten hospital LOS"	Quality Improvement Project	**Sampling Technique:** Convenience sample from a medical surgical floor at a community hospital in the Midwest. **# Eligible:** 108 patients **# Control:** Compared to data from previous quarter (exact number not provided) **# Intervention:** All 108 eligible patients were a part of the intervention group **Power analysis:** Unknown **Group Homogeneity:** Unknown	**Control**: Followed standard care, which did not have a set protocol for mobility. **Intervention**: Individualized mobility plans. **Intervention fidelity (describe the protocol):** Upon admission nurses completed a sit to stand assessment to determine their mobility level on admission and every shift. The patients received a score from 1 to 4 based on their mobility level. Each score had associated mobility interventions for the patient such as walking with	**DV:** Length of stay (LOS) in the hospital **Measurement tool (reliability), time, procedure:** A modified sit to stand assessment tool was utilized that had specific mobility interventions. The reliability and validity of this tool were not discussed. The project ran for 90 days.	**Statistical Procedures(s) and Results:** A two tail test was used to compare differences in means between groups. Pear's r was calculated to determine correlations between variables. Patients with a mobility plan had a statistically significant difference in their LOS compared to the control group (p = 0.0006) Patients in the intervention group were discharged to the same or lower level of care compared to control group (r =0.7602).

			nursing support technicians or uses physical therapy equipment.		
Citation: Hoyer, E. H., Friedman, M., Lavezza, A., Wagner-Kosmakos, K., Lewis-Cherry, R., Skolnik, J. L., … Needham, D. M. (2016). Promoting mobility and reducing length of stay in hospitalized general medicine patients: A quality-improvement project. *Journal of Hospital Medicine*, 11(5), 341–347. https://doi-org.proxy-hs.researchport.umd.edu/10.1002/jhm.2546					Level VI
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
"To determine whether a multidisciplinary mobility promotion quality-improvement (QI) project would increase patient mobility and reduce hospital length of stay (LOS)"	Quality Improvement Project	**Sampling Technique:** Convenience sample from two inpatient general medicine units at a large academic medical center in Baltimore, Maryland was used for the QI project. **# Eligible:** 3,352 patients during QI project **# Accepted #:** 3,352 patients during QI project **# Control:** 3,302 patients' data retrospectively collected from 12 months prior to QI project **Power analysis:** Unknown **Group Homogeneity:** The	**Control**: 12 months of patient data prior to QI project implementation **Intervention**: Development of the Johns Hopkins Highest Level of Mobility (JH-HLM) scale to document mobility and integration into the electronic health record. It was required to document a patient's mobility score three times a day. Data collected during the 12-month QI project was also broken into categories include ramp up phase and late QI phase. **Intervention fidelity:** The QI project included	**DV:** Mean length of stay (LOS) in the hospital, maximum daily JH-HLM scale score, and changes in JH-HLM scale score from admission to discharge. **Measurement tool (reliability), time, procedure:** At the time of this study, there was no proven reliability or validity to the JH-HLM scale. Data was collected for 12 months during the QI project and for an additional 4 months after the QI project. Data was collected from the Sunrise Clinical Data Manager and Johns Hopkins Hospital Datamart financial database.	**Statistical Procedures(s) and Results:** A t tests and Wilcoxon rank sum test were used to identify mean and median LOS. A multivariable linear regression model was then used to identify a change in LOS from the 12 months during the QI project and 12 months prior to the QI project. Median LOS was shorter during the QI project compared to before the project (3 vs 4, $p < 0.001$). Mean LOS was also shorter during the QI project (5.1 vs 6, $p < 0.001$). Percentage of patients who ambulated increased from 43%

		pre-project group characteristics were like the quality improvement project group characteristics.	interdisciplinary education, audits on documentation compliance, and meetings/huddles for barrier identification. The JH-HLM scale is an 8-point ordinal scale which captures mobility milestones.		(ramp up phase) to 70% (post-QI phase) (*p* <0.001). Percentage of patients who had an improvement in their mobility score increased from 32% to 45% (*p* < 0.001). After doing a sensitivity analysis and imputing missing scores results were very similar.
Citation: Hoyer, E. H., Young, D. L., & Klein, L. M. (2018). Toward a Common Language for Measuring Patient Mobility in the Hospital: Reliability and Construct Validity of Interprofessional Mobility Measures. *Physical Therapy*, *98*(2), 133–142. https://doi-org.proxy-hs.researchport.umd.edu/10.1093/ptj/pzx110					Level VI
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
"The purposes of this study were to evaluate the reliability and minimal detectable change of AM-PAC IMSF and JH-HLM when completed by nurses and physical therapists and to evaluate the construct validity of both measures when used by nurses"	Prospective evaluation	**Sampling Technique:** Convenience sample from a neuroscience department at a large academic medical center in Baltimore, Maryland. **# Total patient participants:** 187 **# Reliability portion participants:**118 participants who were evaluated by 4 physical therapist and 8 nurses. **#Validity portion participants:** 69 participants who	To determine reliability each participant was scored twice using the JH-HLM scale and AM-PAC IMSF by 1 physical therapist and 2 nurses. Validity of the JH-HLM scale and AM-PAC IMSF was assessed by using another measurement of function and assessing convergence validity. The other	The outcomes examined were test-retest reliability, interrater reliability, and convergent validity for both the JH-HLM scale and AM-PAC IMSF. To determine test-retest and interrater reliability, data was collected by having each participant observed and scored twice by 2 nurses and 1 physical therapist. A total of 8 nurses and 4 physical therapists participated. For construct validity 5 nurses evaluated patients with the JH-HLM scale and 4 other measurements of function	**Statistical Procedures(s) and Results:** To determine test-retest reliability a 1- way random effects intraclass correlation coefficient (ICC) model was used. For interrater reliability testing a 2-way random effects ICC model was used. Overall reliability for AM-PAC IMSF was 0.97 (95% CI=0.98-0.99) and for JH-HLM 0.99 (95% CU =0.98-0.99).

		were evaluated by 5 nurses **Power analysis:** To determine reliability, it was determined that a sample size of 57 was needed to have a power of 0.80 with a minimum test-retest intraclass correlation coefficient of 0.85. To determine construct validity a sample size of 56 was identified to have a power of 0.80 and minimum correlation of 0.3. **Group Homogeneity:** There were varying ranges of experience and educational levels between the nurses and the physical therapists. Characteristics between the reliability group and validity group were similar.	measurements of function included grip strength, Katz Activities of Daily Living Scale, 2-minute walk test, 5-times sit-to-stand test.	and convergent validity was reviewed between the scores.	The Spearman rank order correlation coefficient was to determine convergent validity. All correlations were statistically significant.
Citation: Kappel, S. E., Larsen-Engelkes, T. J., Barnett, R. T., Alexander, J. W., Klinkhammer, N. L., Jones, M. J., … Ye, P. (2018). Creating a Culture of Mobility: Using Real-Time Assessment to Drive Outcomes. *AJN American Journal of Nursing*, *118*(12), 44–50. https://doi-org.proxy-hs.researchport.umd.edu/10.1097/01.NAJ.0000549690.33457.bb					Level VI

Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
"The purpose of this quality improvement (QI) project was to give RNs, patient care technicians (PCTs), physical therapists (PTs), and occupational therapists (OTs) a common language with which to accurately assess a patient's functional status by concurrently implementing the three assessment tools"	Quality Improvement Project	**Sampling Technique:** A convenience sample for an inpatient orthopedic unit at a community hospital in South Dakota **# Eligible:** 120 **# Accepted:** 120 **# Control (Prior to QI project):** 61 Patients **# Intervention (Post QI project):** 59 patients **Power analysis:** Unknown **Group Homogeneity:** Baseline and intervention groups had comparable characteristics.	**Control**: Prior to the QI project there was no consistent documentation of real-time mobility levels of patients **Intervention:** Nursing staff started documenting mobility with the Johns Hopkins Highest Level of Mobility (JH-HLM) scale, physical therapy used the Physical Therapy Mobility Assessment, and occupational therapy used Occupational Therapy Assistance Assessment (OTAA) scale. **Intervention fidelity:** The quality improvement project patient education consisted of providing standardized education about mobility to patients on admission, a voluntary pre-surgery class was offered for elective	**DV:** Assessment tools impact on a patient's mobility and how mobility scores influence length of stay. **Measurement tool (reliability), time, procedure:** The reliability of these assessment tools was analyzed within this study by seeing if they correlate with each other. The quality improvement project lasted for 3 months. Information was gathered retrospectively from the patient's electronic health records.	**Statistical Procedures(s) and Results:** The Wilcoxon rank sum test and Spearman rank correlation were to compare two groups and assess statistical dependence between two variables. All assessment tools had significant correlations with each other. JH-HLM and PTMA rs = 0.36, p = 0.03. JH-HLM and OTAA rs=0.46, p = 0.01. PTMA and OTAA rx=0.58, p <0.00. There was a statistically significant increase in the number of times patients moved from the bed to chair (p =0.002), ambulated with nursing assistance (p <0.001), ambulated with PT assistance (p=0.003), and the maximum distance ambulated with nursing assistance (p=0.02) compared to the baseline group.

			surgeries, posters were placed in patients rooms about the importance of ambulating, patients received a activity tracking calendar, and access to a video about post-operative mobility.		There was no statistically significant difference in the LOS between the two groups.
Citation: Khandhar, S., Schatz, C., Collins, D., Graling, P., Rosner, C., Mahajan, A., . . . Fernando, H. (2018). Thoracic enhanced recovery with ambulation after surgery: a 6-year experience. *European Journal of Cardio-Thoracic Surgery*, 1192-1198. https://doi.org/10.1093/ejcts/ezy061					Level VI
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
"Our institution implemented a protocol known as thoracic enhanced recovery with Ambulation after surgery (T-ERAS) in thoracic operations. The objective was early ambulation starting in the postoperative ambulatory care unit."	Quality Improvement Project	**Sampling Technique:** Convenience sampling from a community hospital in Fairfax, Virginia of patients undergoing a video assisted thoracoscopic surgery (VATS) lobectomy. **# Eligible:** 1,172 **# Accepted:** 304 (others excluded if surgery was more extensive than lobectomy) during QI project **# Control:** 100 patients prior to QI project **# Intervention:** 75 patients in early	**Control**: Patients prior to the implementation of the Thoracic Enhance Recovery After Surgery protocol **Intervention:** Thoracic Enhanced Recovery After Surgery (T-ERAS) protocol **Intervention fidelity (describe the protocol):** The T-ERAS protocol consist of recommendations during pre-operative, intraoperative, and postoperative	**DV:** Successful completion of early post-operative ambulation (ambulate 250 feet within one hour of being extubated), post-operative complications, and length of stay. **Measurement tool (reliability), time, procedure:** Data from this QI project was monitored for 6 years. Therefore, there were two cohorts (early and late) to account for staff adoption of the protocol. Patients were assisted to a chair as soon as possible after they were extubated, went on a 250ft walk in the recovery unit, and then went on a second walk from the recovery unit to their hospital room which was 500 feet.	**Statistical Procedures(s) and Results:** Fischer's exact test was used for categorial variables. Mann–Whitney–Wilcoxon rank sum test was used for continuous variables. The late cohort had a statistically significant increase in completing early post-operative ambulation compared to the early cohort (37% vs 72%, p <0.001) The post T-ERAS group had statistically significant shorter length of stay

		cohort and 132 in late cohort **Power analysis:** Unknown **Group Homogeneity:** There was no statistically significant difference between the pre-intervention group, early cohort, or late cohort.	phases. Pre-operative they stop smoking 3 weeks prior to surgery, are educated about post-operative expectations, and ambulate to the operating room. Intraoperative IV fluid are kept to a minimum, narcotics use is minimized, and they are extubated prior to leaving the operating room. Postoperatively they sit in a chair as soon as possible, ambulate 250 feet within one hour of being extubated, avoid intravenous opioid use, and then ambulate 500 feet to the step-down unit.	Nursing staff documented time of extubating, time to ambulating, and observed distance ambulated in the electronic medical record.	compared to pre-T-ERAS group (1-1.25 days vs 2 days, $p < 0.001$) T-ERAS group had lower incidence of post-operative pneumonia compared to pre T-ERAS (0.7% vs 6%, p =0.004). There was no statistically significant difference between groups for other post-operative complications.
Citation: Klein, L. M., Young, D., Feng, D., Lavezza, A., Hiser, S., Daley, K. N., & Hoyer, E. H. (2018). Increasing patient mobility through an individualized goal-centered hospital mobility program: A quasi-experimental quality improvement project. *Nursing Outlook*, 66(3), 254–262. https://doi-org.proxy-hs.researchport.umd.edu/10.1016/j.outlook.2018.02.006					Level III
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
"To describe implementation and outcomes from a nurse directed patient mobility program"	Quasi-experimental quality improvement project	**Sampling Technique:** Convenience sampling from two inpatient adult units in a large academic	**Control:** Standard documentation of patient's mobility with the Johns Hopkins Highest Level of Mobility	**DV:** Mean daily maximum JH-HLM, mean JH-HLM daily goal, percentage of JH-HLM goal met during hospitalization, and the percentage of JH-HLM	**Statistical Procedures(s) and Results:** Independent sample t-tests for the project unit and control unit during the

		medical center in Baltimore Maryland. Both units care for patients with neurological, neurosurgical, and medical diagnoses. One unit was designated as the control unit (CU) and one the project unit (PU) **# Eligible:** 2,164 patients from both units in the quality improvement time period **# Accepted:** All patients were accepted during the project time period (2,164) **# Control:** 956 on CU during project. **# Intervention:** 1,208 on the PU during the intervention. **Power analysis:** Unknown **Group Homogeneity:** Both groups had similar demographics at baseline and project time frames. There was no difference in	(JH-HLM) scale and Activity Measure for Post-Acute Care Inpatient Mobility Short Form (AM-PAC IMSF). **Intervention:** Education and implementation of the John's Hopkins Mobility Goal Calculator (JH-MGC). **Intervention fidelity:** The JH-MGC takes a patients AM-PAC IMSF score and associates it with a specific mobility level on the JH-HLM scale. The JH-MGC sets specific daily mobility goals for patients based on their mobility capabilities.	goal exceeded during hospitalization. **Measurement tool (reliability), time, procedure:** Both the JH-HLM scale and the AM-PAC IMSF have proven reliability and construct validity. The JH-MGC was developed after identifying a positive linear relationship between a patient's JH-HLM scale and AM-PAC IMSF. An interdisciplinary cohort of clinical nurse specialist, physical therapist, and physicians agreed on the alignment of JH-HLM and AM-PAC IMSF scores to develop the Johns Hopkins Mobility Goal Calculator. The length of the intervention was 8 weeks. Mobility data was extracted from the Sunrise Clinical Manager System. Demographic information was gathered from Johns Hopkins Hospital Financial database.	baseline and project implementation time frames. Then a Benjamin-Hochberg procedure for t-test results was used due to the multiple comparisons. At baseline there were no differences between units for any of the outcome measures. After the intervention the project unit had significantly higher JH-HLM scores ($p <$ .001, 5.8 vs 5.2) and goal attainment ($p <$ .001, 2% vs. 51.8%). There was no statistically significant difference between groups for the mean JH-HLM goal ($p =$ .389)

		outcome measures between groups during the baseline time frame.			
Citation: Schaller, S. J., Anstey, M., Blobner, M., Edrich, T., Grabitz, S. D., Gradwohl-Matis, I., Heim, M., Houle, T., Kurth, T., Latronico, N., Lee, J., Meyer, M. J., Peponis, T., Talmor, D., Velmahos, G. C., Waak, K., Walz, J. M., Zafonte, R., & Eikermann, M. (2016). Early, goal-directed mobilisation in the surgical intensive care unit: a randomised controlled trial. *Lancet*, *388 North American Edition*(10052), 1377–1388. https://doi.org/10.1016/S0140-6736(16)31637-3					Level II
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
"In this study we tested if early, goal-directed mobilisation, using a strict mobilisation algorithm combined with facilitated inter-professional communication, in critically ill SICU patients leads to improved mobility during SICU admission, decreased length of stay on the SICU, and increased functional independence at hospital discharge"	Randomized controlled trial	**Sampling Technique:** International multicenter sample from 5 University hospital's Surgical Intensive Care Unit (1 in Germany, 1 in Australia, and 3 in USA). Requirements were 18 years of age or older, ventilated for less than 48 hours, were functionally independent at baseline, had a reversible disorder, and were able to give consent. **# Eligible:** 665 **# Accepted:** 200 **# Control:** 96 **# Intervention:** 104 **Power analysis:** Estimated 100	**Control:** Standard of care including mobilization that was based on the institution's practice guidelines. **Intervention:** Standard of care plus goal directed mobilization based on a mobilization algorithm. **Intervention fidelity:** The intervention group had a mobilization goal that was defined after morning rounds and then communicated between shifts. The goal was based on an algorithm that had four different mobility milestones, which identified	**DV:** Primary outcome was the mean SOMS. Secondary outcomes were length of stay in the SICU and functional mobility at hospital discharge. **Measurement tool (reliability), time, procedure:** The algorithm mobility scale has been validated. Scores were collected from day 1 until the patient was discharged from the SICU. Data was collected on the patient's mobility levels by reviewing the documented observed mobility achieved in the chart during their SICU stay and the mean was calculated after discharged. They were monitored for 28 days after discharge from the SICU. Functional mobility as discharge was determined with a modified functional	**Statistical Procedures(s) and Results:** Mann-Whitney U test was used for continuous variables and Fischer's exact test was used for categorial outcomes. The intervention group had a statistically significant higher mobilization ($p<0.0001$), decreases length of stay in the SICU ($p=0.0054$), and improved functional mobility level at hospital discharge ($p=0.0002$). There was no difference in serious adverse events between groups.

		patients per group would have a power greater than 80% with an assumption of 11% mortality rate and 11% attrition rate. **Group Homogeneity:** Base line characteristics between groups were similar. The control group had slightly higher rates of patients with cerebrovascular disease and trauma than the intervention group.	their SICU Optimal Mobility Score (SOMS). Interdisciplinary team decided on specific procedures to reach the goal and a sign was placed above the patient's bed that stated the goal. In the evening the patient's achieved mobility level was documented in the medical record.	measure score which was given by study staff after chart review and bed-side clinical examination. The study was conducted from July 1, 2011 and November 4, 2015.	
Citation: Wolk, S., Linke, S., Bogner, A., Sturm, D., Meißner, T., Müssle, B., … Welsch, T. (2019). Use of Activity Tracking in Major Visceral Surgery-the Enhanced Perioperative Mobilization Trial: a Randomized Controlled Trial. *Journal of Gastrointestinal Surgery*, *23*(6), 1218–1226. https://doi-org.proxy-hs.researchport.umd.edu/10.1007/s11605-018-3998-0					Level II
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
"The aim was to monitor and increase the postoperative mobilization of patients after major visceral surgery by providing a continuous step count feedback using activity tracking wristbands" Hypothesis: "Continuous feedback of the daily activity during the first 5 postoperative days (PODs) following major visceral	Randomized control trial	**Sampling Technique:** Single site trial in the Visceral, Thoracic, and Vascular Surgery department at an academic hospital Dresden, Germany. Patients were considered if they were having surgery on their colon, rectum, stomach,	**Control:** Patients received activity tracking wristbands postoperatively that did not display their step count. **Intervention:** Patients received activity tracking wrist bands post-operatively that showed continuous	**DV:** Primary outcome was the average step count for five days after surgery. Secondary outcomes included cumulative step count, activity time, and length of hospital stay. **Measurement tool (reliability), time, procedure:** The step tracking device was approved by the Medical	**Statistical Procedures(s) and Results:** Mann Whitney U test was utilized for comparison of continuous values. The Fischer exact test was used for categorial values. Two-way analysis of variables test was used to compare daily step

surgery using activity tracking wristbands (intervention) results in a higher mean daily step count, compared with no activity tracking feedback (control)”		pancreas or liver. Patients were then divided in two arms of the study (Laparoscopic surgery and open surgery). Participants were then randomly placed in control or intervention group. **# Eligible:** 173 **# Accepted:** 132 (72 in open surgery arm, 60 in laparoscopic surgery arm) **# Control:** 36 in open surgery group, 30 in laparoscopic surgery group **# Intervention:** 36 in open surgery group, 30 in laparoscopic surgery group **Power analysis:** For a power of 80% with a P value of <0.05 and drop out rate of 12%, it was determined that a sample size of 120 total participants were needed (30 in each group). This was calculated with a two-tail unpaired t-test.	feedback on the number of steps they had taken. **Intervention fidelity (describe the protocol):** All patients in the study were informed about proper use of the wrist band and were given pre-defined mobilization targets. Those in the intervention group had a staff member assess their step count twice a day and read the number out loud to see if they had met their goal.	Device Act and it was approved for medical use Activity for each patient was monitored for five days after surgery. To collect data the number of steps observed on the step tracking device were monitored twice a day by the study staff and recorded on the patient’s case report form for analysis.	counts between groups. The laparoscopic surgery group intervention group had a statistically significant increase in the average step count ($p < 0.001$), cumulative steps taken (9867 vs. 6103, $p = 0.037$), and activity time (p = 0.0.037). In the open surgery arm of the study, the control group had a higher step count and activity time than the intervention group. There was no statistically significant difference when looking at patients without comorbidities in the open group. Average step count also correlated with length of hospital stay (R = -0.341, $p < 0.001$). This was determined by Spearman Rank Correlation Coefficient Test)

		Group Homogeneity: The control group in the open surgery group was statistically younger and had less comorbidities (P= 0.052, P=0.005). There was no statistically significant difference of group demographics or diagnosis. However, there was a broad range of different types of surgery creating inhomogeneity.			

Rating System for Hierarchy of Evidence

Level of Evidence	Type of Evidence
I (1)	Evidence from systematic review, meta-analysis of randomized controlled trails (RCTs), or practice-guidelines based on systematic review of RCTs.
II (2)	Evidence obtained from well-designed RCT and/or reports of expert committees.
III (3)	Evidence obtained from well-designed controlled trials without randomization.
IV (4)	Evidence from well-designed case-control and cohort studies
V (5)	Evidence from systematic reviews of descriptive and qualitative study
VI (6)	Evidence from a single descriptive or qualitative study
VII (7)	Evidence from the opinion of authorities

Table 2

Synthesis Table: Implementation of Early Postoperative Mobility Tool

Evidence Based Practice Question (PICO): Do surgical gynecologic oncology patients who have established mobility goals based on the Johns Hopkins Highest Level of Mobility scale compared to current practice, have higher postoperative mobility levels?			
Level of Evidence	**# of Studies**	**Summary of Findings**	**Overall Quality**
II	**2**	Schaller et al. (2016) found that having established mobility goals based on an algorithm and interdisciplinary communication resulted in Surgical Intensive Care Unit (SICU) patients have higher levels of mobility, shorter stays in the SICU, and have higher levels of mobility when being discharged from the hospital. There was no difference in serious adverse events such as falls or dislodgement of tubes between groups Wolk et al. (2019) found that patients who undergo laparoscopic abdominal surgery had an increase in the average steps taken a day, total step count, and activity time when they received feedback from an activity tracking wrist band compared to those who did not receive feedback. For open abdominal surgery patients, there was no evidence that suggested step count feedback increased postoperative mobilization. Another finding for both groups in the study was that higher cumulative step counts were associated with shorter hospital stays.	B, both Scaller et al. (2016) and Wolk et al. (2019) had adequate sample size, some control, and consistent results contributed to validity. Randomization present, but it could not be double blinded based of clinician's role in the interventions. The studies had multiple sites and a wide variety of surgeries included in the study contributing to generalizability. However, this variety also created group inhomogeneity. Both articles also have consistent recommendations based on a comprehensive literature review that includes reference to scientific evidence.

		Schaller et al. (2016) and Wolk et al. (2019) had similar findings that having mobility goals that were clearly communicated increased a patient's mobility level. They both found that the more a patient moved the less time they spent in an acute care setting. Schaller et al. (2016) and Wolk et al. (2019) focused on a post-surgical population. However, Schaller et al. (2016) focused on patients requiring intensive care postoperatively, while Wolk et al (2019) focused stable patients on a medical surgical floor.	
III	**1**	Klein et al. (2018) found that when medical/surgical neurology patients have established daily mobility goals identified by the Johns Hopkins Mobility Calculator they are more likely to have higher Johns Hopkins Highest Level of Mobility scores, higher percentage of mobility goal attainment, and shorter length of hospital stay compared to those who do not have mobility goals.	C, no randomization, no power analysis. Some control and group homogeneity were present. There were consistent results which promoted the use of establishing daily mobility goals. Further research was recommended to evaluate if results can be generalized to other settings. Unable to establish direct cause and effect relationship between intervention and outcomes.
VI	**5**	Dewitt et al. (2019) and Khandhar et al. (2018) found that setting clear mobility goals for patients decreased their length of stay in the hospital, postoperative complications, and level of care needed at discharge. Dewitt et al. (2019) based mobility goals off the patient's baseline mobility, while Khandhar et al. (2018) had a standard goal of ambulating 250 feet within one hour of being extubated from a thoracic surgery. Hoyer et al. (2018) and Kappel et al. (2018) both evaluated the Johns Hopkins Highest Level of Mobility (JH-HLM) scale to evaluate its reliability	C, these five quality improvement projects have no randomization or controls present. These five authors looked at comparisons between baseline and postimplementation data. Sample sizes were moderate. However, Hoyer, Young, and Klein (2018) was the only study that provided a power analysis, so minimum sample size is unknown. Each study focused different patient populations but there were consistent results and recommendations, promoting generalizability. However, since they are all quality improvement projects, no conclusions can be made about cause and effect.

		and validity. Hoyer et al. (2018) found the JH-HLM scale had interrater reliability and construct validity. Kappel et al. (2018) found that the scores of the JH-HLM correlated with assessment from physical therapists and occupational therapist. Khandhar et al. (2018), Hoyer et al. (2016), and Kappel et al. (2018) all had quantifiable goals for the amount a patient should ambulate. Khandhar et al. (2018) did not use the JH-HLM scale, but the goal of ambulating 250 feet is the same as a mobility level of 8 on the JH-HLM. All three of these studies found that having quantifiable goals increased the amount a patient ambulated and decreased their length of stay in the hospital.	

System for Hierarchy of Evidence

Level of Evidence	**Type of Evidence**
I (1)	Evidence from systematic review, meta-analysis of randomized controlled trails (RCTs), or practice-guidelines based on systematic review of RCTs.
II (2)	Evidence obtained from well-designed RCT and/or reports of expert committees.
III (3)	Evidence obtained from well-designed controlled trials without randomization.
IV (4)	Evidence from well-designed case-control and cohort studies
V (5)	Evidence from systematic reviews of descriptive and qualitative study
VI (6)	Evidence from a single descriptive or qualitative study
VII (7)	Evidence from the opinion of authorities

Rating Scale for Quality of Evidence (Newhouse)

High (A)	Scientific	Consistent results with sufficient sample size, adequate control, and definitive conclusions; consistent recommendations based on extensive literature review that includes thoughtful reference to scientific evidence
	Summative Review	Well-defined, reproducible search strategies; consistent results with sufficient numbers of well-defined studies; criteria-based evaluation of overall scientific strength and quality of included studies; definitive conclusions
	Experiential	Expertise is clearly evident
Good (B)	Scientific	Reasonably consistent results, sufficient sample size, some control, with fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence
	Summative Review	Reasonably thorough and appropriate search; reasonably consistent results with sufficient numbers of well-defined studies; evaluation of strengths and limitations of included studies; fairly definitive conclusions.
	Experiential	Expertise seems to be credible.
Low Quality (C)	Scientific	Little evidence with inconsistent results, insufficient sample size, conclusions cannot be drawn
	Summative Review	Undefined, poorly defined, or limited search strategies; insufficient evidence with inconsistent results; conclusions cannot be drawn
	Experiential	Expertise is not discernable or is dubious
Newhouse, R. (2006). Examining the source for evidence based nursing practice. JONA.Volume 36, Number 7/8, pp 337-340		

Table 3

Patient Demographic Information (n = 162)

Category	Number	Percentage
Type of Surgery		
Laparoscopic	101	62%
Open Laparotomy	61	38%
Preoperative Diagnosis		
Malignant neoplasm of the uterus/endometrium	48	30%
Malignant neoplasm of the ovary	7	4%
Leiomyoma of the uterus	61	38%
Other*	45	28%
Age		
< 35	8	5%
36 – 50	53	33%
51 – 65	72	44%
> 65	29	18%

* Includes pelvic mass, adnexal mass, postmenopausal/abnormal uterine bleeding, and ovarian cyst

Figure 1

Mobility Documentation on Postoperative Day Zero

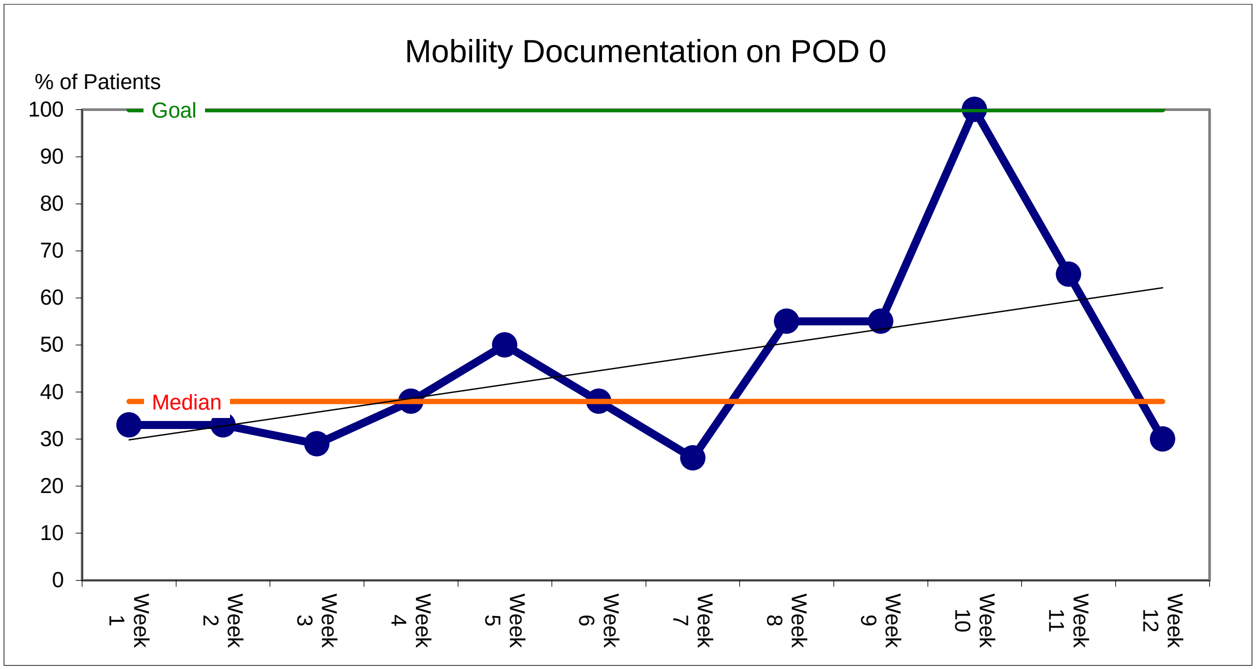


Figure 2

Patients Who Ambulated Ten Steps or More on Postoperative Day Zero

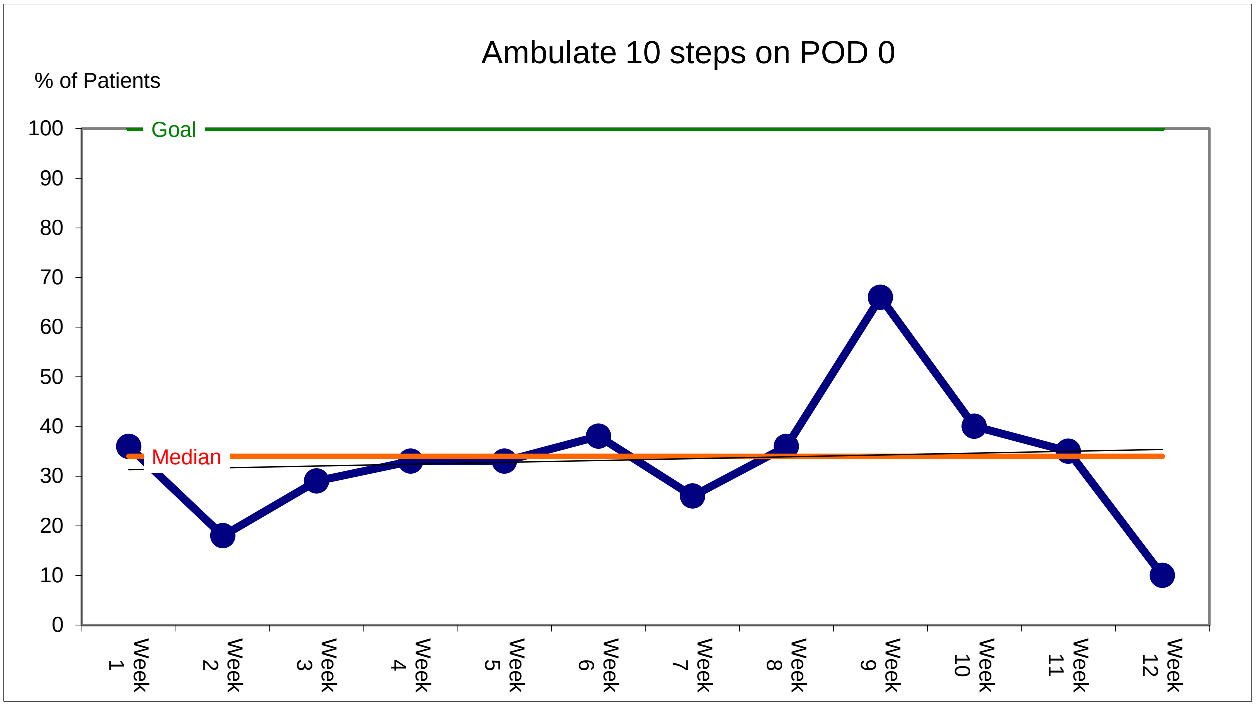
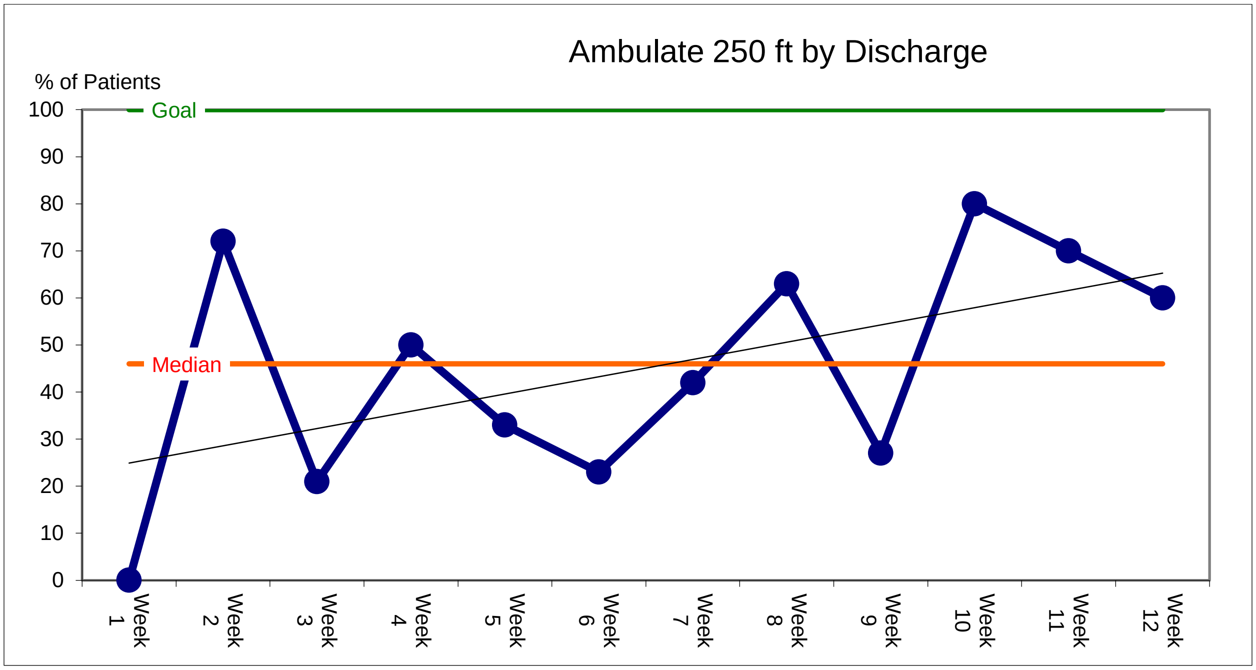


Figure 3

Patients Who Ambulated 250 Feet or More by Discharge



Appendix A

Johns Hopkins Highest Level of Mobility (JH-HLM) Scale

Johns Hopkins
Highest Level of Mobility (JH-HLM) Scale

MOBILITY LEVEL ↑

		Score
WALK	250+ FEET	8
	25+ FEET	7
	10+ STEPS	6
STAND	≥1 MINUTE	5
CHAIR	TRANSFER to CHAIR	4
BED	SIT AT EDGE OF BED	3
	TURN SELF/BED ACTIVITY*	2
	ONLY LYING	1

**Bed activity includes passive or active range of motion, movement of arms or legs, and bed exercises (e.g., cycle ergometry, neuromuscular electrical stimulation).*

Appendix B

Permission to Use JH-HLM Scale

Good afternoon Dr. Hoyer and Mr. Friedman,
My name is Mary Marasa, and I am a Family Nurse Practitioner student at the University of Maryland. I am contacting you today to request permission to utilize the Johns Hopkins Highest Level of Mobility Scale for my Doctor of Nursing Practice quality improvement project. I would be implementing this scale at [*the hospital*] where I currently work as a nurse on the inpatient oncology floor. Please let me know if there are any questions or concerns.

1. Requesting Organization: *Mid-Atlantic Community Hospital*
2. Organization Contact Person(s): Mary Marasa
3. E-mail: mmarasa@umaryland.edu
4. Phone: 410-440-4735
5. Individual location and/or entities utilizing tool: Inpatient medical/surgical units
6. General description of how the tool may be used at your organization: The Johns Hopkins- Highest Level of Mobility Scale will be incorporated into the electronic health record. It will be used to monitor and promote patient's mobility while they are inpatients.

Thank you for your time. Stay safe and healthy.
Warm Regards,
Mary Marasa

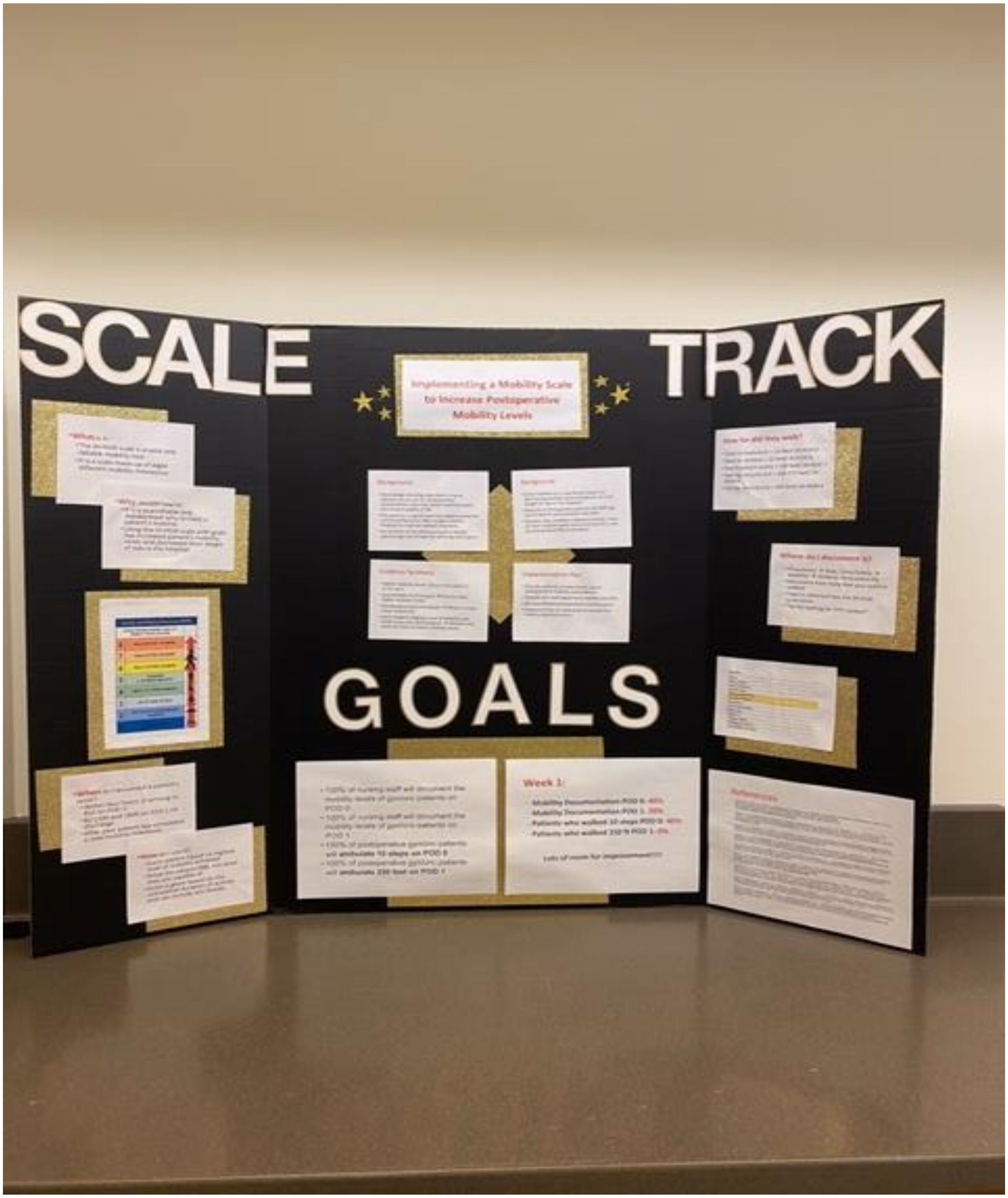
Michael Friedman <mfried26@jhmi.edu>

Good luck. Consider this email permission for use.

Michael

Appendix C

Annual Competency Education Poster

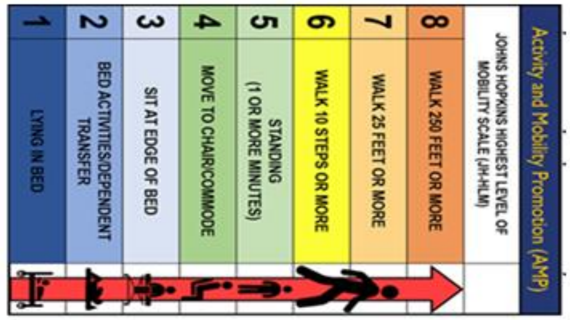


Appendix D

Mobility Reminder Badge Card

How far did they walk?

	Distance	JH-HLM Score
Bed → Bathroom	10 ft	6
Door → Window	22 ft	6
Past 5 rooms	100 ft	7
½ Lap	250 ft	8
Full Lap	450 ft	8



Appendix E

Post Mobility Education Knowledge Check

Name:

Mobility and JH-HLM Scale Knowledge Check

1. For gynecologic oncology patients, what is their postoperative mobility goal on postoperative day zero?
   a. Walk 100 feet or more
   b. Slide from PACU stretcher to bed
   c. Walk 10 steps or more
   d. Stand for 1 minute or more

2. For gynecologic oncology patients, what is their postoperative mobility goal on postoperative day one?
   a. Walk 250 feet or more
   b. Sit in the chair during the day
   c. Walk 100 feet or more
   d. Walk from chair to the bathroom

3. A patient walks from the door to the window in room 1530. What is their JH-HLM scale score?
   a. 7
   b. 8
   c. 6
   d. 5

4. A patient walks one full lap (blue rectangle on mobility map) on B15. While walking they take two 15 second rest breaks. What is their JH-HLM scale score?
   a. 7
   b. 8
   c. 6
   d. 5

5. When do you document a gynecologic oncology patient's postoperative mobility level?
   a. Within four hours of arriving to B15
   b. By 11 am and 6pm daily
   c. After they reach a mobility milestone
   d. All of the above

Appendix F

Computer Documentation Reminders

Friendly reminder…

Did you document your patient’s mobility level?

Appendix G

Post-Anesthesia Care Unit Education

DNP Project: Implementing a Mobility Scale to Increase Postoperative Ambulation

Why is this project needed?

- GYN/ONC patients are at high risk for postoperative complications. The ERAS protocol helps been implemented to help improve postoperative outcomes.
- Early mobilization is a part of the ERAS protocol and it is defined as getting out of bed on postoperative day (POD) 0. Early mobilization decreases the length of stay in the hospital and postoperative complications.
- Currently, the majority of GYN/ONC surgical patients do not get out of bed on POD 0.

What are the goals of the project?

- Implement the Johns Hopkins Highest Level of Mobility (JH-HLM) scale to standardize mobility documentation and set quantifiable mobility goals (see scale below).
- Get postoperative GYN/ONC patients out of bed sooner and have them walk more while in the hospital. Their POD 0 mobility goal is to ambulate 10 steps (JH-HLM scale score 6)

What can YOU do to help?

- When bringing GYN/ONC patients to B15 remind them they will be walking from the stretcher to the bed or chair (they are informed of their mobility expectations preoperatively).
- Stop stretcher close to the door when entering the patient's room.
- **Wait** for RN/NST to come into the room before getting the patient out of bed.
- Always use your clinical judgment. If it is inappropriate to have the patient get out of bed due to high pain, nausea/vomiting, low blood pressure, etc. have the patient slide from the stretcher to the bed.

Contact Mary Marasa for any questions/comments/concerns

Appendix H

Rehabilitation Unit Education

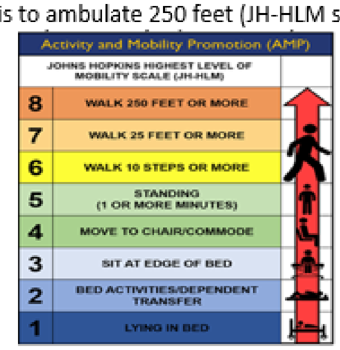
DNP Project: Implementing a Mobility Scale to Increase Postoperative Ambulation

Why is this project needed?

- GYN/ONC patients are at high risk for postoperative complications. The Enhanced Recovery After Surgery (ERAS) protocol helps improve postoperative outcomes.
- Early mobilization is a part of the ERAS protocol and it is defined as getting out of bed on postoperative day (POD) 0. Early mobilization decreases the length of stay in the hospital and postoperative complications.
- Currently, the majority of GYN/ONC surgical patients do not get out of bed on POD 0.

What are the goals of the project?

- Get postoperative GYN/ONC patients out of bed sooner and have them walk more while in the hospital.
- Implement the Johns Hopkins Highest Level of Mobility (JH-HLM) scale to standardize mobility documentation.
- Set quantifiable mobility goals:
  - POD 0 mobility goal is to ambulate 10 steps (JH-HLM scale score 6).
  - POD 1 mobility goal is to ambulate 250 feet (JH-HLM scale score 8).



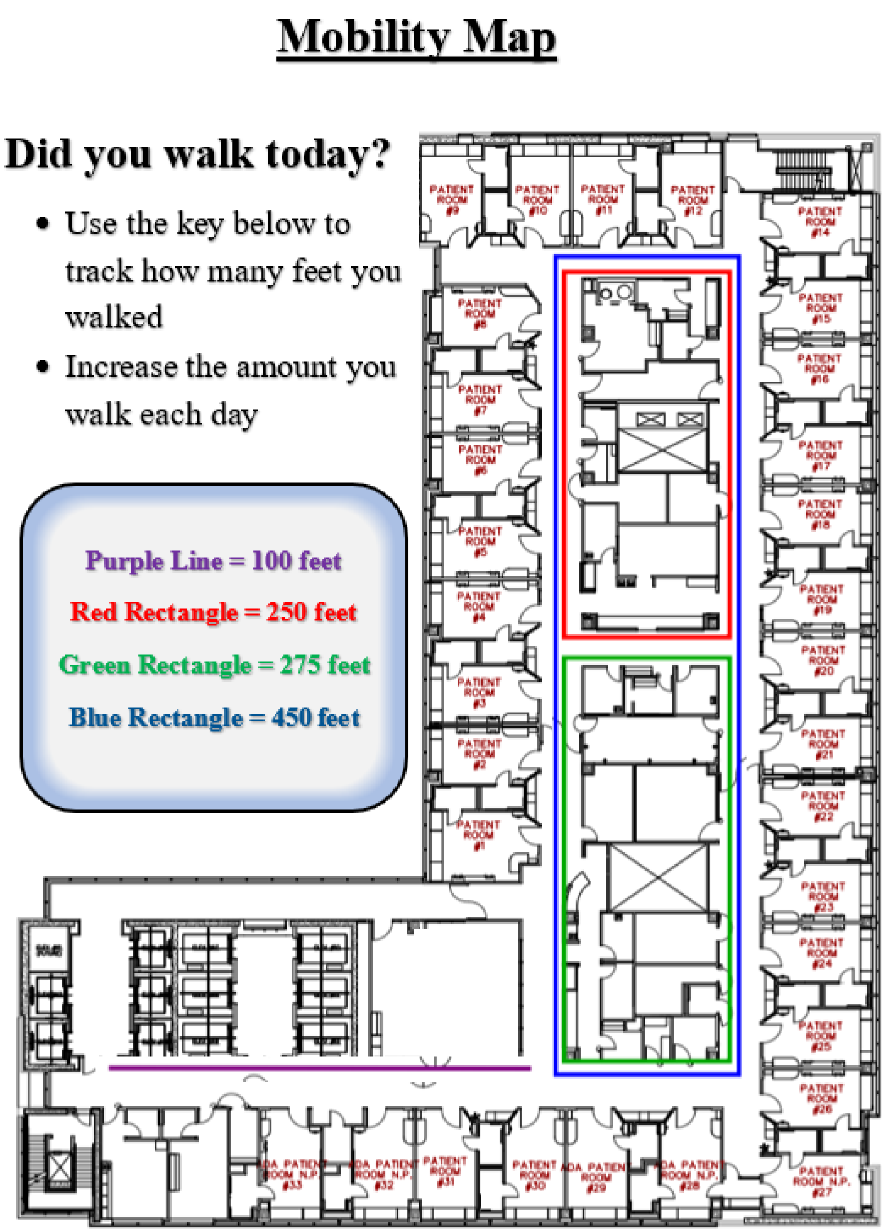
How can YOU help?

- Encourage POD 1 GYN/ONC patients to ambulate 250 feet (if clinically appropriate) during their therapy sessions.
- Utilize the Mobility Map in the patient's room to encourage patients to keep track of the number of feet they walk.
- Promote a common interdisciplinary mobility language by setting specific goals based on the JH-HLM scale.

Contact Mary Marasa for any questions/comments/concerns

Appendix I

Mobility Map



Appendix J

After Surgery To-Do List

Gynecologic Oncology After Surgery To-Do List:

Your nurse will inform you which steps need to be completed prior to discharge

✓	Action Step
☐	**Sit in chair** Moving after surgery is an important part of recovery and because of this, you will be assisted out of bed and into the chair within four hours of arriving to the inpatient unit.
☐	**Walk in halls** Walking is one of the best ways to build back your strength and promote healing after surgery. Once cleared by your nurse, walk in the halls the morning after surgery.
☐	**Eat solid food** Once cleared by your surgeon, you will be given solid food to eat. If you feel nauseous, let your nurse know so they can help manage your symptoms. You should eat all your meals out of bed.
☐	**Use your breathing tool** Your goal is to use your breathing tool (incentive spirometer) at least 10 times an hour while awake. Ask one of your care team members if you have any questions about how to use your breathing tool.
☐	**Perform ankle pumps** Perform 20-30 ankle pumps (flex your toes towards the ceiling then point them towards the floor) every half hour while awake to increase the circulation in your legs, decrease swelling, and help prevent blood clots.
☐	**Control pain** It is expected to have some discomfort after surgery. However, your pain should be kept at a tolerable level so you can take deep breaths, go on walks, and sleep at night. Talk to your nurse about your pain level and pain control options.
☐	**Urinate after catheter removal** You may have a foley catheter (a tube to drain urine from your bladder) in place after surgery so your care team can closely monitor your urine output. Once this is removed, you should urinate within 6 hours.
☐	**Check morning blood work** You will have your blood drawn early in the morning the day after surgery. Your care team will monitor the results and will inform you if there are any abnormalities.

Appendix K

Postoperative Mobility Chart Audit Tool

Postoperative Mobility Scale Chart Audit Tool

Patient ID	**Type of Surgery** Laparoscopic=1 Open= 2	**Diagnosis**	**Age**	**POD 0 mobility documentation** Yes=1 No=2	**POD 0 JH-HLM Score ≥6** Yes=1 No=2	**POD 1 mobility documentation** Yes=1 No=2	**POD 1 JH-HLM score ≥8** Yes=1 No=2	**JH-HLM Score on Discharge**	**Length of Stay (Hours)**