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An Interdisciplinary Approach to Reducing Length of Stay in Joint Replacement Patients

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Demand for hip and knee arthroplasty in the United States is rising rapidly. This is creating considerable strain on healthcare systems' institutional resources and finances. To reduce this strain, Spectrum Health in Grand Rapids, MI, developed a strategy to decrease length of stay for most primary hip and knee joint replacement patients. Four specific interventions were undertaken concurrently: (1) communication with providers, (2) modification of patient communications, (3) standardized risk assessment and prediction, and (4) physical therapy on POD (postoperative day) 0 (i.e., the day of surgery). Length of stay was reduced an average of 0.5 days per patient for primary hip and knee joint replacement surgeries, creating a positive financial outcome without negatively affecting quality and patient satisfaction. This demonstrated the ability of a large, high-volume joint replacement center to transform organizational culture and generate rapid, measureable change.

Data on inpatient surgery from the United States' Centers for Disease Control and Prevention (CDC) indicate that 719,000 total knee arthroplasty (TKA) procedures and 332,000 total hip arthroplasty (THA) procedures were performed in 2010 (CDC, 2012a). This was at a cost of more than $11 billion in 1 year (CDC, 2012b). The diagnosis-related group code for hip and knee arthroplasty is the highest hospital inpatient short-stay cost for Medicare. By 2030, the demand for primary and revision hip replacements is projected to more than double, while the demand for primary and revision knee replacements is projected to increase by more than 600%. The total number of replacements that will be performed annually by 2030 is projected to be nearly 4.5 million (Kurtz, Ong, Lau, Mowat, & Halpern, 2007).

The demand for THA and TKA procedures is rising rapidly because of the aging of the population and the prevalence of arthritis. This creates considerable strain on healthcare systems from an institutional resource perspective, with a significant number of hospital beds and staff devoted to arthroplasty patient care. This demand also generates a large financial strain on individuals, payers, and the national economy. One strategy to reduce the overall cost and strain on the nation's healthcare system is to decrease hospital length of stay (LOS). When handled correctly, this strategy also can help healthcare organizations meet quality and patient satisfaction goals. Patients are expecting shorter lengths of stay and faster rehabilitation as outcomes from hip and knee replacement continue to improve.

Background

Spectrum Health is a major, regional, not-for-profit healthcare system with headquarters in Grand Rapids, MI. It offers a full continuum of healthcare services through 12 hospitals, more than 181 service sites, skilled nursing care facilities, and a nationally recognized health plan. Spectrum Health currently has more than 23,000 employees, 1,300 physicians and advanced practice providers, and 2,300 active volunteers.

Within two of its Grand Rapids-based hospitals, Spectrum Health has five orthopaedic units with a total of 129 orthopaedic beds. Services are offered in general orthopaedics, joint replacement, spine, foot and ankle, hand, upper extremities, sports medicine, orthopaedic oncology, pediatric orthopaedics, and orthopaedic trauma care. Orthopedic Network News has listed the Center for Joint Replacement (CJR) at Spectrum Health in Grand Rapids as the nation's sixth largest provider of hip and knee replacements, with approximately 2,400 replacement surgeries being performed annually by 23 employed and independent joint replacement surgeons.

Spectrum Health's CJR is committed to continuously improving the quality of its services and generating

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excellent patient outcomes. In 2007, the CJR was one of the first 15 programs in the United States to earn disease-specific certification in hip and knee replacement through the Joint Commission; it has been continuously certified since then. The Joint Commission's disease-specific care certification is nationally recognized among joint replacement centers as a process for achieving excellence. Certification requires a facility to demonstrate compliance with consensus-based national standards, effective integration of evidence-based clinical practice guidelines to manage and optimize care, and an organized approach to performance measurement and performance improvement that includes data collection and analysis (Joint Commission, 2014).

Under Joint Commission requirements, a minimum of four performance improvement measures are selected by each organization and certification must be renewed every 2 years. For the 2013–2015 certification cycle, Spectrum Health's CJR chose the following four performance improvement measures: decreased LOS, fewer blood transfusions, fewer postoperative complications, and fewer postoperative readmissions. Selection of these measures was based on their influence on quality, outcomes, patient satisfaction, and financial impact on the organization. A collaborative multidisciplinary team that included quality improvement specialists, nurses, rehabilitation specialists, care managers, and physician leaders led efforts to monitor and improve quality outcomes in all of these measures.

LOS Reduction Initiative

In conjunction with acquiring and maintaining Joint Commission disease-specific certification for its hip and knee replacement programs, Spectrum Health established an institutional goal to lower the LOS for primary THA and TKA patients. Several studies have shown that multimodal approaches can be effective at reducing LOS (Ayalon et al., 2011; Jones et al., 2011; Kehlet, 2013; Khan, Ng, Gonzalez, Hale, & Turner-Stokes, 2008). Thus, a multimodal approach was chosen to implement best practices across multiple physician groups that would generate meaningful improvement in average LOS for primary joint replacement patients.

The CJR's performance improvement team implemented several strategies to decrease LOS. This team included the clinical nurse specialist for joint replacement, the nurse managers of the joint replacement units, two orthopaedic surgeon clinical advisors for joint replacement, a quality improvement specialist, the rehabilitation supervisor, the care management supervisor, staff nurses from the joint replacement units, and other intermittent participants as needed for consultation. With the Joint Commission's 2-year recertification period running from June 2013 to June 2015, the LOS project interventions began in August 2013; the last intervention was implemented in April 2014.

The Goal

Joint replacement LOS at the CJR had remained consistent at approximately 3.34 days for hip replacements and 3.94 days for knee replacements as of Q1 2013. The team realized that it would require an organizational change to influence this measure. The decision was made to use two-night hospital LOS as the initiative's goal. This decision was based on the Advisory Board's reporting tool, Crimson, which contains physician performance data; when compared with similar institutions, the LOS at Spectrum Health was longer than average. To accomplish this, four specific interventions were undertaken concurrently: (1) communication with providers, (2) modification of patient communications, (3) standardized risk assessment and prediction, and (4) physical therapy on POD (postoperative day) 0 (i.e., the day of surgery).

Provider Communication

In January 2014, a communication tool in the form of a letter (see Appendix A) was developed by the CJR's two orthopaedic surgeon clinical advisors and its nursing leadership. This letter explained the evidence supporting the LOS initiative and provided information about the implementation plan. It was sent to all of the CJR's participating joint replacement surgeons and was presented in person to their office staff members in March and April 2014. The letter was also presented to all mid-level providers, orthopaedic residents, internal medicine hospitalists, preoperative assessment clinic staff, preprocedure planning staff, preoperative surgical staff, post-acute care consultants, care managers, rehabilitation specialists, and inpatient nursing staff during this time. The CJR's orthopaedic surgeon clinical advisors followed up with providers who had questions or concerns and encouraged their participation in the initiative. In addition, there was individual follow-up by one of the orthopaedic surgeon clinical advisors with the few physicians who did not promptly follow the new standard.

Patient Communication

In addition to communicating with providers, the existing preoperative joint replacement patient education class content was modified in December 2013 to reflect the new LOS recommendations. As each patient was admitted, nursing, rehabilitation, and care management staff utilized white boards in the patient rooms to visually communicate the discharge goal of POD 2. Also, scripting was developed to help guide discharge conversations each day of the hospital stay (see Appendix B). The overarching strategy was to ensure that anyone who spoke to the patient or family anytime during the surgical process would present a unified message and expectations for hospital LOS.

Risk Assessment and Prediction

Another strategy was the implementation of a standardized tool to help guide discussions around discharge planning before surgery. With permission from its original author, the Risk Assessment and Prediction Tool (RAPT) (see Appendix C) was given to all joint replacement patients attending a preoperative patient education class beginning in September 2013. The tool was designed to predict the likelihood that a patient would be able to return home after joint replacement surgery. It asked six questions, including the patient's age, gender, distance he or she was able to walk before surgery, use of a walking aid, use of

community resources, and if he or she would have help at home after discharge. Each patient response was scored according to the following three categories:

- Scores of more than 9 = highest likelihood of discharge to home
- Scores ranging between 6 and 9 = likely to discharge to home
- Scores less than 6 = likely to need subacute rehabilitation after discharge

The RAPT was sent to patients to be completed at home before attending class, and it was scored as they arrived. Individual guided conversations were held to discuss patient scores during the discharge education portion of the class. In addition, patients with scores less than 6 were encouraged to discuss specific discharge planning needs and preferences after class to ensure that appropriate arrangements were made prior to surgery. A list of local subacute rehabilitation and home care agencies was provided to all patients, along with a frequently asked questions sheet to help patients explore options for facilities. Decisions made at the class were communicated to hospital care management staff for reference when the patient arrived at the inpatient unit postoperatively.

POD Zero Physical Therapy

The final and most influential intervention in decreasing LOS was the initiation of physical therapy on POD 0 for elective joint replacement patients. Rapid mobilization and patient education have been shown to decrease LOS (Ayalon et al., 2011; Jones et al., 2011; Kehlet, 2013; Khan et al., 2008; Tayrose et al., 2013). Raphael, Jaeger, and van Vlymen (2011) demonstrated that patients who began mobilization on the day of surgery reported significantly less pain and had a shorter LOS than those who began later.

Prior to the LOS reduction initiative, Spectrum Health had routinely staffed its Rehabilitation Department from 7 a.m. until 5 p.m. This schedule did not allow joint replacement patients to receive POD 0 evaluation and rehabilitation sessions because most joint replacement patients received spinal anesthesia. The effects of the spinal anesthesia typically did not resolve until late afternoon, after the rehabilitation staff had left for the day. In December 2013, the decision was made to pilot 12-hour shifts for the physical therapists working on the total joint orthopaedic units from Monday through Friday. Two therapists were staffed each day from 7:30 a.m. until 8:00 p.m. In addition, one rehabilitation technician was scheduled for a 12-hour shift each day, Monday through Friday. The goal was for every patient to receive at least one session of therapy on the day of surgery.

The pilot continued successfully for approximately 4 weeks. Following the 4-week pilot, the key stakeholders in the Rehabilitation Department discussed the outcomes and decided to continue with POD 0 evaluations. The pilot resulted in an increase in patient satisfaction, an increase in employee satisfaction, and a decrease in LOS. Therefore, POD 0 physical therapy was implemented as a permanent change in practice in early 2014.

Patient selection for POD 0 therapy was based on the time the patient arrived on the inpatient unit and the availability of the physical therapy team. The physical therapists attempted to evaluate every patient who arrived on the unit prior to 5 p.m. If the patient was able to complete an ankle pump on the nonoperative side and was able to feel pressure on the nonoperative leg and buttocks, physical therapy was initiated. If the patient was numb, the physical therapist made a subsequent attempt in the evening, as time allowed.

One barrier to accomplishing POD 0 rehabilitation soon became apparent: the use of femoral nerve blocks for pain control in knee replacement patients. These blocks often caused quadriceps muscle weakness, which resulted in the operative leg buckling with weight-bearing activities. This increased risk for patient falls and did not allow for ambulation until the block resolved, which could take up to 24 or more hours after surgery. In partnership with the Anesthesia Department, adductor canal blocks were trialed in January 2014. These blocks introduced the pain and numbing medication lower in the nerve, below the motor branch. This block proved to be successful, continuing to provide pain control without affecting muscle strength in the operative leg, and femoral nerve blocks were completely discontinued by June 2014.

To prevent pain from being a barrier to POD 0 ambulation, a three-phased multimodal pain order set (see Appendix D) was utilized to ensure that patients received adequate pain control throughout their hospital stay. Patients were categorized as opiate naive, opiate exposed, or opiate tolerant on the basis of their recent narcotic use. The pain medication dosing was adjusted accordingly. The plan included a combination of nonsteroidal anti-inflammatory medications, oral narcotics, short- and long-acting narcotics, intravenous narcotics, and other adjuvant medications. If patients had satisfactory pain control, they would participate in rehabilitation sessions.

Another barrier to POD 0 ambulation was indwelling urinary catheters. To address this, it was decided that catheters were to be removed on POD 0 as soon as the spinal anesthesia resolved. This encouraged patients to get out of bed to toilet, which increased their day of surgery activity. The nursing staff members were educated about this early catheter removal process in March 2014.

Results

The first month in which a noticeable decrease in average LOS was observed was February 2014 for THA patients (see Figure 1); a decrease was noticed in January 2014 for TKA patients (see Figure 2). Both of these decreases occurred after the pilot implementation of POD 0 physical rehabilitation in December. Another downward shift in average LOS occurred in April 2014 for both THA and TKA patients after all providers and staff were fully educated about the new LOS expectations.

Ten continuous months of LOS data below the previous 2013 average resulted in a process shift in average LOS for both THA and TKA patients (see Figures 1 and 2). Overall, data showed an average decrease in LOS for these patients of 0.5 days.

Complications and readmission rates were tracked as separate performance improvement measures. It was important to the initiative's team that these rates not be adversely affected by the decreasing LOS. Fortunately, there

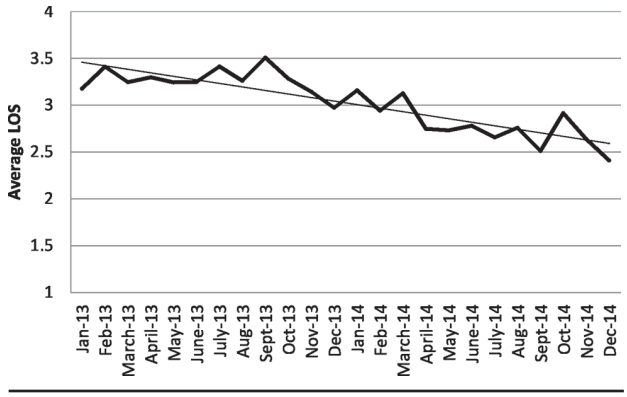

Figure 1. Average length of stay for total hip arthroplasty (THA) patients at Blodgett Hospital, Spectrum Health, from January 2013 to December 2014. LOS = length of stay.

was no negative influence on these measures with the implementation of the interventions and decreasing LOS.

In relation to cost, the initiative team estimated that the average decrease of 0.5 days per patient generated a cost savings of approximately $400 per patient after all interventions were implemented. In 2014, the CJR performed 2,167 primary THA and TKA procedures at a lower LOS, which generated approximately $866,800 in savings.

In Q4 2014, 489 TKA and THA surgeries were completed at the Blodgett Hospital location of the CJR. Of those, 360 (73.6%) were evaluated for rehabilitation on POD 0 by the Rehabilitation Department. The patients who did not participate in POD 0 physical therapy did not meet the criteria for a rehabilitation session because they were not in their postoperative room by 5 p.m., were still numb at the time of reevaluation, or were not clinically stable to mobilize.

In a 1-month follow-up study conducted in June 2015, the team found that physical therapists were able to evaluate the patients an average of 2 hours sooner than before, and patients stated that they felt less pain on the subsequent day after receiving POD 0 therapy. Also, some patients were able to receive a second therapy session on the day of surgery. The CJR is currently evaluating 81% of the patients on POD 0, of which 38% are receiving twice-a-day sessions on POD 0.

Spectrum Health utilizes Hospital Consumer Assessment of Healthcare Providers and Systems surveys to measure patient satisfaction. The CJR has consistently exceeded expectations for the question, "would you recommend this hospital to your friends and family?" Decreasing the LOS did not result in a decrease in patients' likelihood to recommend the CJR.

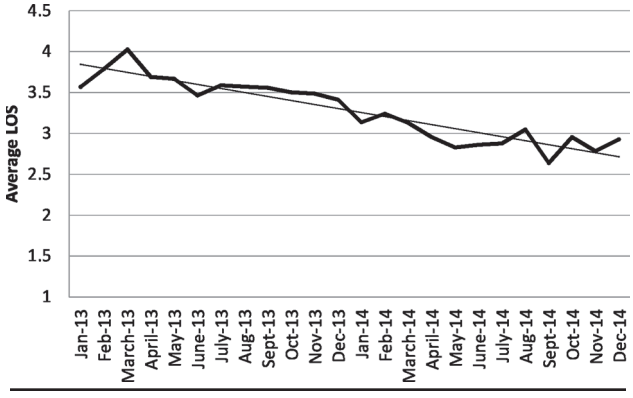

Figure 2. Average length of stay for total knee arthroplasty (TKA) patients at Blodgett Hospital, Spectrum Health, from January 2013 to December 2014. LOS = length of stay.

Discussion

A baseline LOS of greater than 3 days had been the standard for primary TKA and THA patients for at least a decade at Spectrum Health. All of the interventions in this initiative, in combination, were needed to successfully reduce the baseline LOS for those patients.

The Interventions

First, having the strong support of the orthopaedic surgeon clinical advisors was crucial to the success of this LOS initiative. Their ability to communicate the recommendations to their peers and hold them accountable, if necessary, was essential. In addition, supplying the other providers, nurses, care managers, and office staff with timely communication about the practice changes allowed them to also hold surgeons and other providers accountable to the new LOS goal.

Second, it was critical for the patients to receive consistent, caring communication about LOS expectations. From the surgeon's office, through the preoperative joint replacement class, and throughout the hospital stay, all providers communicated with the patients to ensure that they knew about the 2-day LOS expectation. Scripting allowed the nurses and other staff to consistently provide key points each day as the patients progressed. Use of a white board in each patient's room to display the expected discharge date created a visual cue for patients and their families to reference throughout the hospital stay.

Third, with more than 90% of primary THA and TKA patients attending preoperative patient education classes, the RAPT was valuable in helping identify early on those patients who might require a rehabilitation stay at discharge. This classification allowed patients and families to better plan for these stays before surgery so discharge was not delayed. In addition, the RAPT helped other patients recognize up front that they were very likely to be discharged directly to home after their 2-night hospital stay. This allowed them to plan ahead for assistance as they transitioned to home.

Finally, it was important to have surgeon, physician, nursing, and rehabilitation staff support for the POD 0 rehabilitation schedule changes because this was a significant change from previous practice. In addition, being able to identify barriers to success, such as the femoral nerve blocks, and having the support needed to modify pain control practices were critical to ensuring the continued progress of the LOS work. Because of the success of POD 0 rehabilitation, appropriate patients are now being seen twice on the day of surgery and have expressed increased satisfaction with their care.

Expansion of Initiative: Spine

On the basis of the apparent early success of the joint replacement LOS initiative—and while the full

implementation of all of its interventions was still occurring—the decision was made in February 2014 to expand that work into the elective spine fusion population. This population also struggled with an LOS longer than national averages at Spectrum Health, and there was no consistency in LOS communications. Therefore, the potential benefits of addressing the same problem in this population were clear. A letter similar to the primary joint replacement provider letter was developed and distributed in March and April 2014 to all personnel involved. In addition, the preoperative spine class content was modified at that time to give a consistent LOS message to patients.

There was also discussion about the efficacy and feasibility of POD 0 rehabilitation for these patients. During this discussion, it became clear that the majority of the rehabilitation content for this population was education and that these patients tended to have decreased memory capabilities on the day of surgery due to general anesthesia. Therefore, the decision was made to have the nursing staff focus on POD 0 activity and ambulation and have the rehabilitation staff begin their patient training and education on the morning of POD 1. Education was given to all spine nursing staff on the expectations for activity on the day of and day after surgery for fusion patients.

As a result, average LOS for this patient population has also decreased by approximately one-half day per patient. Readmissions, complications, and patient satisfaction continue to be monitored for the spine patients. To date, those outcomes have not been negatively affected by the decreasing LOS. This experience with a different population—in this case, spine fusion patients—lends additional support to the potential for long-term success for reduced LOS for primary THA and TKA patients.

Conclusion

Decreasing the hospital LOS for primary THA and TKA patients has the potential to generate many benefits, including reduced costs, lower complication and readmission rates, greater employee efficiency, higher patient throughput, and greater patient satisfaction. However, this requires the cooperation of all providers involved and a willingness to change existing policies and approaches across hospital departments and external clinical practices. This LOS initiative has demonstrated that large, high-volume joint replacement centers can transform organizational culture and generate rapid, measureable change when all practitioners and administrators involved cooperate to implement a multimodal approach.

Acknowledgments

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Appendix A: Provider Letter

Length of stay (LOS) for joint replacement patients has undergone national changes. As part of our performance improvement measures for hip and knee disease specific certification through the Joint Commission we have set a goal to reduce our length of stay at Spectrum Health. **Our average LOS is longer than other health care providers in Michigan (as reported in the MARCQI registry). Patients perceive a shorter LOS with better outcomes and have come to expect a faster recovery as expectations continue to increase.** In partnership between our joint replacement clinical advisors and our performance improvement team, we have identified two goals to help achieve a shorter LOS:

1. Establish patient expectations and provide a consistent message regarding LOS at every interaction with our patients and families with the goal of discharge post-op day #2.
2. Dedicate resources to improve consistency with early mobilization on day of surgery by initiating physical therapy on post-op day #0.

We are asking for your help in communicating the anticipated length of stay in the hospital as well as the expectation that patients will be mobilized on the day of surgery. Knowing how long to expect to stay in the hospital after a hip or knee replacement allows for the patient and the family to plan for the patient's care after their transition from the hospital. Any inconsistencies in this message can result in longer LOS due to varying expectations of patients and families.

For primary total hip and total knee replacement patients, our goal is a 2 night length of stay after their surgery. We want to encourage patients to go home post-op day #2. We are committed to maintaining patient satisfaction, safety and quality outcomes and patients must still meet rehab discharge criteria, feel comfortable going home and be cleared by their physician before they leave. **By initiating therapy on post-op day #0 and utilization of improved multimodal pain regimens we have had success in having patients meet therapy goals and achieve independence earlier in their post-operative course.**

Our goal is to provide the highest quality patient centered care to our joint replacement patients focusing on maximizing outcomes and patient satisfaction while still managing cost and length of stay. **Our ability to provide value is critical to our ongoing success in the future, and we want to be the leader, setting the bar for other institutions rather than being content to achieve average performance.** As we strive to shorten our LOS, we continue to work to improve our outcomes with regards to major complications, readmissions, patient specific outcomes (WOMAC, SF-12 through MARCQI) and patient satisfaction (HCAHPS) to ensure we are not improving LOS at the cost of diminished patient satisfaction or outcomes.

Thank you for your partnership. Please let us know if you have questions or concerns.

Appendix B: Staff Conversation Script for LOS/Discharge

POD 0 (day of surgery):

- Put anticipated discharge date on the white board (this should be POD 2). Discuss with the patient that this is the date we are anticipating they will be ready to leave the hospital (whether they are going home or to a rehabilitation facility). We will be working for the next 2 days to help them accomplish this goal.
- Remind them they will likely be discharged after their morning therapy session so they should be planning already for a ride from the hospital (should plan morning of POD 2).

POD 1:

- Remind the patient of the anticipated discharge date. Ask them if they have questions or concerns about the discharge plan (then address questions and concerns with the patient-get help if necessary).
- Patient should have a discussion with care management (CM) about a discharge plan/needs, especially equipment needs. Follow up with CM if the patient is not seen.
- You can initiate the conversation about equipment the patient may need/want and let CM know.
- Ask them if they have arranged a ride from the hospital; if not, please address problems/barriers.

POD 2:

- Remind the patient that today is discharge day!
- Encourage them about how far they have come since surgery.
- Remind them that they only need to stay in the hospital until they are "well enough to go home" and that most of their recovery is actually done at home.
- Remind them that they will still have pain and limited activity for another 1–2 weeks; this does NOT mean they need to stay in the hospital.
- Encourage them that their home is actually a nicer place to recover and tell them that patients feel better when they go home.
- If needed, remind them that the longer they stay in the hospital, the greater the chance they could develop complications or infections, so they are actually safer at home.
- Ask them if they have concerns or barriers to discharging today (address problems).
- Ask when their ride is coming and remind them they are typically ready to go after the AM therapy session.

Appendix C: RAPT

We are always looking for ways to improve your transition from the hospital back to your home after your joint replacement surgery. Answering the questions below will better help us to assist you with this. Please fill this out and bring back to your joint replacement class. If you have any questions, we can address them at that time, or feel free to contact me.
Thanks so much for your partnership!

Name: _____ Date of Birth: _____

Date of surgery: _____ Surgeon: _____

1. What is your age group?
   _____ 65 years or less (2)
   _____ 66-75 years (1)
   _____ > 75 years (0)

2. Gender
   _____ Male (2)
   _____ Female (1)

3. How far, on average, can you walk?
   (a block is 200m-halfway around a track)
   _____ Two blocks or more (+ or – rests) (2)
   _____ 1-2 blocks (the shopping center) (1)
   _____ Housebound (most of the time) (0)

4. Which walking aid do you use?
   (More often than not)
   _____ None (2)
   _____ Cane (1)
   _____ Crutches or walker (0)

5. Do you use community supports?
   (home help, meals-on-wheels etc)
   _____ None or 1 per week (1)
   _____ Two or more per week (0)

6. Will you live with someone who can care for you after your operation?
   _____ Yes (3)
   _____ No (0)

Note. Used with the permission of Dr. Leonie Oldmeadow, Alfred Hospital, Victoria, AU.

Appendix D: Pain Order Set

Analgesia: Opiate Naive / Frail Elderly

Medications

Scheduled Pain Management

☐ oxyCODONE SR

10 mg, PO, q12hr, Routine

Comments: Start day of surgery.

☐ celecoxib PO

400 mg, PO, ONCE, Routine

Comments: Give day of surgery. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

☐ celecoxib PO

200 mg, PO, bid, Routine, Start: T+1;0900, 3 day(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

☐ acetaminophen PO

1,000 mg, PO, q8hr, Routine

Comments: DO NOT order acetaminophen/opioid combo products when this is ordered. Maximum daily dose of acetaminophen from all sources not to exceed 3,000 mg.

For patients 65 years of age or older (NOTE)*

☐ ketorolac IV

15 mg, IV Push, q6hr, Routine, Start: T+1;0900, 6 dose(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

For patients less than 65 years (NOTE)*

☐ ketorolac IV

30 mg, IV Push, q6hr, Routine, Start: T+1;0900, 6 dose(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

** FOR ELDERLY OR RENAL / HEPATIC INSUFFICIENCY **(NOTE)*

☐ celecoxib PO

100 mg, PO, daily, Routine, Start: T+1;0900, 3 day(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

☐ acetaminophen PO

650 mg, PO, q8hr, Routine

Comments: Maximum daily dose of acetaminophen from all sources not to exceed 3,000 mg.

Breakthrough Pain Management

** Give These Orders In Addition to PCA **(NOTE)*

Select ONE for Severe pain: (NOTE)*

☐ HYDROmorphone IV

0.5 mg, IV Push, q3hr, routine, PRN severe pain

Comments: If ineffective, may repeat in 1 hour. When acetaminophen-HYDROcodone maximum single dose ineffective at 1 or 2 hours postadministration, administer HYDROmorphone IV. For severe pain unrelieved by a repeat dose, call physician for dosage changes. To be used for severe pain: pain score 7-10 or per patient description.

☐ morphine 2 mg/mL IV

2 mg, IV Push, q3hr, routine, PRN severe pain

Comments: If ineffective, may repeat in 1 hour. When acetaminophen-HYDROcodone maximum single dose ineffective at 1 or 2 hours postadministration, administer morphine IV. For severe pain unrelieved by a repeat dose, call physician for dosage changes. To be used for severe pain: pain score 7–10 or per patient description.

Moderate Pain - FIRST Administer: (NOTE)*

☐ acetaminophen-HYDROcodone (Norco) 325 mg–5 mg PO tablet

2 tab(s), PO, q4hr, routine, PRN moderate pain

Comments: Dose range: May give 1–2 tablets. Start with 1 tablet. If ineffective, may repeat dose in 1 hour unless oversedation per sedation level assessment. Acetaminophen not to exceed 3,000 mg from all sources in 24 hours. To be used for moderate pain: pain score 4–6 or per patient description.

Moderate Pain—Administer SECOND (Choose ONLY ONE): (NOTE)*

☐ oxyCODONE IR

10 mg, PO, q3hr, routine, PRN moderate pain (DEF)*

Comments: DOSE RANGE: May Give: 5–10 mg. Start with 5 mg. If inadequate pain relief, repeat dose for maximum 10 mg in 3 hours unless oversedation noted. Start oxycodone IR only after acetaminophen-HYDROcodone maximum single dose ineffective at 2 hours postadministration. To be used for moderate pain: pain score 4–6 or per patient description.

10 mg, PO, q3hr, routine, PRN moderate pain

Comments: Start oxycodone IR only after acetaminophen–HYDROcodone maximum single dose ineffective at 2 hours postadministration. To be used for moderate pain: pain score 4–6 or per patient description.

☐ traMADol PO (immediate release)

50 mg, PO, q4hr, routine, PRN moderate pain

Comments: Not to exceed 300 mg per day. To be used for moderate pain: pain score 4–6 or per patient description.

Mild pain: (NOTE)*

☐ acetaminophen PO

500 mg, PO, q3hr, routine, PRN mild pain

Comments: To be used for mild pain: pain score 1–3 or per patient description. If ineffective, may repeat in 1 hour. Maximum daily dose of acetaminophen from all sources not to exceed 3,000 mg. Do not give if receiving scheduled acetaminophen.

Reversal Agents

☑ naloxone IV

0.1 mg, IV Push, q 2min, routine, PRN see comments

Comments: If respiratory rate less than 8 or patient unarousable until respiratory rate 10 or until 0.4 mg administered. Notify the physician if given.

Coanalgesics/Spasms

** CHOOSE ONLY ONE **(NOTE)*

if patient is 65 years of age or older (NOTE)*

☐ diazepam PO

2 mg, PO, q6hr, routine, PRN muscle spasm

Comments: For patients 65 years or older

☐ cyclobenzaprine PO

5 mg, PO, tid, routine, PRN muscle spasm

Comments: For patients 65 years or older

if patient is less than 65 years of age (NOTE)*

☐ diazepam PO

5 mg, PO, q6hr, routine, PRN muscle spasm

Comments: For patients less than 65 years

☐ cyclobenzaprine PO

10 mg, PO, tid, Routine, PRN muscle spasm

Comments: For patients less than 65 years

Antiemetics

** FIRST administer: (NOTE)*

☐ ondansetron IV

4 mg, IV Push, q6hr, routine, PRN nausea/vomiting

Comments: Give if unable to take PO. If ineffective, give second antiemetic in the sequence.

☐ ondansetron PO Tab

4 mg, PO, q6hr, routine, PRN nausea/vomiting

Comments: If ineffective, give second antiemetic in the sequence.

** Administer Second (Choose ONLY ONE): (NOTE)*

☐ prochlorperazine IV

2.5 mg, IV Push, q6hr, routine, PRN nausea/vomiting

Comments: For nausea and vomiting not responsive to ondansetron if unable to take PO meds. May repeat dose in 1 hour if ineffective. Maximum of 5 mg in 6 hours.

☐ prochlorperazine PO

2.5 mg, PO, q6hr, routine, PRN nausea/vomiting

Comments: For nausea and vomiting not responsive to ondansetron. May repeat dose in 1 hour if ineffective. Maximum of 5 mg in 6 hours.

☐ promethazine IV

12.5 mg, IVPush, q6hr, Routine, PRN nausea/vomiting

Comments: For nausea and vomiting unresponsive to ondansetron if unable to take PO meds.

For patients 65 years of age or older (NOTE)*

☐ promethazine IV

6.25 mg, IV Push, q6hr, routine, PRN nausea/vomiting

Comments: For nausea and vomiting unresponsive to ondansetron if unable to take PO meds.

Antipruritics

if patient is 65 years of age or older (NOTE)*

☐ loratadine PO

10 mg, PO, q24hr, routine, PRN itching

if patient is less than 65 years of age (NOTE)*

☐ diphenhydrAMINE PO

25 mg, PO, q6hr, routine, PRN itching

☐ diphenhydrAMINE IV

25 mg, IVPush, q6hr, routine, PRN itching

Comments: Give if unable to take oral diphenhydramine.

Bowel Management

☐ senna-docusate 8.6 mg–50 mg PO Tab

1 tab(s), PO, bid, Routine

Comments: Hold for loose stools.

☐ magnesium hydroxide Oral Susp 30 ml UD

30 ml, PO, qhs, Routine, Start: T+1;2100

Comments: Hold for loose stools.

☐ polyethylene glycol oral powder

17 Gm, PO, qam, Routine, Start: T+1;0900

Comments: Hold for loose stools. Dissolve one 17-g packet in 240 ml of juice, water, soda, coffee, or tea.

☐ bisacodyl supp PR

10 mg, PR, daily, routine, PRN constipation, Start: T+2;2100

Comments: Give if no BM by evening of Post Op Day 2. Give if patient is unable to take PO meds.

☐ phosphate (Fleet) Enema

133 mL, PR, daily, routine, PRN constipation, Start: T+2;2100

Comments: Give if unresponsive to bisacodyl and no BM by evening of Post Op Day 2.

Analgesia: Previous Opiates No Tolerance 1

Medications

Scheduled Pain Management

☐ oxyCODONE SR

10 mg, PO, q12hr, Routine

Comments: Start day of surgery.

☐ celecoxib PO

400 mg, PO, ONCE, Routine

Comments: Give day of surgery. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

☐ celecoxib PO

200 mg, PO, bid, Routine, Start: T+1;0900, 3 day(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

☐ acetaminophen PO

1,000 mg, PO, q8hr, Routine

*Comments: **Do not** order acetaminophen/opioid combo products when this is ordered. Maximum daily dose of acetaminophen from all sources not to exceed 3,000 mg.*

For patients 65 years of age or older (NOTE)*

☐ ketorolac IV

15 mg, IVPush, q6hr, Routine, Start: T+1;0900, 6 dose(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

For patients less than 65 years (NOTE)*

☐ ketorolac IV

30 mg, IV Push, q6hr, routine, Start: T+1;0900, 6 dose(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

** FOR ELDERLY OR RENAL/HEPATIC INSUFFICIENCY **(NOTE)*

☐ celecoxib PO

100 mg, PO, daily, Routine, Start: T+1;0900, 3 day(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

☐ acetaminophen PO

650 mg, PO, q8hr, routine

Comments: Maximum daily dose of acetaminophen from all sources not to exceed 3,000 mg.

Breakthrough Pain Management

** Give These Orders in Addition to PCA **(NOTE)*

Select ONE for Severe pain:(NOTE)*

☐ HYDROmorphone IV

1 mg, IV Push, q3hr, routine, PRN severe pain

Comments: If ineffective, may repeat in 1 hour. When acetaminophen-HYDROcodone maximum single dose ineffective at 1 or 2 hours postadministration, administer HYDROmorphone IV. For severe pain unrelieved by a repeat dose, call physician for dosage changes. To be used for severe pain: pain score 7–10 or per patient description.

☐ morphine 2 mg/mL IV

4 mg, IV Push, q3hr, routine, PRN severe pain

Comments: If ineffective, may repeat in 1 hour. When acetaminophen-HYDROcodone maximum single dose ineffective at 1 or 2 hours postadministration, administer morphine IV. For severe pain unrelieved by a repeat dose, call physician for dosage changes. To be used for severe pain: pain score 7–10 or per patient description.

Moderate Pain - FIRST Administer: (NOTE)*

☐ acetaminophen-HYDROcodone (Norco) 325 mg–10 mg PO tablet

1 tab(s), PO, q3hr, routine, PRN moderate pain

Comments: If ineffective, may administer oxycodone IR in 1 hour. Acetaminophen not to exceed 3,000 mg from all sources in 24 hours. If patient exceeds maximum cumulative dose of acetaminophen, then subsequent doses will be given as oxycodone IR. To be used for moderate pain: pain score 4–6 or per patient description.

Moderate Pain - Administer SECOND (Choose ONLY ONE):(NOTE)*

☐ oxyCODONE IR

10 mg, PO, q3hr, Routine, PRN moderate pain (DEF)*

Comments: DOSE RANGE: May Give: 5–10 mg. Start with 5 mg. If inadequate pain relief, repeat dose for maximum 10 mg in 3 hours unless oversedation noted. Start oxycodone IR only after acetaminophen-HYDROcodone maximum single dose ineffective at 2 hours postadministration. To be used for moderate pain: pain score 4–6 or per patient description.

20 mg, PO, q3hr, routine, PRN moderate pain

Comments: Start oxycodone IR only after acetaminophen-HYDROcodone maximum single dose ineffective at 2 hours postadministration. To be used for moderate pain: pain score 4–6 or per patient description.

☐ traMADol PO (immediate release)

50 mg, PO, q4hr, routine, PRN moderate pain

Comments: Not to exceed 300 mg/day. To be used for moderate pain: pain score 4–6 or per patient description.

Mild Pain: (NOTE)*

☐ acetaminophen-HYDROcodone (Norco) 325 mg–5 mg PO tablet

2 tab(s), PO, q3hr, routine, PRN mild pain

Comments: DOSE RANGE: May give 1–2 tablets. Start with 1 tablet. If ineffective, may repeat dose in 1 hour unless oversedation per sedation level assessment. Acetaminophen not to exceed 3,000 mg from all sources in 24 hours. To be used for mild pain: pain score 1–3 or per patient description.

Reversal Agents

☑ naloxone IV

0.1 mg, IV Push, q2min, Routine, PRN see comments

Comments: If respiratory rate less than 8 or patient unarousable until respiratory rate 10 or until 0.4 mg administered. Notify physician if given.

Coanalgesics/Spasms

** CHOOSE ONLY ONE **(NOTE)*

if patient is 65 years of age or older (NOTE)*

☐ diazepam PO

2 mg, PO, q6hr, routine, PRN muscle spasm

Comments: For patients 65 years or older

☐ cyclobenzaprine PO

5 mg, PO, tid, routine, PRN muscle spasm

Comments: For patients 65 years or older

if patient is less than 65 years of age (NOTE)*

☐ diazepam PO

5 mg, PO, q6hr, routine, PRN muscle spasm

Comments: For patients less than 65 years

☐ cyclobenzaprine PO

10 mg, PO, tid, Routine, PRN muscle spasm

Comments: For patients less than 65 years

Antiemetics

** FIRST Administer: (NOTE)*

☐ ondansetron IV

4 mg, IVPush, q6hr, routine, PRN nausea/vomiting

Comments: Give if unable to take PO. If ineffective, give second antiemetic in the sequence.

☐ ondansetron PO Tab

4 mg, PO, q6hr, routine, PRN nausea/vomiting

Comments: If ineffective, give second antiemetic in the sequence.

** Administer SECOND (Choose ONLY ONE): (NOTE)*

☐ prochlorperazine IV

2.5 mg, IVPush, q6hr, routine, PRN nausea/vomiting

Comments: For nausea and vomiting not responsive to ondansetron if unable to take PO meds. May repeat dose in 1 hour if ineffective. Maximum of 5 mg in 6 hours.

☐ prochlorperazine PO

2.5 mg, PO, q6hr, Routine, PRN nausea/vomiting

Comments: For nausea and vomiting not responsive to ondansetron. May repeat dose in 1 hour if ineffective. Maximum of 5 mg in 6 hours.

☐ promethazine IV

12.5 mg, IVPush, q6hr, routine, PRN nausea/vomiting

Comments: For nausea and vomiting unresponsive to ondansetron if unable to take PO meds.

For patients 65 years of age or older (NOTE)*

☐ promethazine IV

6.25 mg, IV Push, q6hr, routine, PRN nausea/vomiting

Comments: For nausea and vomiting unresponsive to ondansetron if unable to take PO meds.

Antipruritics

if patient is 65 years of age or older(NOTE)*

☐ loratadine PO

10 mg, PO, q24hr, routine, PRN itching

if patient is less than 65 years of age (NOTE)*

☐ diphenhydrAMINE PO

25 mg, PO, q6hr, routine, PRN itching

☐ diphenhydrAMINE IV

25 mg, IVPush, q6hr, routine, PRN itching

Comments: Give if unable to take oral diphenhydramine.

Bowel Management

☐ senna-docusate 8.6 mg–50 mg PO Tab

1 tab(s), PO, bid, routine

Comments: Hold for loose stools.

☐ magnesium hydroxide Oral Susp 30 mL UD

30 mL, PO, qhs, routine, Start: T+1;2100

Comments: Hold for loose stools.

☐ polyethylene glycol oral powder

17 Gm, PO, qam, Routine, Start: T+1;0900

Comments: Hold for loose stools. Dissolve one 17-g packet in 240 ml of juice, water, soda, coffee, or tea.

☐ bisacodyl supp PR

10 mg, PR, daily, Routine, PRN constipation, Start: T+2;2100

Comments: Give if no BM by evening of Post Op Day 2. Give if patient is unable to take PO meds.

☐ phosphate (Fleet) Enema

133 mL, PR, daily, routine, PRN constipation, Start: T+2;2100

Comments: Give if unresponsive to bisacodyl and no BM by evening of Post Op Day 2.

Analgesia: Opiate Tolerant

Medications

Scheduled Pain Management

☐ oxyCODONE SR

20 mg, PO, q12hr, routine

Comments: Start day of surgery.

☐ celecoxib PO

400 mg, PO, ONCE, routine

Comments: Give day of surgery. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

☐ celecoxib PO

200 mg, PO, bid, routine, Start: T+1;0900, 3 day(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

☐ acetaminophen PO

1,000 mg, PO, q8hr, routine

*Comments: **Do not** order acetaminophen/opioid combo products when this is ordered. Maximum daily dose of acetaminophen from all sources not to exceed 3,000 mg.*

For patients 65 years of age or older (NOTE)*

☐ ketorolac IV

15 mg, IVPush, q6hr, Routine, Start: T+1;0900, 6 dose(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

For patients less than 65 years (NOTE)*

☐ ketorolac IV

30 mg, IVPush, q6hr, Routine, Start: T+1;0900, 6 dose(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

** FOR ELDERLY OR RENAL/HEPATIC INSUFFICIENCY **(NOTE)*

☐ celecoxib PO

100 mg, PO, daily, routine, Start: T+1;0900, 3 day(s)

Comments: Begin Post-Op Day 1. If both ketorolac and celecoxib are ordered, celecoxib will be started after ketorolac 6 doses is complete.

☐ acetaminophen PO

650 mg, PO, q8hr, routine

Comments: Maximum daily dose of acetaminophen from all sources not to exceed 3,000 mg.

Breakthrough Pain Management

** Give These Orders In Addition to PCA **(NOTE)*

Select ONE for Severe pain: (NOTE)*

☐ HYDROmorphone IV

2 mg, IVPush, q3hr, routine, PRN severe pain

Comments: If ineffective, may repeat in 1 hour. When acetaminophen-HYDROcodone maximum single dose ineffective at 1 or 2 hours postadministration, administer HYDROmorphone IV. For severe pain unrelieved by a repeat dose, call physician for dosage changes. To be used for severe pain: pain score 7–10 or per patient description.

☐ morphine 2 mg/mL IV

6 mg, IVPush, q3hr, routine, PRN severe pain

Comments: If ineffective, may repeat in 1 hour. When acetaminophen-HYDROcodone maximum single dose ineffective at 1 or 2 hours postadministration, administer morphine IV. For severe pain unrelieved by a repeat dose, call physician for dosage changes. To be used for severe pain: pain score 7–10 or per patient description.

Moderate Pain - FIRST Administer: (NOTE)*

☐ acetaminophen-HYDROcodone (Norco) 325 mg–10 mg PO Tablet

1 tab(s), PO, q3hr, routine, PRN moderate pain

Comments: If ineffective, may administer oxycodone IR in 1 hour. Acetaminophen not to exceed 3,000 mg from all sources in 24 hours. If patient exceeds maximum cumulative dose of acetaminophen, then subsequent doses will be given as oxycodone IR. To be used for moderate pain: pain score 4–6 or per patient description.

Moderate Pain—Administer SECOND: (NOTE)*

☐ oxyCODONE IR

10 mg, PO, q3hr, routine, PRN moderate pain (DEF)*

Comments: If inadequate pain relief, repeat dose for maximum 10 mg in 3 hours unless oversedation noted. Start oxycodone IR only after acetaminophen-HYDROcodone maximum single dose ineffective at 2 hours postadministration. To be used for moderate pain: pain score 4–6 or per patient description.

20 mg, PO, q3hr, routine, PRN moderate pain

Comments: Start oxycodone IR only after acetaminophen-HYDROcodone maximum single dose ineffective at 2 hours postadministration. To be used for moderate pain: pain score 4–6 or per patient description.

Mild pain: (NOTE)*

☐ acetaminophen-HYDROcodone (Norco) 325 mg–10 mg PO tablet

2 tab(s), PO, q3hr, Routine, PRN mild pain

Comments: Dose range: May give 1–2 tablets. Start with 1 tablet. If ineffective, may repeat dose in 1 hour unless oversedation per sedation level assessment. Acetaminophen not to exceed 3,000 mg from all sources in 24 hours. To be used for mild pain: pain score 1–3 or per patient description.

Reversal Agents

☑ naloxone IV

0.1 mg, IV Push, q 2min, routine, PRN, see comments

Comments: If respiratory rate less than 8 or patient unarousable until respiratory rate 10 or until 0.4 mg administered. Notify physician if given.

Coanalgesics/Spasms

** CHOOSE ONLY ONE **(NOTE)*

if patient is 65 years of age or older (NOTE)*

☐ diazepam PO

2 mg, PO, q6hr, routine, PRN muscle spasm

Comments: For patients 65 years or older

☐ cyclobenzaprine PO

5 mg, PO, tid, routine, PRN muscle spasm

Comments: For patients 65 years or older

if patient is less than 65 years of age (NOTE)*

☐ diazepam PO

5 mg, PO, q6hr, routine, PRN muscle spasm

Comments: For patients less than 65 years

☐ cyclobenzaprine PO

10 mg, PO, tid, Routine, PRN muscle spasm

Comments: For patients less than 65 years

Antiemetics

** FIRST Administer: (NOTE)*

☐ ondansetron IV

4 mg, IVPush, q6hr, routine, PRN nausea/vomiting

Comments: Give if unable to take PO. If ineffective, give second antiemetic in the sequence.

☐ ondansetron PO Tab

4 mg, PO, q6hr, Routine, PRN nausea/vomiting

Comments: If ineffective, give second antiemetic in the sequence.

** Administer SECOND (Choose ONLY ONE): (NOTE)*

☐ prochlorperazine IV

2.5 mg, IVPush, q6hr, Routine, PRN nausea/vomiting

Comments: For nausea and vomiting not responsive to ondansetron if unable to take PO meds. May repeat dose in 1 hour if ineffective. Maximum of 5 mg in 6 hours.

☐ prochlorperazine PO

2.5 mg, PO, q6hr, routine, PRN nausea/vomiting

Comments: For nausea and vomiting not responsive to ondansetron. May repeat dose in 1 hour if ineffective. Maximum of 5 mg in 6 hours.

☐ promethazine IV

12.5 mg, IVPush, q6hr, routine, PRN nausea/vomiting

Comments: For nausea and vomiting unresponsive to ondansetron if unable to take PO meds.

For patients 65 years of age or older (NOTE)*

☐ promethazine IV

6.25 mg, IVPush, q6hr, routine, PRN nausea/vomiting

Comments: For nausea and vomiting unresponsive to ondansetron if unable to take PO meds.

Antipruritics

if patient is 65 years of age or older (NOTE)*

☐ loratadine PO

10 mg, PO, q24hr, routine, PRN itching

if patient is less than 65 years of age (NOTE)*

☐ diphenhydrAMINE PO

25 mg, PO, q6hr, Routine, PRN itching

☐ diphenhydrAMINE IV

25 mg, IV Push, q6hr, routine, PRN itching

Comments: Give if unable to take oral diphenhydramine.

Bowel Management

☐ senna-docusate 8.6 mg–50 mg PO Tab

1 tab(s), PO, bid, routine

Comments: Hold for loose stools.

☐ magnesium hydroxide Oral Susp 30 ml UD

30 mL, PO, qhs, Routine, Start: T+1;2100

Comments: Hold for loose stools.

☐ polyethylene glycol oral powder

17 Gm, PO, qam, Routine, Start: T+1;0900

Comments: Hold for loose stools. Dissolve one 17-g packet in 240 ml of juice, water, soda, coffee, or tea.

☐ bisacodyl supp PR

10 mg, PR, daily, routine, PRN constipation, Start: T+2;2100

Comments: Give if no BM by evening of Post Op Day 2. Give if patient is unable to take PO meds.

☐ phosphate (Fleet) Enema

133 mL, PR, daily, routine, PRN constipation, Start: T+2;2100

Comments: Give if unresponsive to bisacodyl and no BM by evening of Post Op Day 2.

Note. DEF = default for the selected order; IND = indicator; INT = intervention; IV = intravenous; IVS = IV Set; PO = orally; PRN = as needed; Rx = prescription; SUB = subphase; tid = thrice a day. Copyright 2015, Spectrum Health.