Organization: Johns Hopkins Health System

Solution: Organizational Culture Changes Result in Improvement in Patient-Centered Outcomes: Implementation of an Enhanced Recovery Program for Surgical Patients at Johns Hopkins Hospital and Health System

Program/Project Description, including Goals:
In 2010, we piloted the comprehensive unit based safety program (CUSP) in the operating room with the goal of preventing harm and improving teamwork and safety culture, and a specific focus on addressing higher than expected rates of surgical site infections in patients undergoing colorectal surgery. The team included surgeons, anesthesiology providers, nurses, surgical technicians with local leadership (surgeon, anesthesia provider and nurse). To reduce preventable harm, optimize patient outcomes and experience, and reduce waste, the team used the model for translating research into practice as well as specific tools (staff safety assessment, learning from defects, optimized briefings and debriefings for each procedure) combined with patient engagement strategies to develop, implement, and optimize a bundle of SSI-related interventions over two and half years. These included 1) focused infection related pre-operative education, 2) mechanical bowel preparation with oral antibiotics, 3) pre-operative bathing with chlorhexidine washcloths, 4) use of forced air warming devices in the pre-operative area, and 5) standardized skin preparation with chloraprep™. The group’s efforts resulted in a significant and sustained reduction of SSI rate from 27% to 18% over three years, yet SSI rates remained higher than comparable hospitals and the hospital leadership’s goal of 10%. In addition to persistently high SSI rates, VTE and UTI rates continued to be higher than expected, length of stay for colorectal procedures exceeded comparable institutions and patient satisfaction was low.

On the continuous journey to improve patient outcomes, value and experience in surgery, we stepped back to consider a comprehensive approach to addressing all preventable harms and the patient experience in concert. Therefore, leveraging our existing CUSP infrastructure, we developed an enhanced recovery program for surgical patients which incorporated best practices for perioperative care, prevention of harms and optimal patient engagement/experience.

Process:
Accountability Model
To meet the goal of addressing all elements of preventable harm in colorectal surgery patients, we first leveraged the frontline engagement that was part of the CUSP infrastructure and developed a trust based accountability model at each level, from senior leaders (Chief Financial Officer and Senior Vice President for Patient Safety and Quality) to frontline staff. Our trust based accountability model was designed to be inclusive of important stakeholders and defined the actions needed for each stakeholder. For example, senior leaders clearly communicated why the improvement effort was important, what the goals were, ensured that sufficient resources were allocated to achieve the goal, and monitored results based on predetermined timeline. In addition, senior leadership committed central resources (data analytics, project management and robust process improvement tools) through the Armstrong Institute for Patient Safety and Quality as well as departmental resources (portion of a nurse, additional staff member for the acute pain service, discretionary funds for patient education materials, non-clinical time for the surgeon and anesthesiologist leads) and met with the team frequently to help breakdown barriers and ensure success.
The project leaders were accountable to all frontline providers and patients as well as senior leadership and regularly met with and adjusted processes based on feedback. Ongoing senior leadership support was contingent on progress reports on progress towards the prevention of harm and improvements in the patient experience at regular intervals using the accountability model.

**Solution:**
Using the model of translating research into practice, a multidisciplinary team of surgeons, anesthesiology providers and nurses reviewed national guidelines and level one evidence supporting enhanced recovery, prevention of SSI, VTE, UTI and patient and family centered care. The team developed a pathway that integrated processes to address these elements of preventable harm and unified all phases of the colorectal surgery patients’ care from their pre-operative evaluation in the office through hospitalization and to the post-discharge follow up visit (Table 1). A major focus of the pathway was to engage patients and family through education and shared responsibility for recovery. Details of the pathway are in table 1. Using the principles of the 4E’s (engage, educate, execute and evaluate) within the translating research into practice model, local unit based education and discussions were conducted prior to pathway implementation (pre-op/recovery room, operating room, inpatient units). To promote engagement, all process measures were discussed by frontline providers and changed based on feedback. Processes were integrated into the electronic medical record and checklists were developed where appropriate with the goal of ensuring that all patients received the practices and compliance data were reviewed with providers. As part of this model, both pathway process and outcome measures were communicated to both senior leadership and frontline providers monthly through development of a dashboard. Key elements of the dashboard were length of stay, SSI, patient satisfaction. Both University Health Consortium (UHC) and American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) benchmarks for LOS for comparable hospitals were used as goals. A pathway bulletin board was made for the patients and staff on the inpatient unit where patients were cohorted. Following an in-person kickoff meeting with frontline providers (surgeons, anesthesiology providers, resident physicians, nurses, schedulers and technologists) and hospital leadership (department chairs, CFO, Senior VP Patient Safety and Quality), the program was initiated on February 1, 2014.

**Measurable Outcomes:**
The primary outcome variables were length of stay, SSI, UTI and VTE rates, patient experience and variable direct costs. Baseline data was obtained, for comparison for length of stay and variable direct cost (VDC) (February 1, 2013 – November 30, 2013), patient experience (February 1, 2013 – September 30, 2013), SSI (July 1, 2009 – June 30, 2013), CAUTI (July 1, 2010 – June 30, 2013), and VTE (July 1, 2010 – June 30, 2013). Length of stay was defined as hospitalization time from time of operation to time of discharge. Post-operative SSI, UTI and VTE rates were monitored by a trained nurse clinical reviewer using standardized definitions provided ACS NSQIP. Patient experience with their hospitalization was assessed using HCAHPS survey as defined by CMS. We also measured VDC associated with each case using our health systems cost accounting system. Variable direct cost was used to evaluate the programs financial impact because it represents hospital costs that can be controlled by the provider including drug, laboratory, operating room, radiology, room and board and supply costs.

Over 500 patients have been treated on the pathway. The baseline (pre intervention) mean LOS was 7 days and the median LOS was 6 days. Post intervention, the mean LOS was 5 days and median was 4 days, significantly reduced from the baseline period, p<0.05 (Table 2). We also realized a significant reduction in 30-day morbidity during the
post-intervention period compared to the pre-intervention period (SSI 18.8% vs. 7.3%, p<0.05; VTE 3.5% vs. 1.6% p>0.05; UTI 4.1% vs. 1.6% p>0.05). (Figure 1) Difference in difference analysis comparing the contemporous colorectal and pancreas patients at Johns Hopkins Hospital demonstrated that the significant improvements observed with the pathway in colorectal surgery exceeded any secular improvements in LOS and SSI in the hospital (data not shown).

Improvement was realized in all domains of the HCAPHS survey but most significant gains were noted in staff responsiveness (24% vs. 34% top box scores), communication about medication (52% vs. 71% top box scores) and pain management (68% vs. 77% top box scores). Overall 90% of patients said they would recommend the hospital to their friends and family after the pathway implementation as compared to 79% before (Table 3). To determine the impact of other patient experience improvement efforts occurring in the hospital during this period, the HCAHPS scores for colorectal and pancreas surgery patients were compared. In the colorectal population, scores increased between 9-19% for nurse communication, staff responsiveness, pain control and medication communication. Increases in the pancreas group ranged from 1-6% in nurse and physician and medication communication and discharge information.

Variable direct costs decreased from $10,933 to $9,036 (-18%), p<0.05 after pathway implementation. The greatest impact was seen on routine costs which included the daily room charge (decreased from $3,920 to $3,071, p <0.05) but reduction was also reflected in all categories (supplies, drugs, operating room, medications, radiology and other).

**Sustainability:**
The program has been in place at Johns Hopkins Hospital for 22 months with sustained results. Using a model of continuous process improvement, pathway process and outcome performance is monitored (using an electronic dashboard) and is reviewed monthly with frontline providers (outpatient clinic, surgery scheduling, pre-operative and PACU nursing, OR nursing, surgeons, inpatient units). Using the process of learning from defects when reviewing the process measure data, we continue to identify system-level fixes to improve implementation. These have included electronic health record modifications (documentation and clinical decision support), alterations in work flow (facilitate post-operative early mobility) and new pharmacologic agents to optimize the intra-operative anesthesia protocol and prevent delayed wake ups in the OR.

Given the success of the program in colorectal surgery at Johns Hopkins Hospital, through collaboration we have shared and extended this work both at Johns Hopkins Hospital (liver surgery, cystectomy and gynecologic oncology) and the health system (Bayview Medical Center, Howard County General Hospital and Suburban Hospital) and with other hospitals in the state of Maryland (Anne Arundel Medical Center, Sinai Hospital and Greater Baltimore Medical Center). The Johns Hopkins Enhanced Recovery team has shared patient education materials, pathway specifics, implementation tips and/or electronic health record ordersets with surgeons, nurses and/or anesthesiologists from these hospitals.

Early data from the hepatectomy patients at Johns Hopkins Hospital demonstrates that this approach to perioperative care is translatable to other complex abdominal procedures – this group also realized reduction in complications, LOS [2 days], cost [$2,000] and improvement in patient
reported perceptions of pain management. Similar results have also been seen in colorectal surgery at the other Johns Hopkins Health System hospitals.

Sustainability metrics of the colorectal pathway as well as expansion metrics for other procedures is on the executive dashboard for the surgical services at Johns Hopkins Hospital to ensure that the trust-based accountability model, essential for implementation, is continued.

Role of Collaboration and Leadership:
Teamwork and collaboration were the cornerstone of this work. Especially on the clinical side, surgery and anesthesia jointly addressed and were accountable for colorectal surgery patient outcomes – breaking down longstanding silos in care. Furthermore, this work was represented an extension of the existing colorectal CUSP. This program centers around improving teamwork and communication amongst frontline providers (surgeons, nurses, anesthesia providers, schedulers, technicians, house staff, advanced practice providers etc.) and much of the work that lay the foundation for the successful pathway aimed to improve these domains of safety – enhanced briefings and debriefings in the OR, handoff tools etc. The trust based accountability model was implemented at each level, from senior leaders (Chief Financial Officer and Senior Vice President for Patient Safety and Quality) to frontline staff. This was visible through the face to face kickoff meeting, periodic communications, presentations at leadership meetings (Management Committee, Board of Trustees Meetings etc) and articles in internal communications (Dome newspaper, strategic plan updates etc.). For many frontline providers, attendance at the kickoff meeting was their first interaction with the hospital CFO.

Innovation:
Improvement projects initiated by management are frequently viewed by clinicians as being done to rather than with them and are often highly resisted and largely ineffective because they are not sensitive to local context. Instead, in this model, we leveraged the intrinsic motivations of the clinical leaders, tapping their wisdom to improve patients’ outcomes and experience. Importantly, the initial catalyst for this work was valid, benchmarked clinical data demonstrating worse than expected surgical outcomes (SSI) and patient experience scores. This provided the vision and motivation for clinicians to form a team of diverse frontline providers who previously were not aware of each other’s contributions to the patient experience. This group, in partnership with senior hospital leadership, through a model of trust, support, and accountability, were able to make, over four years, increasingly greater changes to improve patient outcomes and ultimately increase the value of care delivered. Transparent reporting of process and outcomes including length of stay, patient satisfaction and SSIs jointly to frontline providers and organizational leadership drove improvements. Through the model of trust, support, and accountability participants at each level of the organization were asked to reflect on their role in the initiatives success and were then answerable, particularly as system level barriers and resistant clinicians were encountered. Although valid clinically relevant data was essential, it alone, without the facilitating infrastructure describe above is insufficient to drive change.

Through this focused initiative to improve the care of colorectal surgery patients, the organization has realized that comprehensive reorganization of surgical care to improve quality, value and patient experience is an attainable and necessary goal. It is exciting that successful spread is underway to both different procedures and different hospital/practice settings. Previous efforts to reduce preventable harm in surgical patients have had mixed results and no doubt addressing harms independently is exceedingly slow and resource intensive. Given that 50 million patients undergo surgery annually and it is estimated that approximately 1 million patients die or sustain a preventable harm associated with the procedure broad dissemination and implementation of this model of change could lead to both major cost savings as well as improvement in the patient experience with health care in the state of Maryland and the United States.
Related Tools and Resources

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• Exhibit strong collaboration
• Exhibit strong leadership
• Advance the culture of patient safety
• Constitute a best practice with the ability to spread