

Perioperative Surgical Home Concept at the University of Virginia

Robert H. Thiele, M.D.
Department of Anesthesiology

Traci L. Hedrick, M.D.
Department of Surgery

Rationale and Background

The Department of Surgery at the University of Virginia is a participant in the National Surgical Quality Improvement Project (NSQIP) database. From 2008-2012, discouraging trends were noted in the colorectal surgical patient population - increases in indexed mortality, morbidity, and surgical site infections (SSIs), as well as an elevated risk of urinary tract infections (UTI, OR 1.95, not indexed in 2008). A group of anesthesiologists and colorectal surgeons began discussing a comprehensive, perioperative, team-oriented approach to reversing these trends in November 2012.

Search for Solution

Anesthesiologists, surgeons, and pharmacists systematically evaluated the literature addressing all major aspects of care of the perioperative patient to identify opportunities for improvement. Challenges included balancing the benefits (lower infection rate) and the risks (dehydration) of bowel preparation as well as balancing the benefits (less systemic opioid use) and risks (altered thromboprophylaxis regimen, potential impact on mobility and duration of Foley catheter use, hypotension leading to fluid administration) of neuraxial analgesia. We elected to maintain bowel preparation, in conjunction with the use of advanced hemodynamic monitoring equipment that we believed would alert us if the patient arrived to the operating room hypovolemic. We elected to utilize a morphine only spinal intraoperatively, to provide approximately 18 hours of analgesia without the requirement of an indwelling catheter and without the potential for sympathectomy.

Implementation and Impact of Solution

Multidisciplinary meetings between anesthesiologists (including pain medicine physicians), surgeons, pharmacists, and acute care nurses began in April, 2013. A finalized pathway was developed by July, 2013 and after a month of education involving nursing (clinic, preoperative, post-operative, and surgical floor), as well as surgical and anesthesiology residents, and CRNAs, the program was initiated in August, 2013.

Our comprehensive perioperative solution begins in the surgical clinic, where patients are educated about four of the five cornerstones of our program – importance of preoperative nutrition and hydration, focus on pain control with minimal opioid use, aggressive post-operative ambulation, and the prominent role the patient plays in his or her own recovery (goal-directed intraoperative fluid therapy not discussed). This discussion takes approximately 8 minutes and is followed by provision of a “patient checklist” which the patient keeps until discharge, and a comprehensive booklet describing the entire perioperative experience. The checklist matches a similar checklist to be filled out by healthcare providers during the inpatient hospitalization. Following the surgical clinic visit, patients present to the “Preoperative Testing and Evaluation Center” (PETC) managed by the Department of Anesthesiology.

The night before surgery, patients take a 4L bowel preparation (polyethylene glycol, neomycin, erythromycin) and do not take solid food after 6 PM, although they take clear fluids until 2 hours before induction of anesthesia and are encouraged to drink 20 ounces of Gatorade on their way to the hospital. On arrival to our surgical admissions suite, patients present their checklist to the preoperative nurse as well as the surgical and anesthesia teams. They receive a “cocktail” of oral non-opioid analgesic agents (acetaminophen, celecoxib, gabapentin), and alvimopan, after which they travel to the operating room where a morphine spinal is placed followed immediately by subcutaneous heparin injection. Propofol induction is complemented by NMDA antagonists (ketamine and magnesium) and volatile anesthetic maintenance is accompanied by lidocaine and ketamine infusions. Minimal intravenous opioids are given intraoperatively. No maintenance fluids are utilized and boluses are performed only if the patient is hypotensive and pleth variability index (PVI) exceeds 12% for 5 or more minutes. Nasogastric tubes are not utilized.

In the post-operative care unit (PACU), patients are instructed to get out of bed so that they can be weighed. They are also allowed clear fluids. The night of surgery, they continue consuming clear fluids and are again encouraged to get out of bed. They receive a 48 hour infusion of intravenous lidocaine, are allowed oral oxycodone for pain, and are visited by the acute pain service anesthesiologist twice daily. They receive isotonic crystalloid at 40 mL/hr for 24 hours. On post-operative day one, patients are ambulated with the assistance of nursing staff, transition to a solid diet, intravenous fluids are disconnected, and the Foley catheter is removed.

Impact, Lessons, and Next Steps

109 consecutive patients were compared to 98 patients prior to protocol initiation. Total morphine equivalents (throughout hospitalization) decreased from 281 to 64 mg. Perioperative fluid balance was decreased from 4.4L to -200 mL. NSQIP-adjusted length of stay (LOS) was reduced by 2.2 days (significant for both open and laparoscopic procedures), led to a reduction in direct costs of \$7,129 per patient and the space to admit and additional 52 patients to our hospital per year. 30-day readmissions were reduced from 17.3 to 9.2%. SSIs decreased from 21 to 7%, and UTIs decreased from 3 to 0%. Satisfaction with pain control increased from the 43rd to the 98th percentile (Press-Ganey survey system, 95 total respondents) and “extent that patients felt ready for discharge” increased from the 41st to the 99th percentile.

Since demonstrating simultaneous improvements in outcomes and decreased cost, our institution has hired a full time nursing coordinator to expand the perioperative surgical home (PSH) paradigm to other surgical subspecialties. Gynecologic-oncology was initiated on March 10, 2015. Similar protocols are under development for neurosurgery, thoracic, vascular, orthopedic, and hepatobiliary surgery. Our institution has also committed to statistical support, the hiring of a pain nurse practitioner focused on non-opioid pain management of patients in PSH protocols, equipment to measure end-tidal CO₂ on all patients who receive a morphine spinal, and additional intraoperative hemodynamic monitoring equipment.

Beyond expanding the PSH protocols, next steps, some of which are underway include better identifying chronic pain patients, developing an alternative pain scoring system based on function (as opposed to the 0-10 point pain score), development of an “app” as well as online presentation related to PSH protocols (to reinforce patient education prior to admission), calling patients within 72 hours of

surgery to reinforce the protocol as well as identify any potential medical issues that may alter the patient's plan of care, and better preoperative identification and treatment of malnutrition.