



BEST PRACTICES CASE STUDIES

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BEST PRACTICES CASE STUDIES



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ACS Quality and Safety Conference Best Practices Case Studies

Through the Best Practices Case Studies, hospitals participating in ACS NSQIP, CSV/ACS NSQIP Pediatric, GSV, MBSAQIP, COT, and Cancer Programs are provided with an opportunity to share their expertise in implementing surgical quality improvement initiatives within their facilities. The overall goal is to showcase how participating hospitals have utilized programmatic data to improve their performance and outcomes. It is hoped that the Best Practices Case Studies publication will allow program participants to learn from the experience of others and develop similar quality improvement projects within their own organizations.

The idea to publish the Best Practice Case Studies originated through feedback from ACS NSQIP sites via the ACS NSQIP annual conference. Hospitals were looking for information on how to utilize ACS NSQIP data to improve their surgical care and outcomes. Hence, the Best Practices Case Studies initiative was created to provide program participants with examples of quality improvement projects, designed by hospitals and implemented within their own facilities.

The 2020 Best Practices Case Studies were selected from a bank of more than 450 abstracts submitted for the 2020 ACS Quality and Safety Conference. All abstracts were reviewed and vetted by a panel of program experts, and the authors of the studies chosen were asked to further develop their case study and share their accomplishments.

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Each case study was developed by quality improvement professionals at participating hospitals (for example, Surgical Clinical Reviewers, Metabolic Surgical Clinical Reviewers, Surgeon Champions, data analysts, program directors, and so on) and describes the objectives and end results of the quality improvement effort, as well as the planning, development, and troubleshooting process.

Each Best Practices Case Study includes:

- Description of the problem addressed
- Context of the quality improvement process
- Planning and development process
- Description of the activity
- Resources needed
- Results
- Tips for others

Quality improvement is not an exact science; however, these examples may serve as a starting point to assist others in developing their own quality improvement initiatives, as each case study provides details of the quality improvement effort that hospitals may envision at their own facility.

ACS NSQIP, CSV/ACS NSQIP Pediatric, GSV, MBSAQIP, COT, and Cancer Programs are continually looking for participant feedback on making our programs more beneficial to hospitals striving to meet surgical care goals.

Please contact us if you have comments or questions regarding these studies, or if you would like information on how to submit your own Best Practices Case Study for publication in the future.



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MARY BRIDGE CHILDREN'S HOSPITAL,
MULTICARE HEALTH SYSTEMS

Streamlining Outpatient Gastrostomy Tube Placement: A Collaboration between Pediatric General Surgery, Pediatric Gastroenterology, and Outpatient Community Services



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General Information

1. Institution Name: Mary Bridge Children’s Hospital, MultiCare Health Systems

2. Submitter Names and Titles:

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Pediatric Nutrition Services—Phuong Tran, RD

Mary Bridge Community Services—Erin Summa and Peggy Norman

4. Name of Case Study:

Streamlining Outpatient Gastrostomy Tube Placement: A Collaboration between Pediatric General Surgery, Pediatric Gastroenterology, and Outpatient Community Services

What Was Done?

1. Global Problem Addressed

Gastrostomy tube (colloquially referred to as “G-Tube”) placement is often a crucial component in a medically complex child’s care and one of the more common procedures performed at children’s hospitals, but there often exists no uniform approach to patient counseling and postoperative management. Families often agonize about the decision and worry about their ability to care for their child after the tube is placed. Complications, such as early dislodgement, result in emergency department (ED) visits and potential readmissions. Lengths of stay (LOS) and feeding advancements vary between different centers and different providers.¹ All these factors impact quality of care, patient and caregiver satisfaction, and health care costs. It has been shown that a standardized pathway for feeding tube placement can result in significant reduction in length of stay postoperatively and decreased ED visits.² Appropriate preoperative family education is necessary to understand the surgery, but perhaps more importantly, to prepare them for what to expect once their child has a G-Tube. Video skill clips for caregiver education can be an easily accessible and efficient tool to help improve confidence levels, particularly for families with low literacy levels.³

2. Identification of Local Problem

Gastrostomy tube referrals at our institution prior to this intervention were a point of frustration for caregivers, providers, and the nursing staff. There was often confusion on the parts of the caregivers, missing or incomplete preoperative work up or education, delays in scheduling, conflicting instructions on postoperative feeding plans, and frequent ED visits due to dislodgements, feeding intolerance, and conflicting patient education. There was wide variation among surgeons on postoperative feeding advancements and length of stays, particularly on the weekends due to coordination with home health services. The cost of in-person teaching by our pediatric gastroenterology (GI) clinic nursing team was becoming unmanageable and created an additional office visit and cost for families and caregivers. Early in our ACS NSQIP-P process, we learned through discussion with other centers that our length of stay was longer than other comparable hospitals.

How Was the Quality Improvement (QI) Activity Put in Place?

1. Context of the QI Activity

Mary Bridge Children's Hospital is a community-based, 82-bed, Level II trauma center, children's hospital within a hospital as part of a larger, 1,802-bed, integrated health system located in the Pacific Northwest. With more than 30 pediatric specialties, our hospital and its network of primary care, specialty care, therapy, and urgent care visits provide care to more than 330,000 children per year. The Leapfrog Group named Mary Bridge Children's Hospital as one of the 2018 and 2019 "Top Children's Hospitals."

2. Planning and Development Process

Patients requiring outpatient gastrostomy tube placements were noted to have wide variations in pre-consultation education, family preparedness, and completion of necessary diagnostic procedures. These variations resulted in longer clinic visits and delays in surgical scheduling. This was leading to family and provider dissatisfaction. In addition, variation was noted among the pediatric surgeons regarding postoperative education, feeding plans, and length of stay. Upon joining ACS NSQIP-P, we learned when conferring with other hospitals within ACS NSQIP-P our postoperative LOS was higher than other institutions. Having previously completed a very successful Kaizen to standardize appendectomy care with improved patient satisfaction and LOS, the pediatric surgeons turned their attention to outpatient gastrostomy tube placements as their next quality improvement focus.

Pediatric surgery teamed with another key stakeholder, pediatric gastroenterology, to decrease cost within the clinic, the number of unnecessary patient visits, and returns to the emergency room. The pediatric surgeons and pediatric gastroenterologists formed a task force to analyze current state for outpatient gastrostomy tube placements. Multidisciplinary teams comprised of physicians, advance practice providers (APPs), nursing staff, clinic medical assistants, and registered dietitians,

were developed to review steps in the process and identify potential areas of improvement. The Pediatric ACS NSQIP Surgical Champion filled the role of Project Manager, leading the task force.

The task force determined that improvement opportunities spanned the entire process from initial pediatric gastroenterology consultation visit generating the referral to pediatric surgery through the postoperative pediatric surgery clinic visits. The multidisciplinary teams began working the improvements for their respective process pieces.

Description of the Quality Improvement Activity

Several process pieces were identified as primary areas of focus: preoperative referrals and scheduling, patient education, and postoperative management.

Preoperative Referrals and Scheduling

• GI Clinic Referral Process

- The team consisted of a pediatric gastroenterologist, pediatric surgeon, surgery clinic registered nurse, and gastroenterology clinic registered nurse.
- This team developed best practices for referrals and coordination between clinics, including the completion of a fluoroscopic upper gastrointestinal (upper GI) series prior to appointment in the surgery clinic.

• Surgery Clinic Scheduling and Preoperative Visit

- The team consisted of pediatric surgeon, surgery clinic registered nurse, and surgery clinic medical assistant.
- This team developed a standardized case request for surgery scheduling and a process for surgery to be scheduled prior to clinic discharge, including postoperative two- and six-week follow-up visits.

Patient Education

• Gastrostomy Tube Education Video

- Standardization of patient education was a key component to process improvement. The task force created a patient education video to be viewed by caregivers preoperatively. The video was written by Mary Bridge Community Services, a pediatric gastroenterology provider, a pediatric surgeon and APP, and nursing staff from both the GI and surgery clinics.
- A pediatric surgeon and the nursing staff from both clinics provided the on-camera education. Several families also participated by sharing their stories.
- The video was made available online or as a disc checked out from clinic: <http://www.marybridge.org/services/gastroenterology-clinic/g-tube-educational-videos/>

- In addition to the creation of the video, caregiver education handouts, and a post-test were created to ensure comprehension of the materials.
- Since completion of our project, the video was translated into Spanish.
- A post-test was used to identify families who needed additional education which was provided by the GI clinic nursing team either over the phone or in the clinic.

- **Bedside Nursing Education**

- A gastrostomy tube “Pathway to Home” flyer was created to educate inpatient nursing on postoperative and discharge teaching for caregivers.
- Surgery clinic APPs conducted classes during the yearly Surgery Super User pediatric surgical skills nursing and in the RN Residency Program. These classes continue currently.

Figure 1. A Pathway to Home Education Tool

A Pathway to Home for Your New Gastronomy Tube

Here is how caregivers and parents know when child is ready to leave the hospital:

Pain Relief
Able to take pain medications by mouth or G-tube
Pain is well controlled

Temperature
24 hours without a fever i.e. below 100.5 F

Medications
Tolerating all home oral and feeding tube medications

Hydration
Meeting hydration goals with combination of feeding tube feed and oral if appropriate

Education
Has completed the Gastrostomy tube class prior to discharge

Caregiver Demonstration of Basic Skills

- Connecting & disconnecting tubing
- Understanding first 6 weeks of care
- Taping extension tubing
- Cleaning extension tubing and around g-tube
- Flushing medications
- How to start feeds

Home Infusion Teaching and Supplies

- Home formula ordered
- Home supplies and pump ordered
- Home infusion teaching

Feeding Advancement Plan per Inpatient Dieticians:

Appointments:

- Surgical Follow Up Scheduled:
- RD Follow Up Scheduled:
- GI Clinic Follow Up Schedule:

- **Standardized Discharge Instructions**

- This team consisted of surgery clinic APPs.
- Handouts and an electronic medical record (EMR, in this case EPIC) smart phrase were created for gastrostomy care discharge instructions
- This included information on-site care, looping and taping of the extension tubing, bathing instructions, and feeding instructions for the first postoperative week.

Postoperative Management

• Standardization of Postoperative Order Set

- This team consisted of a pediatric surgeon and surgical ARNP.
- This team worked on developing a standardized order set which included site care, preoperative antibiotics, feeding advancement with early resumption of feeds, social work and case management referrals, and registered dietician consultation.

• Postoperative Nutrition

- Pediatric gastroenterology and a registered dietician were assigned to this part of the process.
- This team created post-placement feeding recommendations and goals for the immediate postoperative nutritional plan.
- Hydration goal was the criteria for discharge with nutritive goal being achieved within one to two weeks postoperatively.

• Standardized Discharge Criteria Development

- The pediatric surgeons developed standardized discharge criteria, which included:
 - Afebrile <100.5;
 - Pain well controlled;
 - Typically obtained with acetaminophen and/or ibuprofen;
 - Minimize discharge with oxycodone;
 - Tolerating feeds at hydration goal;
 - Ambulating at baseline function; and
 - Caregiver completion of the “Pathway to Home” with demonstration of skills competency and comfort with tube care.

During the quality improvement process, some team members began implementing pieces of the process as they were developed throughout 2016 and 2017. Our adaptation of all the improvements began in 2018.

Resources Used and Skills Needed

1. Staff

This project was a joint effort on the part of the Mary Bridge Pediatric Surgery and Gastroenterology Departments. This involved six pediatric surgeons, two pediatric gastroenterologists, one registered dietician, five APPs, four clinic RNs, two medical assistants, and two members of our Community Services – Health Promotion team, as well as a contracted producer for the video. Due to the comprehensive overhaul of our process, each component was assigned to members of the surgery and GI teams to dedicate focus on that segment.

2. Costs

The only additional cost accrued was the cost of the video production. The use of the outside contractor cost \$5,000. After the conclusion of the initial project, the video was translated into Spanish for an additional cost of \$2,500.

3. Funding sources, if any

We received a personal grant of \$5,000 by Dr. Amin Tjota and a \$2,500 grant by the Mary Bridge Brigade, our philanthropic foundation, which funded our additional costs.

What Were the Results?

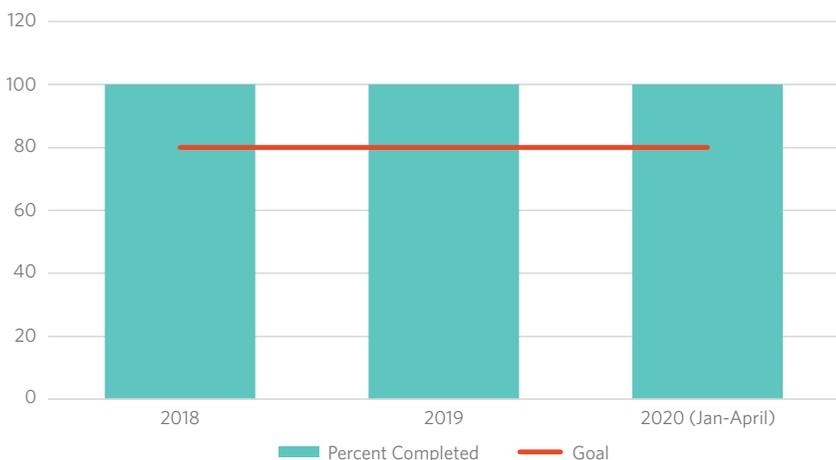
1. Overall Results

All outpatient gastrostomy tubes were reviewed for the year 2018. Exclusions were applied to patients who were in the neonatal intensive care unit (NICU), inpatient consultations, concurrent procedures, postoperative admission to non-surgical services (such as inpatient medical services and pediatric intensive care unit [PICU]), and patients who were not referred via Mary Bridge Pediatric Gastroenterology. We used a combination of chart review, automated dashboards through our EMR, and caregiver surveys to review the improvement implementation.

Upper GI Performed Prior to Surgical Clinic Visit

Initially, the task force set a goal of 85 percent completion of the upper GI prior to the surgical clinic visit. In 2018, we were able to obtain a 100 percent compliance with this measure. In 2019 and 2020 YTD, we have maintained 100 percent compliance with this measure.

Table 1. Percentage of Upper GI Completed Prior to Surgical Consultation Visit



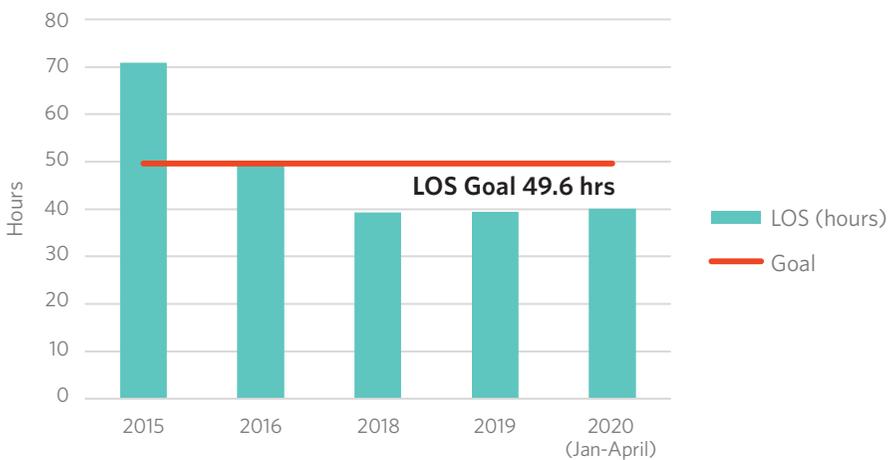
Use of Standardization of Postoperative Order Set

Initially, the task force set a goal of 85 percent compliance with using the standardized postoperative order set. In 2018, we exceeded our initial goal and obtained 96 percent compliance with usage of the order set.

Length of Stay

Average LOS in 2015 was 70.88 hours. In 2016, due to the soft implementation of some improvement activities we dropped the average LOS to 49.17 hours. In 2018, we noted our average LOS to be 39.3 hours which was a 44 percent reduction from our 2015 data. This exceeded our goal of a 30 percent decrease. In 2019 and 2020 YTD, our LOS has remained consistently below our initial goal at 39.4 and 40.1 hours respectively.

Table 2. G-Tube Length of Stay in Hours



Comfort with Care of G-Tube at Time of Discharge

Caregivers were queried through a postoperative survey completed at the final surgery clinic visit or via phone. 80 percent of caregivers rated feeling “comfortable” or “very comfortable” with caring for their child’s gastrostomy tube at time of discharge. This exceeded our goal of 75 percent.

2. Setbacks

One delay in implementation of our process was the construction of the standardized Post Op Gastrostomy Tube Order Set in our EMR (EPIC). While the provider team came to consensus on its design quickly using our Post Op Appendectomy Order Set as a model, the build team was delayed due to demands created by a system-wide EPIC upgrade. This resulted in the order set not being available until almost two months into our implementation phase. In

the interim, the ordering providers used the appendectomy order set adding in the specific G-Tube care and feeding advancement instructions by hand. We have solved this for future projects by planning such EPIC builds far in advance to avoid such delays.

Due to turn over in both our quality and information technology teams, we had significant issues with being able to review compliance with the protocols and identifying cases for review via EPIC. This resulted in the need for manual chart reviews. Surgeons were required to complete a form at the time of the initial consultation to identify the patient for inclusion in the data collection. We are now utilizing ACS NSQIP-P for our G-Tube abstraction granting us concurrent access to the data.

We had significant “contamination” of our baseline data due to providers implementing various aspects of the protocol once approved by our task force rather than waiting for the implementation phase. Because of this early implementation, the decision was made to use 2015 as our baseline due to providers starting to migrate their practice as early as 2016 as we were beginning our design phase. However, this “staged” introduction allowed the providers, nursing staff, and care teams to adjust in smaller increments at a time and made the unveiling of the new process less intimidating. The providers’ engagement in the process was further encouraged as we saw our length of stay gradually decrease with each new component coming on line.

Lastly, during the time of our implementation, several of our GI providers relocated resulting in long referral delays. This resulted in several patients who would have been outpatient referrals becoming inpatient referrals. These patients were not included in the evaluation, but as we educated referring providers these patients received the same preoperative education and postoperative management when able. As understanding grew among other services of our protocol, the frequency of gastroenterology consultation prior to surgical consultation increased.

3. Cost Savings

Prior to the implementation of the new education video and process, the cost of G-Tube teaching by a Registered Nurse was \$11,592 per year. By implementing the video, the estimated cost saving over a 5-year period is \$52,460.

Tips for Others

1. Getting Started

We began this project using the lessons learned during our prior Kaizen experience for postoperative appendectomy pathways. Our guiding principle was making the process easier and more efficient for the families. Education beginning at the first encounter with a consistent messaging was important. The video allowed families to do the education in their own homes at their own pace resulting in improved retention. Having involved members of the team working together on each phase

helped build a sustainable plan. Standardized order sets were very helpful to ensure compliance with the protocol as well as give a “short term” metric to follow providing more immediate feedback to providers. Empowering the nurses to teach the skills with hands on teaching sessions and easy to use tools increased buy-in.

2. How to Sustain the Activity

One of our keys to sustaining the improvements was frequent feedback, particularly sharing the results in reduction of LOS periodically during our implementation period. The standardized order set made it easier to follow the protocol than to deviate. The frequent vocal reports of caregivers about “how (the process) was so much easier than they thought it would be” reinforced the care teams desire to continue. This feedback was shared back with the involved providers.

3. Other Tips and Considerations

- The ACS does have a video available for Pediatric Gastrostomy Education, which could be used to avoid the video production costs. We wished to create one that more closely mimicked the teaching done in our prior hands on “G-Tube class.” We also included several families with G-Tubes describing their experiences which families reported was helpful.
- The post video quiz enabled us to identify families who needed additional clarification/education prior to proceeding. Depending on the knowledge gaps, this was either done over the phone or at an in person visit.
- While our initial post G-Tube feeding advancement plan was moderate (six hours NPO, six hours Pedialyte continuous, then formula advancement, either continuous or bolus, achieving hydration goal within 24 hours), we have migrated to a more aggressive advancement as the team members became more comfortable.

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THE HOSPITAL FOR SICK CHILDREN

Reducing Duration of Postoperative Prophylactic Antibiotic Usage in Neonatal Surgical Patients



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General Information

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4. Name of the Case Study:

Reducing Duration of Postoperative Prophylactic Antibiotic Usage in Neonatal Surgical Patients

What Was Done?

1. Global Problem Addressed

Neonates undergoing surgical procedures are commonly exposed to antibiotics due to concerns regarding significant morbidity and mortality from infection. 'Clean' and 'clean-contaminated' operative wounds have a low risk of infection; 1 to 5 percent and 5 to 15 percent, respectively.¹ There is substantial variation among hospitals in Canada and the United States regarding appropriate postoperative antibiotic prophylaxis for the neonatal population.²⁻⁶ Limited data and guidelines for pediatric patients can be found in the literature but these are extrapolations from adult data and not applicable for patients less than one year of age.⁷⁻⁹ Currently there are no consensus guidelines for postoperative antibiotic use in neonates; notably there is no evidence to support the prolonged use of antibiotics in the immediate postoperative period. Inappropriate antibiotic use in this vulnerable population has well recognized adverse effects including altered microbiome, antimicrobial resistance, increased rates of necrotizing enterocolitis, and longer duration of intravenous access.¹⁰⁻¹² Therefore, judicious use of antibiotics only for neonates at significant risk of infection, such as those having contaminated surgeries, is warranted.

2. Identification of Local Problem

A preliminary review of antibiotic utilization practices in the Neonatal Intensive Care Unit (NICU) at The Hospital for Sick Children in Toronto, ON, demonstrated that the preferred duration of prophylactic antibiotics during the immediate postoperative period varies greatly among surgeons, ranging from 24 hours up to

seven days. This wide variation in practice provided a key opportunity to improve quality of care and outcomes. Baseline data for the period July 1 to December 31, 2018, for neonates admitted to the NICU with ‘clean’ or ‘clean-contaminated’ general surgical conditions identified that 14 of 25 (56 percent) patients who fulfilled the inclusion criteria received postoperative antibiotic prophylaxis for greater than 24 hours. The median (interquartile range [IQR]) duration of antibiotics during this baseline period was 41 (24, 48) hours.

How Was the Quality Improvement (QI) Activity Put in Place?

1. Context of the QI Activity

The NICU at the Hospital for Sick Children serves as the quaternary NICU for a catchment area of 75,000 annual births in Ontario, Canada. The unit has 38 beds with 800 admissions per year, among which approximately 350 have a primary admission diagnosis of a surgical condition. There are 10 to 20 surgical procedures per month. This quality improvement (QI) project aligned with our corporate QI plan to improve antibiotic prophylaxis after surgery. Discontinuation of routine use of antibiotics for prophylaxis against surgical site infection (SSI) after leaving the operating room was among the organizations’ own 2017 *Choosing Wisely Canada* list of five things physicians and patients should question.^{13,14}

2. Planning and Development Process

We recruited a multidisciplinary team of neonatal and surgical physicians, infectious disease specialists, and an antimicrobial stewardship pharmacist. Problem characterization through fishbone analysis (Figure 1) and process mapping (Figure 2) revealed that creating a clear, evidence-based guideline with consistent definitions would likely be most effective. The acceptance and implementation of a new practice guideline amongst a large group of practitioners in both the neonatal and surgical teams was anticipated to be challenging. Hence, we identified and engaged key stakeholders including nursing, physicians, pharmacists, and policy administrators through education sessions and regular team rounds led by our neonatology and surgical QI team leads. All stakeholders were provided with an opportunity to review and provide feedback throughout the project. Our strategy included a series of Plan-Do-Study-Act (PDSA) cycles. Evaluation of the data generated by each test of change was both quantitative and qualitative to help determine the best next step based on the *Adopt, Adapt, or Abandon* model.

Figure 1. Fishbone Diagram Demonstrating Potential Causes of Prolonged Use of Postoperative Antibiotics

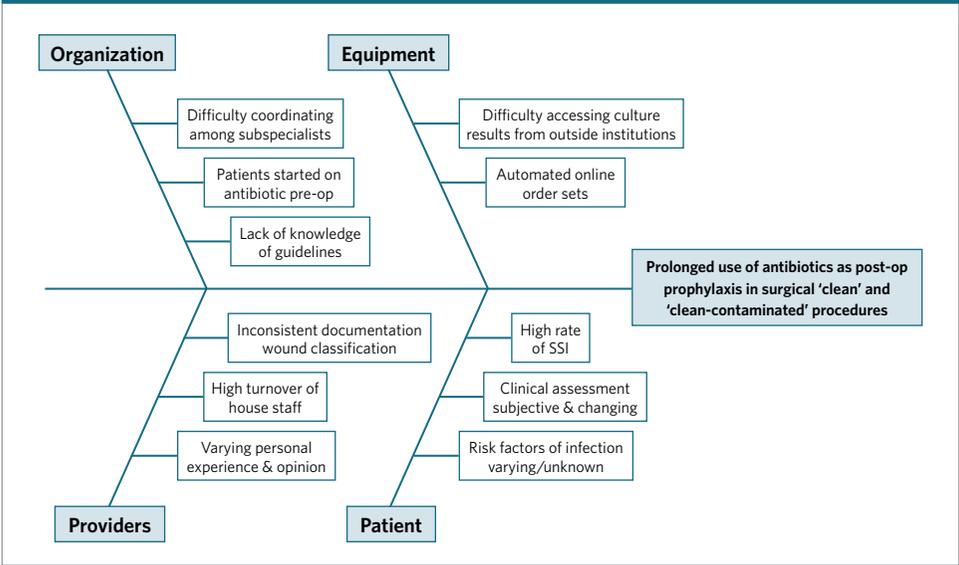
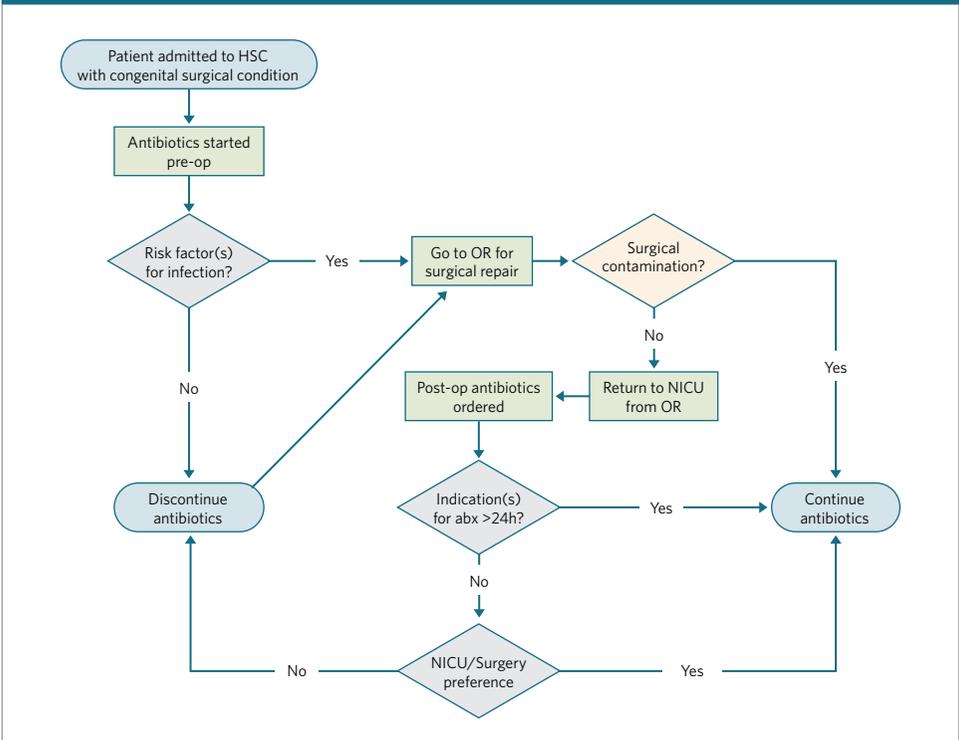


Figure 2. Process Map Demonstrating the Steps Leading to a Decision to Discontinue Postoperative Antibiotics



Our core QI team met monthly to monitor progress through the cycles, seek feedback, and ensure success with implementation. We reviewed the literature as well as guidelines from other institutions and surveyed our clinicians to create a practice recommendation.¹⁵⁻¹⁹ A draft version of the guideline was presented to the main stakeholders, feedback was incorporated, and consensus was achieved. We planned to focus on neonates with congenital general surgical conditions who underwent ‘clean’ or ‘clean-contaminated’ procedures, and the guideline recommended the discontinuation of prophylactic antibiotics at or before 24 hours postoperatively (see Appendix A). The definitions of wound classifications including ‘clean’ and ‘clean-contaminated’ were derived from the Center for Disease Control.¹

Description of the Quality Improvement Activity

After reaching consensus on the guideline, our project leads presented education sessions to key stakeholders that included individuals across varying levels of training and focus and involved residents, fellows, and attending physicians as well as bedside nurses and nurse practitioners.

We implemented the guideline on February 20, 2019, and we evaluated the impact on antibiotic use monthly. We observed that the initial improvement during the first month was not sustained; therefore, we added interventions to increase awareness of the guidelines. These included education sessions during NICU team and research rounds, during which we highlighted the presence of, and rationale for, the guideline; as well as discussion during NICU antimicrobial stewardship program (ASP) rounds that occurred twice every week. We further promoted the guideline through email communication to all NICU staff and the addition of a screensaver highlighting the rationale for the guidelines on all computers in the NICU.

Next, we tackled the challenge of connecting the multiple subspecialty teams. We increased discussion between NICU and surgery house staff regarding antibiotic duration during weekly subspecialty NICU and surgery rounds. We also added a prompt to discuss the duration of postoperative antibiotics on our existing Postoperative Huddle Checklist. The Postoperative Huddle Checklist was implemented earlier in October 2017 as part of a Children’s Hospitals Neonatal Consortium QI collaborative; whose earlier work has demonstrated success in improving postoperative hypothermia.²⁰

Our final intervention was to audit and provide feedback to the NICU and surgery teams. We presented and discussed the results of our project during combined NICU and surgery rounds in November 2019 with emphasis on the indications observed for non-compliance and the lack of demonstrated risk.

The Hospital for Sick Children Quality Review Committee reviewed this project and provided approval and a waiver of Research Ethics Board review.

Resources Used and Skills Needed

1. Staff

Our multidisciplinary core QI team of 12 people included neonatal and surgical physicians, infectious disease specialists, and an antimicrobial stewardship pharmacist. Key stakeholders included all neonatal and surgical trainees, attending physicians, neonatal and surgical nurse practitioners, neonatal nurses, and policy administrators.

2. Costs and Funding Sources

There were no additional costs or funding sources necessary to implement and maintain this QI initiative.

What Were the Results?

1. Overall Results

The primary outcome measure was the percentage of eligible surgical patients in the NICU receiving prophylactic antibiotics for greater than 24 hours postoperatively. The secondary outcome was the duration of postoperative antibiotic prophylaxis in hours. We included only those neonates who had low risk for postoperative infection who could be evaluated for true adverse outcomes related to our intervention. Inclusion criteria were as follows:

1. Gestational age greater than or equal to 35 weeks (no weight restriction);
2. Congenital gastrointestinal (GI) conditions (i.e., tracheoesophageal fistula/esophageal atresia (TEF/EA), intestinal atresia, anorectal malformations, omphalocele, gastroschisis, malrotation);
3. Surgery considered 'clean' or 'clean-contaminated' per Appendix A;
4. Antibiotic duration as prescribed for prophylaxis and not for completion of sepsis protocol with risk factors or treatment of active infection.

At the end of each month, all surgical cases admitted to the NICU were reviewed for eligibility by three physicians (AB, NO and KSL). Information was obtained from the patients' electronic medical record through review of progress notes, surgical case notes, and the medication administration record. Data were entered into the Research Electronic Data Capture (REDCap) database. The duration of antibiotics was calculated from the date and time of administration of the first dose to the start of the last dose during the postoperative period.

Process measures were reasons for non-compliance, specifically the incidence of 'NICU team' or 'surgical team preference', and the discussion of antibiotic duration during the postoperative huddle. These measures were included to screen for contributing systems issues and to focus future interventions.

Balancing measures included the incidence of SSI among patients who had discontinuation of antibiotics within 24 hours postoperatively, and the number of patients restarted on antibiotics within one week of discontinuation. SSI was defined as localized erythema, swelling, pain, and/or purulent drainage at or near the surgical site, with or without a fever, occurring within 30 days of surgery.²¹

1. Analysis

Outcome and process measures were evaluated on statistical process control (SPC) charts. Signals, indicating special cause, were identified by using standard control chart rules.²² Descriptive statistics were used to describe baseline data. To compare data from the baseline and post-intervention periods, the chi-square test was used for proportions (proportion with discontinuation of antibiotics with 24 hours postoperatively), and the Mann Whitney U test was used for non-normally distributed continuous variables (duration of antibiotics).

2. Results

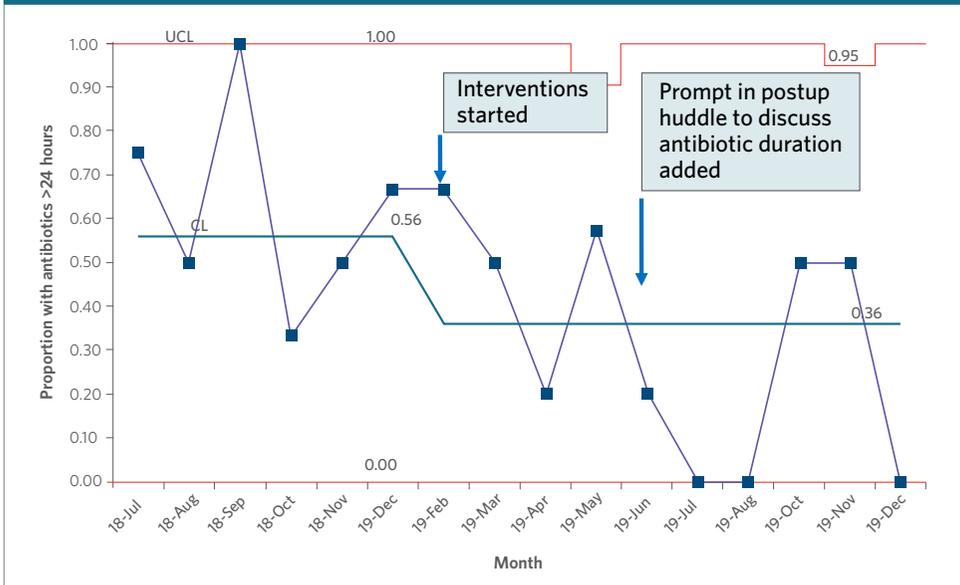
We evaluated a total of 64 neonates who had ‘clean’ or ‘clean-contaminated’ congenital GI surgery over an 18-month period with 25 in the preintervention period (July 2018 to December 2018, 6 months) and 39 in the postintervention period (February 2019 to December 2019, 11 months). The proportion of neonates who received prophylactic antibiotics >24 hours postoperatively decreased from 56 percent (14/25) to 36 percent (14/39) in the pre and postintervention periods respectively (p=0.114). Among these patients who continued antibiotics for >24 hours, the reasons are summarized in the table below.

Reason for Continuation of Antibiotics >24 Hours Postoperatively	Pre-Intervention N=14	Post-Intervention N=14
Surgical team preference	8 (57.1%)	9 (64.3%)
Medical team preference	3 (21.4%)	0
Rule out sepsis	0	2 (14.3%)
Medication error, planned but missed order to discontinue	1 (7.1%)	2 (14.3%)
Unspecified	2 (14.3%)	1 (7.1%)

The duration of prophylactic postoperative antibiotics decreased from median (IQR) of 41 (24, 48) hours to 18 (16, 41) hours in the pre and postintervention periods, respectively (p=0.01).

The proportion of cases with antibiotic duration >24 hours by each month is shown in the p chart in Figure 3.

Figure 3. Statistical Process Control P Chart for Outcome Measure: Proportion of Patients Receiving Postoperative Antibiotics Greater Than 24 Hours



Footnote: The center line (CL) represents the overall proportion in the preintervention phase. Red lines represent control limits. UCL: upper confidence limit.

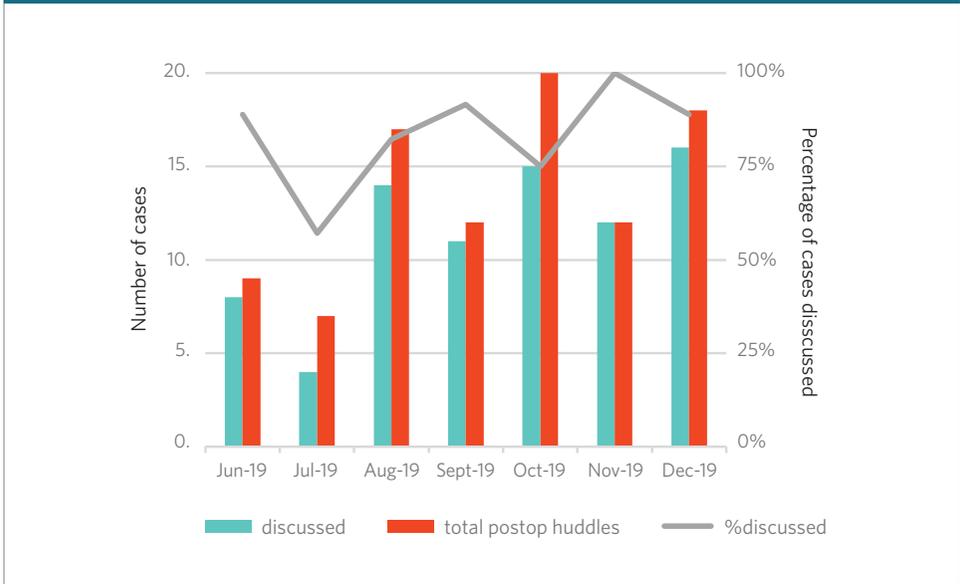
There was overall improvement over time in the proportion of patients who received prophylactic postoperative antibiotics >24 hours, and the duration of postoperative antibiotics. While the overall proportion decreased after implementation, there was major fluctuation in the proportions for each month.

The process measure, compliance with discussion of duration of antibiotics in the postoperative huddle for each month since implementation, is shown in Figure 4. During the full six-month period, antibiotic duration was discussed in 84 percent (80/95) of cases.

For the balancing measures, there were no differences in the pre and postintervention periods. There were two cases of SSI, one during the preintervention period in a patient who had Ladd’s procedure for malrotation and had stoppage of antibiotics 4.7 hours postoperatively and who developed SSI and wound dehiscence two days postoperatively, and the second case during the postintervention period in a patient who had anorectal malformation and had stoppage of antibiotics 37.5 hours postoperatively who developed SSI four days postoperatively. Among patients who had antibiotics restarted within seven days of stopping prophylactic postoperative antibiotics, there were two in the preintervention period (one for urinary tract infection [UTI] prophylaxis and a second patient who was treated for possible culture negative meningitis based on recurrent fever and head ultrasound abnormalities) and 10 in the postintervention phase (eight for UTI prophylaxis, one

for polysplenia prophylaxis, and one for prophylaxis for chest tube insertion). None of these cases who had a restart of antibiotics had concerns regarding infection after discontinuation of postoperative prophylactic antibiotics.

Figure 4. Bar and Line Graph Showing the Process Measure: Discussion of Antibiotic Duration during Postoperative Huddle



Footnote: The left y-axis and the blue bars represent the total number of patients where antibiotic duration was discussed, and the orange bars represent the total number of postoperative huddles evaluated. The right y-axis and the line graph represent the percentage of patients where antibiotic duration was discussed during the postoperative huddle.

In summary, we achieved our aim to decrease the proportion of neonates receiving prophylaxis antibiotics for ‘clean’ or ‘clean-contaminated’ general surgical procedures beyond the 24-hour postoperative period, and also the duration of antibiotic use in the postoperative period. There were no adverse effects of this intervention in terms of an increase in SSI or need to restart antibiotics within seven days of discontinuation.

1. Setbacks

At the project outset, we anticipated challenges in obtaining support for a standardized guideline from all members of the neonatology and surgery team. To overcome this challenge, we involved neonatology and surgical staff at the conceptualization stage and included leadership from both disciplines in our core quality team. We formally presented the literature on the negative effects of prolonged antibiotic administration and the judicious use of antibiotics at other major children’s hospitals during joint surgery and neonatology rounds. All neonatologists and general surgeons had an opportunity to provide feedback on the

draft guidelines prior to finalization. We ensured the guidelines were clear and easy to understand, and disseminated them via multi-modal methods including lectures, emails, and screensavers on NICU computers.

Initially, we planned to target a reduction in the inappropriate initiation of antibiotics for all surgical patients but found that this was difficult to achieve. Our NICU is an outborn unit with no deliveries onsite, and patients are transferred from referral sites frequently already on antibiotics after a partial septic work-up, prior to any contact with our site. Since surgery for congenital GI conditions often occurred within the first 24 hours of life, the continuation of antibiotics beyond 24 hours postoperatively may have been part of the preoperative plan due to perinatal risk factors. Review of the cases started on antibiotics prior to transfer demonstrated that the majority of cases did have an appropriate indication for starting antibiotics postnatally (e.g., maternal risk factors for chorioamnionitis or late preterm delivery between 35 and 37 weeks gestational age). As antibiotics were appropriately initiated, there was no indication for practice change to not initiate antibiotics; therefore, we abandoned this aim to decrease initiation of preoperative antibiotics.

2. Cost Savings

We focused on practice changes to reduce overall unnecessary antimicrobial utilization. While we did not measure specific cost savings, the overall reduction in antibiotic use without a significant increase in adverse outcomes is anticipated to reduce costs due to reduced medication use, and potentially a shorter duration of intravenous line use and reduced length of stay.

Tips for Others

1. Getting Started

A crucial factor for success was the early engagement of key stakeholders at the conceptualization stage, including health care providers from surgery, neonatology, infectious diseases, and pharmacy. We included hospital leaders from the surgical program and ASP into the core neonatology quality team, which was essential to ensuring staff buy-in, especially by the surgical group.

At our institution, a strong multidisciplinary relationship between surgery and neonatology was already in existence, largely in part due to previous and ongoing QI projects. We built on the success of a prior collaborative project among surgeons and neonatologists that implemented a perioperative huddle. We utilized the existing checklist, which was part of a previous QI project, to heighten awareness of our goal to reduce postoperative prophylactic antibiotics use. We also aligned our aims with hospital wide priorities of antimicrobial stewardship and external collaborations such as *Choosing Wisely Canada*, which ensured executive leadership buy-in.

The presentation of real time local data, external standards, and the literature were key steps that increased the acceptability of the practice change. For real time data, we utilized support from our information technology manager to minimize the amount of manual extraction of data.

2. How to Sustain the Activity

In a busy, high-acuity NICU that has multiple frontline staff with frequent turnover, a fundamental strategy was to ensure that any interventions to promote compliance were incorporated into routine events; and did not require a significant effort or time expenditure from any individual. We embedded reminders for antibiotic stewardship within processes that already existed in the culture of the NICU, and selected events that required the leadership of permanent staff rather than temporary rotating staff such as residents and fellows. For instance, we capitalized on the preexisting postoperative huddles that had been established for all surgical procedures since 2017 and were led by NICU charge nurses. During these huddles, a checklist was used 100 percent of the time and it was not a major change to add an additional item to discuss the duration of postoperative antibiotics. We also utilized the twice weekly ASP rounds established in 2012 within the NICU that were led by the hospital ASP team consisting of an infectious disease physician and pharmacist. All patients on antibiotics were routinely reviewed jointly with the NICU house staff and a surgical fellow or nurse practitioner. It was not overly onerous to add a question to these rounds regarding whether postoperative antibiotics could be discontinued. Additionally, we reviewed and presented preliminary results after each PDSA cycle to provide direct feedback and education to key stakeholders during neonatal-surgical multidisciplinary rounds. Embedding reminders and reinforcements helped to consolidate the change and facilitated sustainability of the interventions.

From frontline staff feedback, the most helpful interventions included reminders to stimulate discussion among house staff about the duration and indication of postoperative antibiotics during the twice weekly ASP rounds, and the prompt on the Postoperative Huddle Checklist. Thus, these two interventions are the most important to maintain. Spot audits to track postoperative antibiotic use with feedback to frontline providers would also support sustainability.

Acknowledgements

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NICU Post-Operative Antibiotic Prophylaxis

- ▶ The NICU, Antimicrobial Stewardship Program, and General Surgery teams are working to reduce the inappropriate use of antibiotics in surgical patients in the NICU.
- ▶ Prolonged antibiotics contribute to:
 1. Antibiotic resistance for future infections
 2. Changes to the gut microbiome
- ▶ Post-op surgical prophylaxis has **not** been shown to reduce the risk of Surgical Site Infections (SSI) in 'Clean' or 'Clean-Contaminated' surgical procedures
- ▶ Only pre-op surgical prophylaxis given within 60 mins prior to surgery significantly decreases the risk of SSI
- ▶ **SickKids guidelines** recommend NO antibiotics given after the patient leaves the OR for 'Clean' or 'Clean-Contaminated' procedures. This is part of the Hospital's **Choosing Wisely Campaign**.

What can **you** do to prevent antibiotic resistance?

STOP prophylactic antibiotics after the patient leaves the OR within 24 hours.

- Include clear duration plans in post-operative notes
- Include stop dates/times on all post-op prophylaxis orders
- Discuss the rationale for longer durations in post-op huddle - e.g. 'Contaminated' or 'Dirty' surgeries

This recommendation applies to:

- GA: $\geq 35+0$ weeks (no weight restriction)
- Congenital GI conditions (ie, TEF +/-EA, intestinal atresia, anorectal malformations, omphalocele, gastroschisis, malrotation)
- Surgeries considered (i) 'clean' or (ii) 'clean-contaminated' (see below)
- Antibiotics prescribed for prophylaxis, not treatment of active infections

Wound Classification:

- ✓ **Clean:** uninfected operative wound; no inflammation encountered and respiratory, alimentary, genital, or uninfected urinary tracts are not entered. Clean wounds are primarily closed and drained with closed drainage. Operative incisional wound following non-penetrating (blunt) trauma included if they meet the criteria. (eg. Ladd's procedure if inversion appendectomy, inguinal hernia, fundoplication w/o gastrotomy).
- ✓ **Clean-Contaminated:** Operative wounds in which respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions; without unusual contamination. Operations of biliary tract, appendix, vagina, and oropharynx are included, provided no evidence of infection or major break in technique. (eg. TEF, intestinal atresia, most gastroschisis w/ silo, gastrotomy).
- ✗ **Contaminated:** Open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique (ex, open cardiac massage) or gross spillage from the GI tract, and incisions in which acute, non-purulent inflammation encountered including necrotic tissue without evidence of purulent drainage (ex, dry gangrene), are included in this category. (eg, stool spillage in OR).
- ✗ **Dirty or Infected:** Includes old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation. (eg, NEC, perforated bowel).

Thank you for your cooperation! Feel free to direct questions/comments to any of the team members.

Ashley Blagdon, Niki Oikonomopoulou (Co-Leads); Adrienne Bischoff, Liran Tamir-Hostovsky, Mohammed Abu Helwa, Carlos Zozaya, Marta Garcia, Brian Gulack (Members); Annie Fecteau, Kathryn Timberlake, Michelle Science, Kyong Lee (Supervisors)

February 18, 2019

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AUGUSTA UNIVERSITY MEDICAL CENTER

Improvement in Early Alimentation and Return of Bowel Function Rates with Implementation of Improving Surgical Care and Recovery (ISCR) in Colorectal Surgery



AMERICAN COLLEGE OF SURGEONS

*Inspiring Quality:
Highest Standards, Better Outcomes*

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4. Name of Case Study:

Improvement in Early Alimentation and Return of Bowel Function Rates with Implementation of Improving Surgical Care and Recovery (ISCR) in Colorectal Surgery

What Was Done?

1. Global Problem Addressed

Enhanced Recovery After Surgery (ERAS) is a well-established multimodal program that encompasses all phases of care with standardized pathways in order to decrease variability amongst surgeons and improve patient outcomes. In colorectal surgery, ERAS has been shown to decrease length of stay, accelerate recovery postoperatively and improve outcomes leading to an overall decrease in cost.¹⁻³ Improving Surgical Care and Recovery (ISCR) is grounded in these principles and offers tools and educational materials to facilitate implementation of these pathways.⁴

2. Identification of Local Problem

We recognized the opportunity to improve our quality of care for patients undergoing colorectal surgeries by providing standardization and frequent analysis of our data in order to increase efficiency, decrease length of stay and improve outcomes. Our adult ACS NSQIP data indicated a need for improvement in our rates of urinary tract infection, post op surgical site infection, length of stay, and postop vein thrombosis.

How Was the Quality Improvement (QI) Activity Put in Place?

1. Context of the QI Activity

Augusta University Medical Center is a 478-bed academic health center with a Level 1 trauma center, a 154-bed children's hospital, and more than 80 outpatient practice sites serving Augusta, GA, and surrounding counties.

There is considerable institutional focus on quality care with the introduction of a Director of Quality and Safety and Surgeon Champions. The hospital already had a robust ERAS program for the bariatric and colorectal surgeries service; however, there was still inter-physician variation with use of all aspects of ERAS. The decision

was made by the organization to enroll in the ISCR program that was established between the American College of Surgeons and Johns Hopkins Medicine Armstrong Institute for Patient Safety and Quality.

2. Planning and Development Process

The project was initiated by our Surgeon Champion and Chief of Surgery. The decision was made to enroll in the ISCR program with an initial focus on the colorectal service line with plans to incorporate additional service lines such as orthopaedic, gynecology and emergency general surgery. The program provides prototypes for enhanced recovery pathways based on current evidence review. With this framework in place, we created a multidisciplinary team that meets biweekly to review data and identify areas of improvement and adapt the protocols to the local hospital culture. Buy-in was achieved through frequent communication with nursing staff and attending surgeons and residents via meetings and educational seminars during didactic conferences. From January 1, 2019, to June 30, 2019, baseline data from the colorectal procedures was abstracted and analyzed which helped us focus on key deficit areas that were relatively simple to address with progression to more complex issues. For instance, we focused on implementing the protocols on elective cases prior to working on implementing these protocols in the emergency colorectal procedures.

Once the protocols were established and the staff education on the principles was completed, adherence to the project goals improved over time. The frequency of the multidisciplinary meetings decreased. This was achieved by streamlining the protocols at the beginning of the project and including all staff involved in patient care such as nursing, surgery residents, anesthesia, and pharmacy. Once the barriers were identified and solutions incorporated, the protocols became the standard of care and the focus was diverted to booster training as needed due to staff turnover.

Description of the Quality Improvement Activity

Key components of our quality improvement project were education and standardization. This was achieved through creation of a patient information booklet that detailed the various steps, expectations, and goals for our patients' health journey before, during, and after hospitalization. The patients would meet with the Nurse Navigator prior to their scheduled operation and they would review incentive spirometry, how to shower with CHG soap prior to surgery, carb loaded drink prior to surgery, preoperative oral medications and bowel prep as applicable, benefits of early ambulation, concepts behind multimodal pain control and diet/nutrition.

Prior to their procedures, patients would have completed a mechanical bowel prep and oral antibiotics at home. They would discontinue oral intake of solids 8 hours prior to their procedure or prior to starting their bowel prep. They would continue consuming liquids with the last intake being a carbohydrate drink 2 hours prior to their procedure. During preop, patients would be started on a multimodal pain control that included gabapentin, acetaminophen and regional anesthesia as appropriate (epidural, spinal, or TAP block). Appropriate anti-emetic would be initiated as well (intraoperative intravenous anti-emetics).

Post-procedure, patients would be started on a clear liquid diet and multimodal pain regimen, including acetaminophen, gabapentin, nonsteroidal anti-inflammatory drugs (ketorolac or ibuprofen), muscle relaxant, lidocaine patch, and PRN oral and IV opioids. Patients would be encouraged to take oral pain medications over IV pain medications, and this was started in the PACU. During the hospitalization, goals would include early removal of foley, frequent ambulation, frequent use of incentive spirometry, and discontinuation of IV fluids as early as possible. Early alimentation was encouraged with a clear liquid diet on POD 0 and diet advanced guided by patient preference. Prior to discharge, patients would meet with the Nurse Navigator to reiterate the importance of activity at home, eating a healthy diet, and wound care instructions.

Baseline data collection was initiated January 1, 2019, and the implementation of ISCR protocols was initiated on July 1, 2019, and is ongoing.

Resources Used and Skills Needed

1. Staff

We used a multidisciplinary team approach that included a surgeon champion; surgical resident; anesthesiologist; nurse navigators; various floor nursing, clinic nursing, and perioperative representatives; nurse managers; integrated clinical practice strategist; and ACS NSQIP coordinator (SCR).

2. Costs

There were no additional costs beyond the normal operating costs and current personnel expenses with no additional hires during this timeframe. There was no additional funding designated for this quality improvement project.

What Were the Results?

1. Overall Results

Outcome measures for colorectal surgeries were collected from January 1, 2019, to June 30, 2019, prior to ISCR implementation to serve as a baseline. ISCR protocols were initiated on July 1, 2019, and over the course of 10 months, 57 cases were analyzed. Table 1 includes demographic data for the patients undergoing colorectal procedures before and after ISCR implementation. A reduction in mean postop days for return of bowel function (2.91 to 1.84), diet tolerance (3.35 to 2.20), and pain control with PO medications (3.80 to 3.18) was observed after initiation of ISCR protocols (as noted in Table 2).

Table 1. Patient Demographics Pre and Post ISCR Implementation

	Pre-ISCR Implementation (26 cases)	Post-ISCR Implementation (57 cases)
Mean Age in Years	58.79 +/- 10.79	55.58 +/- 13.68
Male	15 (57.69%)	27 (47.37%)
Female	11 (42.31%)	30 (52.63%)
Caucasian	13 (50.00%)	34 (59.65%)

Table 2. Outcomes Measures Related to Early Alimentation and Return of Bowel Function Pre and Post ISCR Implementation

	Pre-ISCR Implementation (26 cases)	Post-ISCR Implementation (57 cases)
Outcome Measures	Number of Post-Operative Days	Number of Post-Operative Days
Diet Tolerance	3.35	2.20
Return of Bowel Function	2.91	1.84
Pain Control with PO Pain Medication	3.80	3.18

Additional outcome measures including length of stay, multimodal pain management, and 30 day readmission rates were collected and compared pre and post ISCR implementation at our facility and other facilities that are utilizing ISCR protocols (Figures 1 and 2).

Figure 1. Process Measures of Colorectal Procedures Pre and Post ISCR Implementation

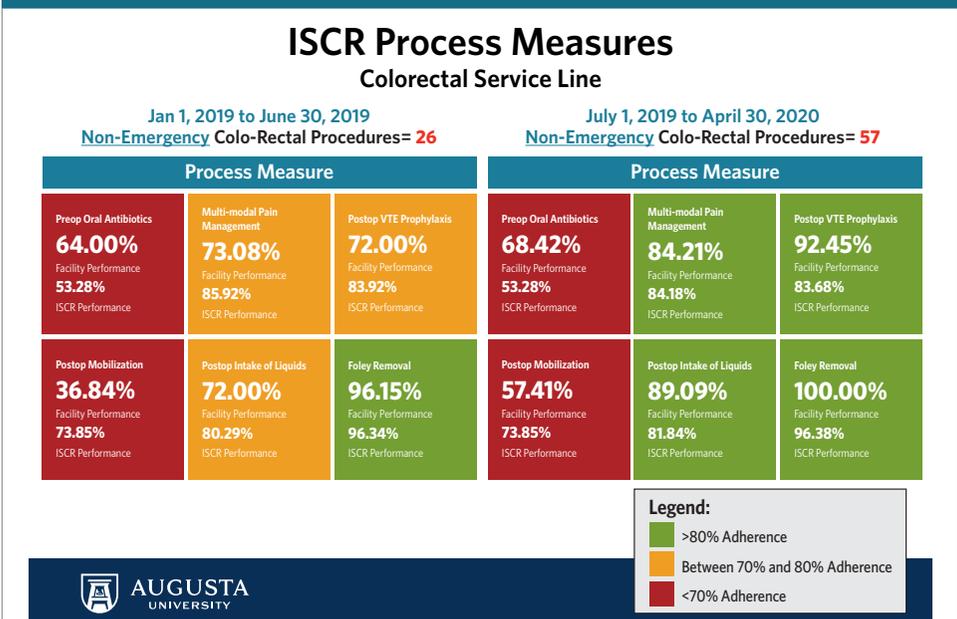


Figure 2. Postoperative Occurrences Measured Pre and Post ISCR Implementation for the Colorectal Service Line

Colorectal Service Line

Jan 1, 2019 to June 30, 2019 Non-Emergency Colo-Rectal Procedures= 26			July 1, 2019 to April 30, 2020 Non-Emergency Colo-Rectal Procedures= 57		
Postoperative Occurrences			Process Measure		
30-Day Readmission 26.92% Facility Performance 11.41% ISCR Performance	30-Day SSI 23.08% Facility Performance 10.36% ISCR Performance	30-Day VTE 3.85% Facility Performance 1.62% ISCR Performance	30-Day Readmission 15.79% Facility Performance 9.13% ISCR Performance	30-Day SSI 12.28% Facility Performance 9.87% ISCR Performance	30-Day VTE 3.51% Facility Performance 1.38% ISCR Performance
30-Day UTI 11.54% Facility Performance 2.59% ISCR Performance	Length of Stay (Days) 8.88 Facility Performance 6.49 ISCR Performance	Return of Bowel Function 2.91 Facility Performance 2.04 ISCR Performance	30-Day UTI 3.51% Facility Performance 2.32% ISCR Performance	Length of Stay (Days) 6.61 Facility Performance 6.53 ISCR Performance	Return of Bowel Function 1.84 Facility Performance 2.21 ISCR Performance



2. Setbacks

The main barriers encountered were related to compliance and implementation of ISCR protocols. This was tackled in a variety of ways including frequent education of floor, preoperative and PACU nursing staff by the Nurse Navigator. This allowed for booster training and identification of ambiguities in the protocol as perceived by nursing staff. Patients were also educated by the Nurse Navigator preoperative, intraoperative, and postoperative with a focus on early alimentation, multimodal pain management, use of oral instead of intravenous pain medication when possible, early ambulation, and benefits of earlier discharge. Additionally, order sets were created with input from surgery residents to streamline the admission process and ensure all aspects of the protocols were instituted.

Regular meetings (every two weeks) by the multidisciplinary team allowed for discussion of the data and addressing setbacks as they were encountered. For example, a decrease in compliance was noted in particular wards where there was recent staff turnover and this was remedied by staff education by the Nurse Navigator. Additionally, certain aspects were not being documented such as rates of ambulation. This was ameliorated by allowing Patient Care Technicians to document when patients were ambulating. This improved documentation while not increasing nursing workload.

Frequent communication between the Surgeon Champion and individual hospital providers is essential in establishing hospital wide compliance of protocols and eliminate variation that is secondary to physician preferences that may not be

aligned with best practices guidelines. Sharing of data, literature and meetings with hospital providers can help assuage concerns and increase compliance.

3. Cost Savings

There was no additional funding provided for this quality improvement project. Formal cost savings analysis has not been studied at this time.

Tips for Others

1. Get buy in from staff by emphasizing the quality improvement project as a potential for organizational cost savings, decreased resource utilization, and improving patient outcomes.
2. Establish a Surgeon Champion who is invested in the project and provide support from senior management.
3. Create a multidisciplinary team that meets frequently to review data and discuss solutions to unanticipated implementation hurdles.
4. Involve a Nurse Navigator to provide teaching to front line nursing staff as well as surgical patients during all phases of the hospital care in order to clarify treatment expectations and goals.
5. Create a patient information booklet that sets clear expectations and answers most common questions, and review this booklet with each patient in the preoperative evaluation to address the key points.
6. Use resources and programs already available as a template for your quality improvement projects. The American College of Surgeons and Johns Hopkins Medicine Armstrong Institute for Patient Safety and Quality have created the Improved Surgical Care and Recovery (ISCR) pathways for multiple service lines.

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4. Name of Case Study:

STOPPING THE CLOT: Reducing Postoperative Venous Thromboembolism in Neurosurgery

What Was Done?

1. Global Problem Addressed

Venous thromboembolism (VTE) occurrences are defined by a deep vein thrombosis (DVT), pulmonary embolism (PE), or both. The incidence of VTE affects nearly one in 1,000 people and contributes to 60,000 to 100,000 deaths annually.¹ Risk factors for VTE can be both hereditary and acquired. We have come to understand patients that require surgery are at a higher risk of developing a VTE.

2. Identification of Local Problem

Our ACS NSQIP January 2018 Semi-Annual Report (SAR) identified that Mercy Hospital Springfield was a high outlier for venous thromboembolism (VTE) occurrences in neurosurgery. Mercy Hospital Springfield, in comparison with our Mercy Collaborative, was found to have greater than 50 percent of the VTE occurrences within the same time frame. A 4.32 percent occurrence rate was reported for VTE within our neurosurgical patient population.

How Was the Quality Improvement (QI) Activity Put in Place?

1. Context of the QI Activity

Mercy Hospital Springfield is a community hospital located in Springfield, Missouri. It is known as the region's longest-serving health care provider. With 914 beds, we serve patients serves people throughout southwest Missouri and northwest Arkansas. We are home to a Missouri and Arkansas designated Level I trauma center and burn center, Life Line air ambulance service, a dedicated children's hospital, cancer center, Level III neonatal ICU, heart institute, and a nationally certified stroke center.

Mercy Hospital Springfield is part of the Mercy Health system. Mercy, named one of the top five large U.S. health systems for four consecutive years (2016 to 2019) by IBM Watson Health, serves millions annually. Mercy includes more than 40 acute care, managed, and specialty (heart, children's, orthopaedic and

rehab) hospitals; 900 physician practices and outpatient facilities; 45,000 co-workers; and 2,400 Mercy Clinic physicians in Arkansas, Kansas, Missouri, and Oklahoma. Mercy also has clinics, outpatient services and outreach ministries in Arkansas, Louisiana, Mississippi, and Texas. In addition, Mercy's IT division, Mercy Technology Services, and Mercy Virtual commercially serve providers and patients from coast to coast.

2. Planning and Development Process

The neurosurgery section group, comprised of physicians and mid-level providers, met officially in early March 2018 and comprehensively discussed factors that were felt to be contributory to the high VTE occurrence rates. Among the factors identified were a lack of uniformity in applying VTE chemoprophylaxis across the practice. This was felt to be due to differing treatment biases of the various practitioners, the heterogeneity of the patient population secondary to varying co-morbidities and risk factors, and ultimately the lack of a defined protocol for standardizing this aspect of patient care. To this end, a body of literature was reviewed and recent data from a recent completed protocol implementation at a major academic medical center was also discussed. No Level 1 guidelines exist in the scientific literature. However, based on review of various meta-analyses and recent unpublished data from a major academic medical center pertaining to implementation of a VTE prevention protocol, it was felt that there was a definite advantage to implementing a standard protocol for chemical VTE prevention. The data indicated a lower risk of VTE with no statistically significant increased risk for hemorrhagic complications. The VTE protocol was developed and discussed at a subsequent Neurosurgery section meeting with a general consensus from the neurosurgeons to move forward with the protocol.

Description of the Quality Improvement Activity

Three separate protocols were created for the Neurosurgery patient populations: Neurosurgical Postoperative Spine, Neurosurgical Postoperative Adult Cranial, and Neurosurgical Adult Trauma. Neurosurgical Postoperative Spine and Neurosurgical Postoperative Adult Cranial are similar. Chemical and mechanical prophylaxis would be utilized for the patient population as set forth by the defined criteria and assessment of any contraindications. The Neurosurgery section agreed to initiate preventative treatment 24 hours after surgery completion barring any exceptions (i.e., patients in shock; existing or emerging hemorrhagic complications without shock; clinically or radiologically identified postoperative hematoma formation; physicians with reasonable concern for postoperative hematoma formation based on intraoperative findings/course; significant postoperative anemia that has not stabilized; coagulopathy). To maintain standardization of dosing and to account for body weight variation, pharmacy would be consulted for weight-based adjustments of the prophylactic dosage. The Neurosurgical Adult Trauma protocol is defined for patients with traumatic brain and spinal cord/spine injuries. VTE prophylaxis

is initiated 72 hours after the injury/procedure for most intracranial hemorrhages, after craniotomy, and most spinal cord injuries. Criteria has been established to consider chemical prophylaxis 24 hours after a stable repeat head CT scan for patients with mild Traumatic Brain Injury (TBI) and the following: GCS of 15 within 30 minutes of injury; subdural or epidural hematoma < 8mm; contusion or intraventricular hemorrhage < 2cm (single lobe only).

Implementation of the VTE protocol took place in June 2018. The Neurosurgery section agreed that given the concern for possible increased incidence of postoperative hemorrhagic complications, they would re-evaluate the protocol at six months. At that time, the section would review the incidence of postoperative hemorrhages following implementation of the protocol and then make a final decision on whether to modify the protocol or implement the existing paradigm permanently. The protocol was reviewed in late 2018. Based on the successful results, the protocol was left in place without modifications.

Resources Used and Skills Needed

The ACS NSQIP Surgical Clinical Reviewers, ACS NSQIP Surgeon Champion, neurosurgery section, quality department and neurosurgical nursing staff were involved in the implementation, adherence, and outcomes of this developed protocol. No additional costs or funding beyond normal hospital operations were necessary to implement and maintain this protocol.

What Were the Results?

1. Overall Results

Following the deployment of the VTE Neurosurgery Chemoprophylaxis protocol, downward trending occurrence rates were observed utilizing SAR and ISAR data. VTE occurrence rates in Neurosurgery have decreased from 3.97 percent at the time of protocol initiation to 0.72 percent as based on our January 2020 SAR.

Mercy Hospital Springfield - Neurosurgery VTE Occurrences

SAR/ISAR Report	Occurrences/ Total Cases	Occurrence Rate	Odds Ratio
October 2017 ISAR (4/1/2016 - 3/31/2017)	14/301	4.65%	3.33
January 2018 SAR (7/1/2016 - 6/30/2017)	13/301	4.32%	3.06
April 2018 ISAR (10/1/2016 - 9/30/2017)	15/287	5.23%	3.66
July 2018 SAR (1/1/2017 - 12/31/2017)	12/275	4.36%	2.89
October 2018 ISAR (4/1/2017 - 3/31/2018)	11/256	4.30%	2.39
January 2019 SAR (7/1/2017 - 6/30/2018)	11/277	3.97%	2.13
April 2019 ISAR (10/1/2017 - 9/30/2018)	8/289	2.77%	1.61
July 2019 SAR (1/1/2018 - 12/31/2018)	8/293	2.73%	1.47
October 2019 ISAR (4/1/2018 - 3/31/2019)	4/279	1.43%	1.07
January 2020 SAR (7/1/2018 - 6/30/2019)	2/278	0.72%	0.97
April 2020 ISAR (10/1/2018 - 9/30/2019)	3/293	1.02%	1.01

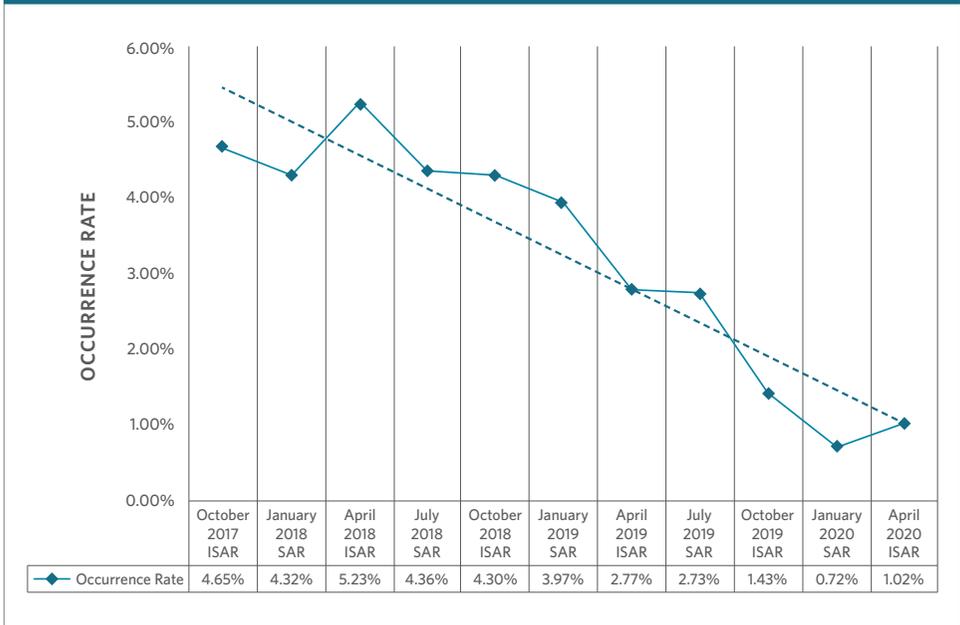
2. Setbacks

There were no encountered barriers related to the implementation of this protocol.

3. Cost Savings

Cost savings for this initiative was not calculated; however, a decrease in VTE rates does yield shorter hospital length of stays, decreased need for pharmaceutical treatment, and less likely need for additional readmissions and/or follow-up visits. As a result of this, decreased VTE instances is a large cost savings investment.

Figure 1. Mercy Hospital Springfield Neurosurgery VTE



Tips for Others

- Utilization of ACS NSQIP SAR and ISAR data for early trending to be able to identify areas of improvement
- Development of continuous monitoring of protocol compliance (medication administration, preop/postop prophylactic measures, VTE risk assessment, VTE treatment provided)
- Ongoing monthly communication with key stakeholders

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RUTGERS NEW JERSEY MEDICAL SCHOOL

Using the Palliative Performance Scale as a Trigger to Increase Goals of Care Conversations in Elderly Trauma Patients



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General Information

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4. Name of Case Study:

Using the Palliative Performance Scale as a Trigger to Increase Goals of Care Conversations in Elderly Trauma Patients

What Was Done?

1. Global Problem Addressed

Adults over 55 now account for more than 40 percent of trauma patients.¹ Compared with younger patients, these older trauma patients have higher rates of mortality and those that survive have worse long-term functional outcomes.^{2,3} These potential poor outcomes should be discussed with patients, as many older adults report valuing quality of life over quantity of life.⁴

Palliative care is specialized medical care that focus on preferences and quality of life in patients with serious illness. Palliative care should not be provided solely at the end of life. Any patient with a serious illness, functional dependency or advanced care needs should have a palliative care assessment while hospitalized.⁵ A critical aspect of providing palliative care involves having goals of care conversations with patients and providing care in line with their preferences. Although providing goal concordant care is recommended for all seriously injured patients, palliative care is unfortunately underutilized in surgical populations.^{6,7}

2. Identification of Local Problem

Our center has a strong interest in palliative care that has been integrated into our routine delivery of trauma care. Goals of care conversations are started early in patients that are identified as having a high risk of dying. Although almost all of our patients that died were receiving palliative care prior to death, we hypothesized that there remained gaps in palliative care delivery in our patients that were discharged alive, with poor functional outcomes. We performed a prospective observational study of all trauma patients ≥ 55 years admitted to our institution, and identified that more than two-thirds of our patients discharged with a poor functional outcome did not have a goals of care conversation while in the hospital.⁸

How Was the Quality Improvement (QI) Activity Put in Place?

1. Context of the QI Activity

University Hospital is a 500-bed urban safety net hospital located in Newark, NJ. It is the only Level I trauma center in Northern New Jersey with more than 3,000 trauma activations per year.

At our institution from 2016 to 2018, we performed a prospective observational study to evaluate the Palliative Performance Scale (PPS) as predictor of outcomes in elderly trauma patients. The PPS is validated tool for the assessment and prognostication of seriously ill individuals.⁹ It was initially developed for use in cancer patient, but has since been used in other seriously ill populations.¹⁰ The PPS scale consists of five domains: ambulation, activity and evidence of disease, self-care, intake and level of consciousness. Scores range from 0 to 100 in increments of 10, where 0 is death and 100 is healthy without limitations. Prior to initiation of the study a meeting was held and all members of the trauma team were introduced to the PPS and trained how to accurately calculate a patient's score. During the study period, advance practice nurses, that are members of the trauma team, evaluated all admitted trauma patients ≥ 55 years and calculated their PPS. From this study we found that low PPS (<80) was independently predictive of mortality and poor functional outcomes (defined by Glasgow Outcome Coma Score Extended [GOSE] of 1-4) at discharge and six-months.¹¹

2. Planning and Development Process

The American College of Surgeons Trauma Quality Improvement Program (TQIP) Palliative Care Best Practice Guidelines recommend that all trauma patients be evaluated for palliative care needs within 24 hours of admission. Patients identified as having life-threatening or disabling traumatic injuries, or those with less severe injuries that are frail, or have multiple co-morbidities, should have a goals of care conversation within 72 hours of admission.¹² We used these guidelines to create and monitor our quality improvement initiative.

To increase goals of care conversations in patients with a high likelihood of being discharged with a poor functional outcome (GOSE of 2-4), we targeted patients with low PPS (<80) score. This target was based off the findings from the prospective study performed by Hwang et al.¹¹

Prior to initiating the quality improvement project, it was imperative that we obtained buy-in. With support of the trauma medical director and chair of the surgical department, we engaged key stake holders-The head of quality improvement and the trauma nurse manager. In addition, we performed an assessment with the advance practice providers to discuss the barriers they faced. After engaging all these key stake holders, we presented our current data on goals of care conversations and our plan for our project to all members of the trauma team during both trauma section meeting and trauma grand rounds. In addition, flyers were placed in the surgical intensive care unit.

Description of the Quality Improvement Activity

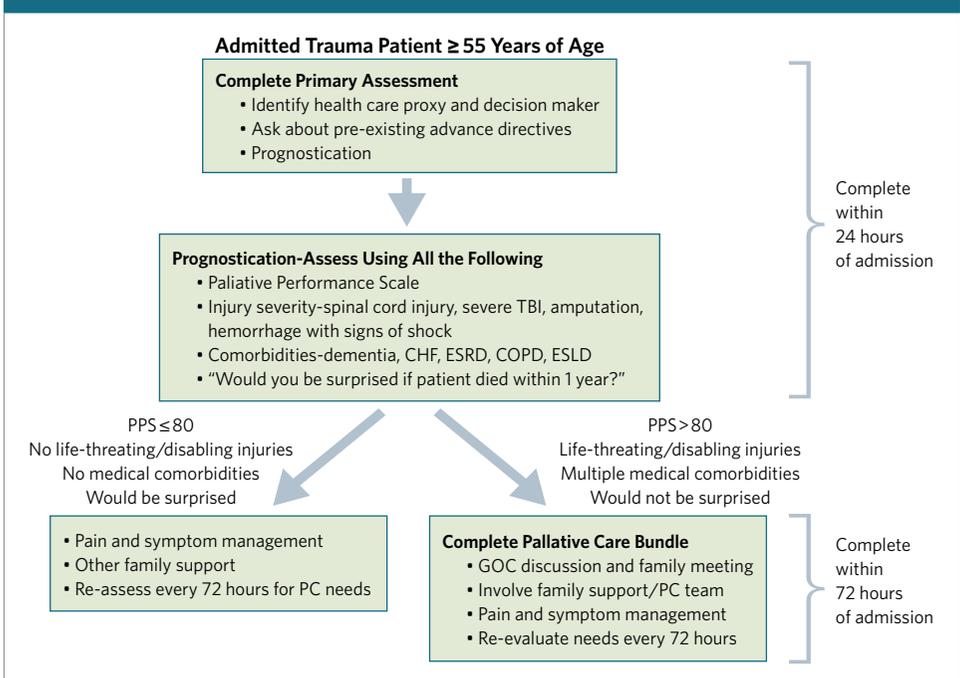
This Quality Improvement project was implemented on April 9, 2019.

The purpose of this project was to increase goals of care conversations in elderly patients with a low pre-injury PPS score by using a score less than 80 as a trigger for the conversation.

Our revised standard practice consisted of all admitted trauma patients ≥ 55 years of age having a PPS calculated on admission. A score less than 80 was an automatic trigger for referral for goals of care conversation to occur within 72 hours. The resident physician or advance practice provider evaluating the patient would initiate the conversation or call a palliative care consult, if they felt the patient had advanced needs they could not handle. Goals of care conversations and palliative care consult for all other patients remained at the discretion of the attending based on degree on injury severity and pre-existing comorbidities. A flow sheet of patient evaluation can be seen in Figure 1.

Prior to implementation of this quality improvement project, all members of the trauma team including attendings and advance practice providers had been trained in evaluating the PPS and in having goals of care conversations. A palliative care specialist was brought in to host a one day workshop on communication skills that included didactics and role play. Following this workshop, advance practice providers were equipped with the tools to not only evaluate PPS, but also hold goals of care conversations independently.

Figure 1. Palliative Care Needs Flow Sheet for Trauma Patients



Resources Used and Skills Needed

1. Staff

No additional staff was required for the implementation of this project. Buy-in and participation was necessary from the trauma team, including the trauma medical director, trauma faculty, advance practice providers and residents. In addition, support from the palliative care team was needed. This project was led by a surgical research fellow working in the trauma department.

2. Costs

There were no additional costs to implement this project.

3. Funding Sources

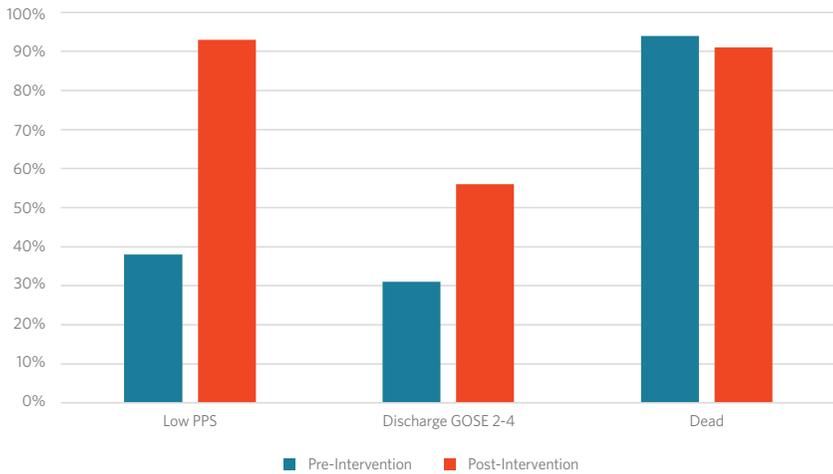
No funding sources were directly related to this project. The surgical research fellow received salary support from Auen Foundation for research in palliative care.

What Were the Results?

1. Overall Results

Over a six-month period 147 of 172 (85 percent) admitted trauma patients ≥ 55 years old had a PPS documented, with 43 percent completed within 24 hours of admission. Goals of care conversations were had with 93 percent of patients with a low pre-injury PPS, which was a 55 percent increase from pre-intervention. By increasing goals of care conversations in patients with low PPS, we were also able to increase conversations in patients discharged alive with poor functional outcomes by 25 percent (Figure 2). Nearly two-thirds (64 percent) of all goals of care conversation occurred within 72 hours of admission. Of all patients that had a GOCC, 14 percent of meetings were held independently by the Advance practice providers. The remainder of the conversations were held with the palliative care team or surgical attendings.

Figure 2: Proportion of Goals of Care Conversation Pre- and Post-Implementation of PPS as Trigger in Patients with Low PPS, Poor Functional Outcome at Discharge, and In-Hospital Mortality



2. Setbacks

• Barriers to Buy-In and Evaluating the PPS

- Evaluating patients and calculating a PPS is an additional task that must be completed in an already busy trauma center. There were patients that did not have PPS evaluation or documentation. This occurred most often during the high-volume months or on holidays.
- Patients that arrived without families that were unable to participate in a meaningful way could not have their PPS evaluated within 24 hours of admission or at all.
- The PPS was evaluated by advance practice providers who are not always present in the surgical ICU. Many patients admitted directly to the ICU were missed.

• Solutions to Buy-In and Evaluating the PPS

- To increase buy-in, we engaged the trauma nurse manager and head of quality improvement. We also presented our findings at trauma section meeting.
- To avoid any missed patients, especially those pending family input for completion, the surgical research fellow kept an active run sheet of all admitted trauma patients, and whether or not a PPS had been documented. The research fellow would then send out biweekly emails of pending patients.

- To capture patients that were admitted to the surgical intensive care unit we trained surgical residents who cover the unit on how to evaluate the PPS.
- **Barriers to Having the Goals of Care Conversations**
 - The palliative care team is a busy service that may not be able to see all patients in expeditious time frame or on the weekends.
 - Surgical attendings do not always have time to conduct goals of care conversations.
- **Solutions to Having the Goals of Care Conversation**
 - All members of the trauma team including advance practice providers were trained in conducting goals of care conversations. This training allowed them to have these conversations independently when the palliative care team or surgical attendings were not available.

3. Cost Savings

This project did not focus on cost savings, it was purely focused on increasing goals of care conversations. Although we did not focus on or measure costs, palliative care has been shown to decrease the use of health care resources and reduce costs.¹³

Tips for Others

Tips to Increase Buy-In

1. Buy-in from key stake holders such as the trauma medical director, trauma faculty, and advance practice providers is essential.
2. When introducing the project, stress the WHY. No one wants to perform additional work, but by stressing how this project is impacting patient care can increase engagement.

Tips for Developing the Skill Set

1. For institutions without a palliative care team or trauma teams that are not comfortable in discussing goals of care, we would recommend faculty training in palliative care.

Tips for Sustaining the Project

1. A team leader is necessary to oversee the project and maintain a database.
2. We chose to focus our initiatives on the advance practice providers as they are constant members of the trauma team. Surgical residents rotate on and off service every month and are not as consistent members of the team.
3. Share successes! Update team members regularly with progress to help keep them engaged.

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GOOD SAMARITAN MEDICAL CENTER

Performance Improvement in a Hip Fracture ERAS Program



100+years

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*Inspiring Quality:
Highest Standards, Better Outcomes*

General Information

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4. Name of Case Study:

Performance Improvement in a Hip Fracture ERAS Program

What Was Done?

1. Global Problem Addressed

Hip fractures are a major public health concern in the United States with more than 100,000 hip fracture repairs performed annually.¹ A large proportion of hip fractures occur in the geriatric population and are often presented with comorbidities.² The consequences of a hip fracture consist of a one-year mortality rate of more than 30 percent, functional loss, and estimated medical expenses of more than \$40,000.³ With an aging population, the incidence of hip fractures will continue to increase. Although there has been an improvement in surgical interventions, the rates of subsequent fractures are high at 30 percent for women and 22 percent for men.⁴ Of the subsequent fractures, the mortality rates for men and women are 74 percent and 49 percent, respectively.⁴ One method to improve the outcomes of hip fracture patients is the adoption of an Enhanced Recovery After Surgery (ERAS) program. ERAS is a multidisciplinary approach to perioperative care with the goal of standardizing patient care to reduce the physiological stress of surgery, complications, and mortality. By minimizing the variation in perioperative care and implementing a patient-centered team approach that coordinates all phases of care, the value of care (quality ÷ cost) should improve.⁵

2. Identification of Local Problem

Previous semi-annual reports from the American College of Surgeons (ACS) National Surgical Quality Improvement Program (ACS NSQIP) presented an opportunity for improvement in the care of our hip fracture patients. Namely, risk-adjusted rates of postoperative mortality, delirium, venous thromboembolism (VTE), and surgical site infection (SSI) were consistently in the upper deciles. Therefore, in 2018, we joined the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery (ISCR) with an emphasis on hip fractures. We focused on patients undergoing the following hip surgeries: open reduction, internal fixation, hemiarthroplasty, and/or total arthroplasty. Our overall goal was to standardize and integrate all phases of care. Our specific aims were to improve postoperative mortality, delirium, SSI, urinary tract infections (UTI), VTE and length of stay (LOS).

How Was the Quality Improvement (QI) Activity Put in Place?

1. Context of the QI Activity

Good Samaritan Medical Center is a community based, 250-bed level II trauma center and is part of the SCL Health integrated network. As a long-standing member of ACS NSQIP, we formed an ERAS task force to develop and implement ERAS service lines for elective colorectal surgery in 2016, and elective total hip and knee replacement in 2017. These initiatives produced substantial health care value and provided the motivation to implement a care pathway for hip fracture patients, which coincided with the ISCR program's development of a hip fracture ERAS pathway in 2018. Our hospital admits approximately 200 patients with hip fractures per year.

2. Planning and Development Process

The ERAS task force directed its efforts to hip fractures in 2018. The urgent, non-elective nature of patients admitted for hip fractures, particularly during "off-hours," required expansion of our team to include the Emergency Department (ED). We also recruited physician hospitalists and nursing leadership (Chief Nursing Officer, directors, managers) because some hip fracture patient admissions were transferred directly from outlying health facilities to the hospital floor, and thus bypassed the ED process. The task force was led by the ACS NSQIP physician champion who also serves as the Medical Director of ERAS. The exploratory meeting with all stakeholders began with the question: "In your phase of care, what is an identifiable opportunity gap for improvement?" As every representative expressed key concerns and suggestions, it became obvious that an ERAS pathway for hip fracture was a critical need. Subsequent meetings were held monthly to build a pathway that synergized care within and among the care phases.

Description of the Quality Improvement Activity

The ACS NSQIP surgical clinical reviewer (SCR) served as the ERAS coordinator for hip fracture. This coordinator worked in conjunction with representatives in all phases of care. Because our hospital was the first to develop hip fracture ERAS in the SCL Health system, our Clinical Informatics (CI) specialists assisted in developing subsets of hip fracture ERAS-specific orders nested into pre-existing medical and surgical hospital order sets. One key addition was a dietary order that allowed solid food intake until 10 hours before the anticipated surgery start time, and clear liquids until 4 hours prior to the surgery start time. These stop times added 2 hours to the American Society of Anesthesiologists NPO guidelines to account for the possibility of surgeries being moved to earlier in the day. Another key addition was a delirium prevention protocol ordered for all patients admitted with a hip fracture.

The medical director of ERAS created and disseminated a detailed pathway from admission to post-discharge, and a “pocket guide” highlighting the key steps in each phase of care. These materials were developed from published literature, the ISCR hip fracture resource library, and our task force consensus. The director also presented at the Lunch and Learn, our hospital-wide grand rounds. The SCR/ERAS coordinator led small-group meetings and provided education materials to representatives from each phase of care.

The physician director of the ED and the ED nursing leaders relayed the education materials to the ED department providers and staff. An informational handout was created to provide education to the patient and family members (Appendix 1). The ED physicians received training on fascia iliaca compartment (FIC) blocks and adopted the rationale for allowing, at a minimum, water intake. Opioid-sparing multi-modal analgesics were encouraged in addition to the FIC block. The directors of hospital medicine emphasized the need for rapid medical clearance to expedite the time from admission to surgery,⁶ the importance of allowing solid food and clear liquid intake within ASA guidelines prior to the expected time of surgery, and principles of opioid-sparing analgesics.⁷ These action items provide a promising strategy to reduce the incidence of perioperative delirium.⁸ In total, we considered pain, dehydration, opioids, polypharmacy (i.e., benzodiazepines, anticholinergics), environmental factors, urinary retention, and constipation as major precipitating factors for delirium.⁹

A final element specific to patients admitted for hip fracture was a process checklist to be completed by providers in each phase of care (Appendix 2). This “shared note” was added to the EPIC medical record after an ED administrative assistant sent a text alert to the SCR/ERAS coordinator and the Medical Director of ERAS, notifying of a new admission. This was necessary because hip fracture admissions occurred at all hours and providers needed a “behavioral nudge” to institute the ERAS-specific orders and care processes, including the preoperative diet and delirium prevention strategies. The preoperative diet order was especially challenging for multiple reasons: (1) the anticipated surgery start time was subject to operating room availability and the time required for medical clearance of the patient; (2) although multiple diets were available in the EPIC ordering system (i.e., regular, diabetic, clear liquids, NPO), there was no order option accompanying the appropriate diet with stop times for solids and liquids; and (3) the EPIC ordering system is a different platform than what is utilized in the hospital kitchen. As such, an ordering provider could free-text instructions for solid and liquid stop times, but the kitchen would not see the free text. This means that the patient or the family could phone the kitchen ordering system and receive a meal delivery in discord with the EPIC physician order. An “NPO violation” was considered unacceptable as this could lead to surgical delays despite the effort to minimize time from admission to surgery. To address this barrier, we created a new physician order called “Nurse to Place NPO Order,” which allowed the floor nurse to discontinue the solid order and subsequent clear liquid order 10 and 4 hours prior to surgery, respectively.

Several “soft rollout” ERAS items were adopted in early 2019, such as FIC blocks in the ED and spinal anesthesia in the OR. The official launch with all aspects of the pathway, including the patient education handout, the ERAS checklist upon admission, and preoperative diet, was August 21, 2019. The traditional care approach and the ERAS core principles are listed in Table 1.

Table 1. Core Principles in Hip Fracture Care with ERAS Implementation		
Core Principle	Traditional Approach	ERAS Implementation
Patient/Family Education	No written information given prior to ERAS	ERAS information sheet given to patients and family members
Diet	NPO after midnight	Water allowed in ED Solids until midnight before surgery Clear liquids >4 hours before surgery
Multimodal Pain Management	Opioid-based analgesia	FIC block in ED Non-opioid multimodal analgesics Opioids for breakthrough pain, no patient-controlled analgesia (PCA)
Delirium Screening and Prevention	Delirium prevention protocol not universally ordered	Automatically assess if <65 yrs old and at-risk patients <65 yrs old ICDSC score \geq 4: notification of hospital medicine
Time from Admission to Surgery	Within 48 hours	Within 30 hours
Surgical Site Infection	Optional bed bath with bath wipes prior to surgery	“Nose to Toes” chlorhexidine gluconate wipes the night before surgery, repeated in preop unit
Mobilization	Physical therapy begins the day after surgery (POD 1)	Out of bed (OOB) day of surgery Physical therapy day of surgery Ambulate within 12 hrs of surgery

FIC: fascia iliaca compartment; ICDSC: Intensive Care Delirium Screening Checklist

Resources Used and Skills Needed

1. Staff

The ERAS task force and number of participants is listed in Table 2.

2. Costs

There were no additional costs beyond normal hospital operations to implement and maintain the QI program.

Table 2. ERAS Task Force

Stakeholder	Number
ACS NSQIP/ERAS Physician Champion	1
ACS NSQIP Surgical Clinical Reviewer / ERAS Coordinator	1
Orthopaedic Surgeon	2*
Orthopaedic Surgery Physician Assistant	2*
Anesthesiologist	2*
Hospital Medicine Physician	2*
Emergency Department Physician Director	1
Emergency Department Nursing Leadership	2
Chief Medical Officer, sponsor of ERAS project	1
Chief Nursing Officer	1
Director of Clinical Pharmacy	1
Trauma Nurse Specialist	2
Hospital Floor Nursing Leadership	3
Perioperative Nursing Leadership (preop unit, OR, postop unit)	4
Infectious Disease Officer	1
Dietary and Nutrition Specialist	1
Orthopaedic Care Specialist / Navigator	1
Physical and Occupational Therapy	1
Clinical Informatics	1
Total	30

* Indicates two personnel were required in each category, one representing a physician group that serves patients in a Health Maintenance Organization (Kaiser Permanente) and private practice orthopaedic and internal medicine physician groups that serve patients apart from the HMO.

What Were the Results?

1. Overall Results

The patient characteristics and process measures are listed in Table 3. We excluded patients receiving percutaneous hip pinning from analysis, because this surgery is minimally invasive and can be performed under local anesthesia and sedation. Our control group consisted of all hip fracture patients in 2018 to eliminate the confounding effects of “soft rollout” interventions that were developed in early 2019. The percentage of patients with preoperative dementia was greater in the pre-ERAS group, which may be attributed to a slightly older population. Alternatively, the emphasis of ERAS interventions (FIC blocks, opioid-sparing multimodal analgesics, delirium prevention protocols upon admission, clear liquid diet) may have reduced preoperative mental status changes and decreased the

chance of listing dementia in the hospital problem list. The time from admission to surgery was improved in the ERAS group. The use of FIC blocks, regional anesthesia in the OR, and the use of tranexamic acid was greater in the ERAS group. The other process interventions that were novel in the ERAS pathway did increase from pre-ERAS, but there is certainly capacity for improvement in these categories.

Table 3. Patient Characteristics and Process Measures		
Characteristic	Pre-ERAS n = 194	ERAS n = 140
Date range of surgery	01/01/2018 – 12/31/2018	08/21/2019 – 03/31/2020
Mean age (yr)	81	79
Sex (F:M)	134:60	82:58
Preoperative dementia	13%	5%
Admission to surgery < 30 hrs	80.8%	83.8%
Fascia iliaca compartment (FIC) block in ED	16%	40%
Allowed clear liquids until 4 hours prior to surgery	N/A	43%
CHG wipe in preop unit	N/A	50%
Use of regional anesthesia	27.9%	52.1%
Use of tranexamic acid in OR	8%	40%
Out of bed on day of surgery	N/A	40%
Postoperative scheduled Tylenol	N/A	49%

Data for ERAS patients derived from ISCR reports from August 21, 2019, to March 31, 2020.

As shown in Table 4 the major finding of our QI program is that the 30-day mortality median length of stay was reduced from 5 days to 4 days after implementation of ERAS. Following ERAS implementation, the rate of delirium was reduced from 32 percent to 19 percent ($p < 0.05$). Since delirium is the most common complication after surgery in the geriatric population, we were pleased to see a drastic reduction in delirium event rates.¹⁰ Postoperative VTE requiring therapy were reduced from 3 percent to 2 percent. Rates of postoperative UTIs unexpectedly increased from 3 percent to 4 percent, despite encouragement of urinary catheter removal on POD 1.

Table 4. Outcome Measures before and after Hip Fracture ERAS Implementation

Outcome	Pre-ERAS n = 192	ERAS n = 167
Mortality (no.%)	8%	6%
Length of stay (median), days	5.0	4.0
Length of stay (mean ± SD), days	5.15	4.9
Postoperative delirium	32%	19%*
Blood transfusion	1%	3%
Discharge to home instead of care facility	16%	21%
Surgical site infection	1%	0%
Urinary tract infection	3%	4%
Venous thromboembolism	3%	2%

Data for ERAS patients derived from ISCR reports from August 21, 2019, to March 31, 2020, and manual abstraction. Delirium events, blood transfusion events, and discharge placement were tracked during hospitalization. Mortality, surgical site infection, urinary tract infection, and venous thromboembolism were tracked for 30-days post-discharge. * $p < 0.05$.

2. Setbacks

Major barriers that we encountered during the QI activity implementation centered on the complexity of coordinating all personnel in every phase of care. Busy EDs and physician groups have many rotating on-call providers which evokes a natural variation in familiarity with the ERAS protocol. These challenges are exacerbated by limitations in the EPIC medical record system for off-hours admissions. For instance, ERAS programs for elective surgeries allow pre-hospital education, health optimization, standardized nutritional support, and carbohydrate fluid administration on the morning of surgery. In contrast, our hip fracture program relied upon around-the-clock notification from the ED administrative assistants via text messaging. By remote access into EPIC, we manually entered a shared note checklist upon admission and asked representatives from each phase of care to contribute to the shared note. Completion of the shared note was also difficult due to the large volume of nursing personnel during each care phase. Direct communication was required to advise providers on the proper handling of preoperative diet orders, which was not always feasible. A final setback and limitation of this report was the inability to automatically extract opioid administration from the EPIC medical record, which would result in mean morphine equivalent data for each patient.

A solution to these barriers may be addressed by a “Care Pathway” system within EPIC, that conceivably would automatically activate the ERAS pathway for hip fracture patients who are admitted through the ED. The system would then guide providers along each step of the pathway. Moreover, improvements are needed for a simple ordering system to allow clear liquids until 4 hours before surgery, and an electronic method to abstract total opioid use.

We revised our original QI plan regarding the preoperative diet. The “Nurse to Place NPO Order” was an undue burden on the busy floor nurse. Although we did not encounter NPO violations, we soon realized that allowing solid foods until 10 hours before surgery was too cumbersome, and we simplified this strategy by stopping solid foods at midnight. Another opportunity gap we need to address is ongoing vigilance of delirium risk. While the delirium prevention protocol is helpful, we have less ability to track whether the hospital physician was notified if an ICDSC score was increasing for a given patient, and what action items were instituted to ameliorate delirium.

3. Cost Savings

- The approximate amount we invested was minimal, aside from meeting times and participation of hospital staff.
- The financial analyst at our hospital system estimated that reducing LOS for hip fracture patients by one day saves \$593 per patient. For the present ERAS cohort, this saved approximately \$90,000. For a full year of approximately 200 admissions, the savings would be roughly \$118,600.

Tips for Others

- The key aspect of our launch was to keep a common and achievable goal in mind while establishing new protocols in the ED. After establishing our goal we focused on educating hospital staff and patients during the process to ensure we were collecting accurate and measurable data. For example, if a FIC block was performed in the ED the procedure notes were included in the ED notes along with any complications. Once we decided to measure percentage of patients receiving a FIC block it was easy to access the data and determine if the FIC block occurred in the ED or after hospital admission.
- Meetings occurred monthly at Good Samaritan Medical Center and were key to meeting our deadlines. During meetings it was helpful to discuss our successes, setbacks, and necessary changes. We used a master excel spreadsheet to keep track of our data. Some data was pulled from ISCR reports and some was manually abstracted.
- A leader is important during the process to ensure the team is keeping on track with the ERAS goals. It can be a complicated and tiring process to launch a new program; therefore, a key stakeholder is necessary to manage all of the milestones during the process.

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Appendix 1. Patient Handout: *Caring for Our Patients with a Broken Hip*

Our Medical Center now has a care pathway for our patients with hip fracture, which is called **Enhanced Recovery after Surgery (ERAS)**. This is a team approach that involves you, your loved ones, and our entire team of doctors, nurses, therapists, and support staff.

We have developed this care pathway because we know that when we all work together, from your hospital admission until your full recovery, we are giving you the best chance of having the best possible outcome.

Here is what you can expect during your hospital stay:

EMERGENCY DEPARTMENT

- We will explain your diagnosis and give you explanations of what you can expect during your stay
- You will be offered clear liquids to drink. If you are diabetic you will be allowed water. You will also receive IV fluids to avoid dehydration.
- Our ED doctor will consider performing a nerve block procedure to reduce your pain.
- We will treat your pain with a variety of medications to help reduce the amount of opioid narcotic medications that you are given.
- By treating your pain with a variety of methods and allowing you to drink, we hope to reduce the chance of you having confusion.
- You may be offered a urinary catheter to help you urinate until after surgery.
- We will try to schedule your operation within 24 hours of arrival to the hospital.

HOSPITAL FLOOR BEFORE SURGERY

- You will be allowed to drink clear liquids until 4 hours prior to surgery (diabetics get water only).
- You will be allowed to eat up until midnight prior to surgery. Please do not eat or drink anything that is not provided by the hospital team.
- We will continue to treat your pain with a variety of medications to help reduce the amount of opioid narcotic medications that you are given.
- If you take certain blood thinners, you will receive treatments to improve blood clotting during surgery.

SURGERY

- You will meet your surgeon and anesthesiologist for questions, answers, and consent for surgery.
- You may be offered spinal anesthesia (medicine in your back, plus sedation) or general anesthesia (asleep with a breathing tube).
- Water and other clear liquids may be offered in the recovery room.

HOSPITAL FLOOR AFTER SURGERY

- We will get you out of bed for meals and start physical therapy as soon as possible.
- If you have a urinary catheter it will be removed in a day or two.
- We will treat your pain with a variety of medications to help reduce the amount of opioid narcotic medications that you are given.
- You can expect to take blood thinners to prevent blood clots for a month or more after surgery.
- We will coordinate your after-hospital care to ensure the safest and soonest recovery to get back to your way of life. Thank you.

Appendix 2. ERAS Hip Fracture Checklist “Shared Note” on EPIC

Welcome to the ERAS pathway! Our goals are to standardize care, optimize patient and family education, reduce pain and opioids, minimize delirium, allow appropriate food and fluids, operate within 24 hours of admission, encourage postoperative nutrition and ambulation, and optimize VTE prophylaxis and rehabilitation on discharge.

Ensure all items below are documented in the appropriate location in the chart.

ADMISSION/EMERGENCY DEPARTMENT

- Diagnosed with hip fracture and added into EPIC List: {yes no}
- Provide patient 1 page Talking Points education material: {yes no}
- Nerve block in ED (fascia iliaca or femoral): {yes no} Date ^{***}, Time ^{***}
- Foley catheter placement or external catheter at discretion of ED team: {yes no}
- Water allowed until 4 hour before surgery start time; Non-diabetics may have clear liquids: {yes no}

INPATIENT UNIT-PREOP

- Surgery performed within 24 hours: {yes no}
- Provider places ‘Nurse to Place NPO Order’: {yes no}
- Nurse places order/times for clear liquids AND NPO strict: {yes no}
- Water ad lib until 4 hour before surgery; Non-diabetics may have clear liquids (i.e., apple juice): {yes no}
- Solid foods up until 10 hour before surgery: {yes no}
- Delirium Prevention Protocol: {yes no}
- Provider notified of delirium screening score of ≥ 4 : {YES/NO/NA}
- Isogel bed: {yes no}
- Begin sequential compression devices (SCD’s): {yes no}
- Education materials (1 page Talking Points and Hip Fracture Booklet) reviewed with patient and family: {yes no}
- Foley catheter placement or external catheter (if appropriate): {yes no}
- CHG bath the night before or day of surgery: {yes no}
- Receive scheduled non-opioid pain medication (example-Tylenol, NSAIDS or Gabapentin): {yes no}

SURGERY

- Nose to toes in Pre-surgical Care Unit: {yes no}
- Fascia Iliaca (FIC) block if no planned periarticular block by surgeon; may place FIC catheter: {yes no}
- Spinal anesthesia (preferred, may be appropriate for INR up to 1.4 after r/b/a assessment): {yes no}
- Tranexamic acid 10 mg/kg up to 1g given prior to incision: {yes no}
- Periarticular injection by surgeon: {yes no}
- PONV prophylaxis: {yes no}

INPATIENT UNIT POSTOP

- Delirium Prevention Protocol: {yes no}
- Provider notified of delirium screening score of ≥ 4 : {YES/NO/NA}

- VTE prophylaxis started within 24 hours of surgery, mechanical + pharmacologic: {yes no}
- Advance diet as tolerated, eat meals out of bed: {yes no}
- Patient mobility: OOB POD 0--chair {yes no}, ambulate {yes no}
- WBAT POD 1: {yes no}
- Date of 1st ambulation (>10ft): {yes no} Date *** , Time ***
- Foley removal within 24 hours after surgery: {yes no}
- Receive scheduled non-opioid pain medication (example-Tylenol, NSAIDS or Gabapentin): {yes no}
- Discharge planning initiated (Care management): {yes no}
- Postoperative VTE prophylaxis plan (example-Lovenox x 4 weeks, ASA 81 BID x 4 weeks) ***

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HOLSTON VALLEY MEDICAL CENTER, BALLAD HEALTH

Reducing Returns to the Operating Room: A Patient Quality and Safety Initiative



AMERICAN COLLEGE OF SURGEONS

*Inspiring Quality:
Highest Standards, Better Outcomes*

100+years

General Information

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4. Name of Case Study:

Reducing Returns to the Operating Room: A Patient Quality and Safety Initiative

What Was Done?

1. Global Problem Addressed

While technology has continued to advance the surgical field toward more minimally invasive, cost-conscious, patient satisfaction driven procedures, the battle to prevent surgical complications has also taken center stage as a means to improve patient outcomes and reduce overall health care costs for both patients and hospitals. Complications and their associated costs after surgical intervention vary widely in both complexity and cost. Wound infections alone can vary from estimated costs of \$400 to \$30,000 dependent on complexity.¹ Major surgeries with significant complications, including those requiring re-operation, can surge cost by five times, approximating an increase of \$159,345 per case.² Many guidelines and initiatives have been developed to reduce surgical complications. Initiatives like Enhanced Recovery After Surgery (ERAS) have greatly reduced complications, re-operations, and readmissions all while improving costs and satisfaction.³ Ideally, developing an overall plan that incorporates a multi-initiative approach to reduce complications and minimize returns to the operating room while decreasing length of stay and improving patient satisfaction is key.

2. Identification of Local Problem

In 2017, an initiative was started within our facility to increase efficiency, quality of care, and safety within the operating room at Holston Valley Medical Center. During a retrospective review of cases, concern arose regarding patient returns to the operating room. These issues were brought to light when multiple returns labeled as “planned,” consisting often of acute care surgical patients left in discontinuity with wound vacs, were called out as a concern for quality of care. As an example, a single patient experienced more than 30 returns to the operating room by multiple surgeons. While a reasonable number of returns to the operating room are expected, we began our journey reviewing all returns in attempt to identify specific areas of improvement. Review of the nearly 11,000 cases performed yearly in the main operating room at our facility demonstrated that one out of every six patients experienced a return to the operating room, most of which were unplanned. These returns led to decreased patient

satisfaction and increased health care cost not only for the hospital, but more importantly the patient. The return cases were clustered between acute care surgery and orthopaedic surgery, many which were emergent/urgent in nature.

Our goal was to focus on improving quality of care by working through a team effort to identify and reduce returns to the operating room while improving overall outcomes. We identified that critical to the success of this project was the cooperative involvement of our quality team, surgeons, and operating room team, combined with overall support of our hospital's administrative team. Of utmost importance was obtaining surgeon buy-in while maintaining a non-punitive approach in both case review and communication.

How Was the Quality Improvement (QI) Activity Put in Place?

1. Context of the QI Activity

Holston Valley Medical Center is a not-for-profit, tertiary center located in Kingsport, TN. During the time this initiative was started, Holston Valley served as one of two Level I trauma centers in our region. Since that time, Holston Valley has undergone a merger into a larger system, Ballad Health. In order to minimize duplication and better serve our communities, Holston Valley became a Level III trauma center while remaining a large tertiary care center in our region.

Since 2016, Holston Valley has participated in the American College of Surgeons National Surgical Quality Improvement Project. We are an active member in the Tennessee Surgical Quality Collaborative. Our involvement in both these areas dramatically increased from 2016 forward. As a result, our focus turned to improving areas demonstrated on our ACS NSQIP risk-adjusted score card. While focusing on overall improvements in surgical site infections, length of stay, and moving forward with starting our ERAS program, reducing returns to the operating room became a priority.

2. Planning and Development Process

Once our return to the operating room rates were determined to be 16.67 percent, we knew as a facility that we must act swiftly. The process for improvement started by designating that all cases that returned to the operating room within thirty days of the original operation would be reviewed weekly then presented to an overseeing committee, the Incident Review Committee (IRC). Additional review can be provided if necessary at monthly Peer Review or existing Quality Committee meetings. These committees report to the Medical Executive Committee which in turn reports to the Community Board for Holston Valley.

In order to obtain buy-in from the surgeons, establishing their involvement early was critical. The Medical Director of the Operating Room, a surgeon, reviewed all return to the operating room cases. Once presented to the IRC, the attending surgeon was sent a letter either stating that there were no concerns of care identified or asking for further explanation. This letter serves to keep the

surgeon in the loop for which cases are being reviewed and allows them active participation in the quality review process. With consensus reached amongst surgeons that reducing returns and therefore improving patient care, our project moved forward rapidly.

Description of the Quality Improvement Activity

Having garnered the support of both surgeons and administration, we began outlining a clear process that incorporated both the involvement of our quality team and our medical staff to facilitate change. The overall process was two-pronged. First, we established a process to review each return to the operating room. Second, we focused on changes that can be made in the operating room to reduce potential causes for unplanned returns.

In regard to the review process for returns to the operating room, we developed the policy to review all returns to the operating room on a case-by-case basis, regardless of whether the return was planned or unplanned. In addition, any case, for which a concern is identified, whether it involves a return to the operating room or not, can be reported through the incident report system by any staff member. This has allowed all staff members to feel empowered to report quality of care concerns in real-time for evaluation. Each return to the operating room or reported concern is reviewed in detail by the Medical Director of the Operating Room, a fellow surgeon. Once the case is reviewed, the Medical Director reports the details of the case along with a recommendation to either validate, invalidate, or request further review to the IRC. The IRC consists of the Chief Medical Officer (CMO), Medical Staff Executive committee (President, President-Elect, Past President, and Secretary/Treasurer), Quality Physician Chair, Quality Manager, Risk Management, Chief Nursing Officer (CNO), and Pharmacy Director. At this point, the reviewed case can be deemed invalid with no concerns, valid with concerns, recommended to Peer Review for that specialty for further evaluation, or request explanation from the surgeon. Peer Review recommendations are made to the Quality Committee which forwards information to the Medical Executive Committee. Validated concerns are placed on the surgeons Ongoing Professional Practice Evaluation (OPPE) Scorecard for two years. The surgeon is contacted throughout the course of the review by letter for full transparency and allowed to contribute in dialog throughout.

The second arm of our approach to quality improvement focused on reducing potential risks contributing to returns in the operating room. A considerable portion of the focus in the area utilized a team of Infection Prevention, Quality, and Operating Room Management who drove an initiative of re-education. Emphasis was placed on reinforcing sterilization techniques, re-educating to ensure proper hand scrubbing, and patient optimization as the patient moved through all phases of the operating room. Traffic in and out of the individual operating suites was minimized. Vendors were monitored to ensure scrubs were changed, movement in and out of the operating suite was reduced, and re-education performed to reiterate not violating sterile field.

In conjunction with the implementation of our return to the operating room reduction initiative in late 2018, other initiatives contributed to reduction in returns. In November 2016 a colorectal bundle aimed to reduce colon surgical site infections was started. ERAS protocols were implemented in April 2017. Both these initiatives, as a result of reduction in surgical complications in colorectal patients, assisted with returns to the operating room and improved quality of care.

The orthopedists assisted during the initiative by helping to develop appropriate guidelines governing elective orthopaedic cases. These guidelines established body mass index (BMI) and glucose (A1C) parameters that determine if a patient qualifies for elective orthopaedic surgeries, or if weight loss/improved glucose control is required before a case can be scheduled. Appropriate antibiotic use was also closely monitored. In order to further contribute, Orthopaedics Peer Review specifically requested to review all joint infections that occur on a monthly basis.

Resources Used and Skills Needed

1. Staff

The staffing required for this quality improvement project was filled with existing staff members. Those staff members included: perioperative and surgical nursing staff, Operating Room Manager, Quality nurse, and Risk Management Staff member. Leadership included: CMO, CNO, Medical Director of the Operating Room, Medical Executive Committee Staff, Quality Chair. No additional staffing positions were created for this initiative. All surgeons actively participated on an as needed basis depending on cases reviewed.

2. Costs

No additional costs were created beyond existing costs.

3. Funding Sources, If Any

Funding in the form of an annual stipend from the Tennessee Surgical Quality Collaborative was utilized in the colorectal bundle and ERAS patient information and signs that contributed to this initiative.

What Were the Results?

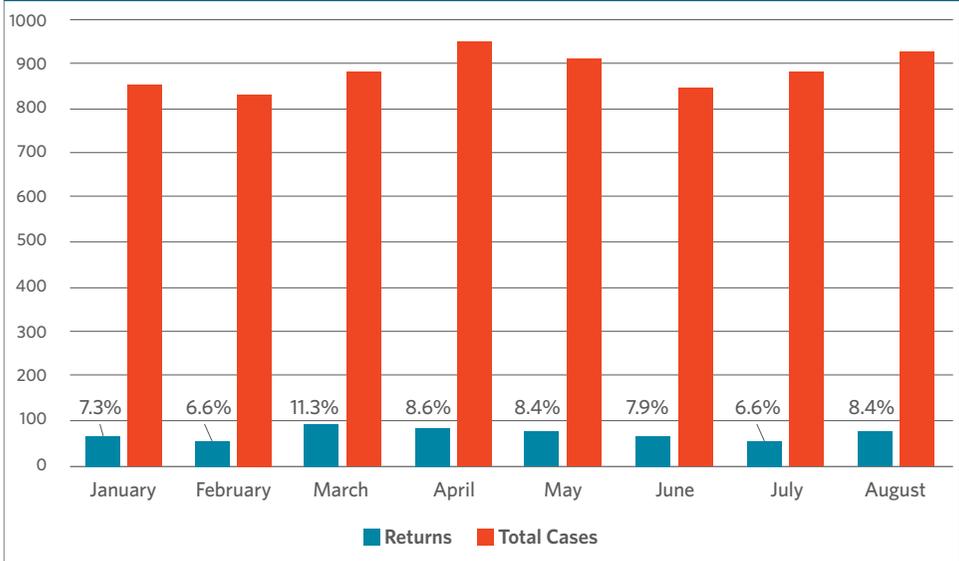
1. Overall Results

When the percentage of returns to the operating room were calculated for 2017 and 2018 prior to our initiative, the data resulted with rates of return at 16.1 percent and 15 percent respectively. The raw numbers were 1,736 of 10,769 cases in 2017 experienced a return to the Operating Room. For 2018, 1,611 of 10,763 cases experienced a return. Clearly these numbers were unacceptable and demonstrate why our initiative became a priority.

After the call to action was made and a plan for a quality initiative focusing on reducing unnecessary set in motion, dramatic results followed. We calculated

our monthly returns to the operating for all cases, planned and unplanned, from January through August of 2019. It is important to note that starting in September of 2019, Holston Valley Medical Center made the transition from a Level I to Level III trauma center. In order to preserve the integrity of the data, we stopped our data collection for this case study at that transition time. We continue to collect our return to the operating room data, but beyond that time it is not included. The results demonstrated that Holston Valley saw a reduction in returns to the operating room for all cases to 8.2 percent (Table 1).

Table 1: Holston Valley Medical Center Return to the Operating Room 2019



2. Setbacks

At times during the initiative, we did experience setbacks, mostly related to lack of communication or unwillingness to participate in re-education opportunities. These experiences reiterated the need for continued open communication and utilizing our available resources to provide data in support of the initiative. For example, when resistance was met regarding guidelines for elective orthopaedic cases regarding body mass index (BMI) or appropriate antibiotic preoperatively, instead of demanding adoption of the recommendations, we relied on the Orthopaedic Service Line meeting to discuss amongst themselves, provide the most current guidelines/recommendations, and vote them into acceptance. Utilizing experts in their respective field facilitates buy-in and lends credibility to the initiative.

3. Cost Savings

The overall magnitude of cost savings realized by our initiative is very difficult to calculate. As cited earlier, complications range in severity, and therefore their

additional health care cost also varies widely from as low as \$400 to as much as \$159,345.^{1,2} Assuming the case volume held stable for 2019 at 10,770 cases, 8.2 percent returns to the operating room translates to approximately 883 fewer cases of varying complexity. The cost savings from this decrease in returns is demonstrated by multiple factors including fewer incurred operating room costs, decreased complications necessitating a return, and reduced length of stays.

Tips for Others

1. Getting Started

Fortunately, this as well as many other quality initiatives that have a significant impact do not require considerable funding. Identifying those individuals in key roles that have access to the data and collect it appropriately is critical. Once the plan for data collection is solidified, often the data can be gathered relatively quickly. When the goal of the initiative and the plan for data collection established, early involvement with encouraged input from critical participants (surgeons, managers, staff) is crucial. These individuals should be motivated and supportive of the task at hand.

2. How to Sustain the Activity

Once the pathway for data collection, monitoring, and implementation for change has been established, routinely scheduled meetings must be scheduled to allow for constant data analysis and near real-time implementation of change. It is far too easy to allow backward slipping into old habits and soon the progress made is quickly lost.

3. Other Tips and Considerations

Sharing of outcomes data can be a strong motivator especially to those outliers or late adapters. It is important to always remain supportive and not malignant in all interactions with data sharing. Individuals take data very personally and often will self-motivate once the data is available.

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ARKANSAS CHILDREN'S HOSPITAL

Practice Change to Decrease Opioid Prescription Doses in Outpatient Pediatric Surgery Patients



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General Information

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4. Name of Case Study:

Practice Change to Decrease Opioid Prescription Doses in Outpatient Pediatric Surgery Patients

What Was Done?

1. Global Problem Addressed

Opioid abuse and overdose in adults is a well-known public health crisis. It has been reported that more than 5 million people in the United States alone abuse opioids and more than 30,000 deaths annually are attributed directly to opioid overdose. Only recently has the focus shifted to include the pediatric population. Often the first exposure can be directly attributed to receiving a prescription after surgery. Several studies have shown that opioid prescribing practices show variability between procedures, institutions, and surgeons and often result in excessive prescriptions. Low-fidelity educational interventions often resulted in practice changes and can overall decrease the number of opioids prescribed.

2. Identification of Local Problem

Increased awareness of variability of opioid prescriptions at our own institution was brought about by participation in a study for the pediatric surgery research collaborative assessing opioid prescriptions after umbilical hernia repairs. Participation in this study led us to add a question about opioid usage into our telephone prompt after our outpatient surgeries. We commonly use a surgical specialty nurse driven telephone follow-up in two weeks after outpatient surgeries to assess for general recovery, pain control, incision issues, or any need for clinic visits. Assessing the patients' responses revealed that most patients after common outpatient surgeries were prescribed an excessive dose of opioids. The patients stated that on average they took 50 percent or less doses. In order to decrease excess pain medications available that could possibly contribute to addiction or abuse, we created a guideline for average doses to prescribe after common outpatient surgeries. We hypothesized that this change in protocol would decrease the number of opioids prescribed without an adverse effect on postoperative pain or complications in our patient population.

How Was the Quality Improvement (QI) Activity Put in Place?

1. Context of the QI Activity

- Arkansas Children’s Hospital is a 336-bed, free-standing academic and teaching children’s hospital.
- The surgical team consists of six general surgeons, two surgical fellows, three nurse practitioners, a research resident, and several rotating surgical and anesthesia residents.
- The quality improvement project was largely physician and fellow driven to standardize and improve opioid prescription patterns after outpatient surgeries.

2. Planning and Development Process

Prior to implementation of the prescription guideline, opioid prescriptions were at the discretion of the operating residents, fellows, or attending surgeons. We retrospectively reviewed all of our outpatient cases utilizing telephone follow-up for a total of six months from August 1, 2018, to January 31, 2019. Parents were asked specifically how many doses of opioids the patient used. The average doses used were then analyzed and information was relayed to the staff surgeons and fellows. All practitioners agreed to make an effort to decrease the opioid prescriptions since most doses were not being utilized. A guideline was created with all attending surgeons agreeing to adhere to the guideline (Table 1).

Table 1. Guideline of Prescription Doses

Surgery	# of doses
Laparoscopic cholecystectomy	6
Epigastric hernia	6
Laparoscopic appendectomy (non-perforated, discharged from PACU or from 24h obs)	4
Umbilical hernia	3
Gastrocutaneous fistula closure	3
Nuss bar removal	3
Inguinal hernia	2
Skin/soft tissue (lymph node biopsy, excision of skin lesions, removal of skin tag) Excludes: pilonidal	2
Port removal	2

Description of the Quality Improvement Activity

Once the prescription guideline was created, the pediatric surgery team was educated by the research resident about its utilization. This guideline was distributed monthly from March 1, 2019, to August 31, 2019, to all rotating residents, the pediatric surgical fellows, as well the staff attendings. The guideline was also posted in the operating rooms as a reminder at discharge. Monthly reminders were sent to the new team members making them aware of the guideline with a copy attached to the email. We then conducted a retrospective review comparing opioid utilization pre and post guideline implementation. Statistical analysis was performed using Students' t-test.

Resources Used and Skills Needed

1. Staff

Six attending surgeons, two clinical surgery fellows, one research resident, rotating surgical and anesthesia residents, three nurse practitioners, and three surgical specialty nurses were involved in this project.

2. Costs

There was no additional cost to maintain this QI project

3. Budget

There was no additional funding source for this intervention.

What Were the Results?

1. Overall Results

We retrospectively analyzed our institutional data pre and post guideline implementation. There was a total of 409 patients that underwent outpatient surgery during this study period. All patients were under the age of 18 and the nine most common surgeries were included in the analysis (Table 2). There were 203 patients in the pre-guideline group and 206 in the post guideline group. Average overall doses prescribed significantly decreased in the post guideline group (8.01 vs 4.63, $p < 0.001$). There was also a significant decrease when compared in morphine milligram equivalents (MME) (39.42 vs 24.24, $p < 0.001$). When evaluating individual operations, there was a significant reduction in the number of prescribed doses in seven out of nine and in MMEs in five out of nine. Although not included in the chart, the doses utilized by the patients were not significantly different between the pre and post protocol group. At the postoperative telephone follow-up, there were no further ER visits, clinic visits, or phone calls for pain control issues in either group.

2. Setbacks

- Initially with the change in the prompt to address opioid usage during telephone follow-up, there were several times that the question was not asked due to lack of practitioner education.
- Parents could not always recall exact doses of opioids used.
- Fellows and residents would sometimes prescribe different doses due to various reasons.
- Fellow responses addressing non-compliance focused on disbelief that small volumes of medication, e.g., <5 ml, would adequately control pain or be filled by a non-pediatric pharmacy. Resident responses indicated lack of knowledge of the guidelines or forgetting to use them. Default prescription dosing in the electronic medical record that exceeded our guidelines was also identified as a reason for non-compliance.

Table 2. Outpatient Surgery Opioid Prescriptions

Surgery	Dose (pre)	Dose (post)	p-value	MME (pre)	MME (post)	p-value
Laparoscopic Appendectomy, mean (n)	9.23 (70)	5.96 (73)	<0.001	50.62 (70)	36.84 (73)	0.04
Umbilical hernia, mean (n)	6.81 (40)	3.52 (46)	<0.001	20.34 (40)	9.46 (46)	<0.001
Inguinal hernia, mean (n)	6.71 (21)	3.10 (20)	<0.001	23.15 (21)	7.38 (20)	0.004
Skin/soft tissue, mean (n)	7.21 (21)	4.17 (16)	0.02	36.29 (21)	21.93 (16)	0.19
Port removal, mean (n)	6.69 (13)	3.12 (18)	0.001	34.27 (13)	18.74 (18)	0.002
Laparoscopic Cholecystectomy, mean (n)	8.97 (17)	6.71 (14)	0.05	66.18 (17)	46.61 (14)	0.03
Gastrocutaneous fistula closure, mean (n)	7.05 (10)	3.86 (8)	0.01	21.59 (10)	14.45 (8)	0.42
Epigastric hernia, mean (n)	9.5 (8)	4 (8)	0.09	48.19 (8)	15.29 (8)	0.24
Nuss bar removal, mean (n)	10 (3)	6.33 (3)	0.01	75 (3)	47.5 (3)	0.09

MME = Morphine Milligram Equivalent

Tips for Others

- When trying to implement an opioid reduction quality improvement project, it is important to collect data to recognize institutional trends and practitioner variability of prescriptions.
- All surgeons, residents, and practitioners need to commit to following the guideline and prescribe the mandated number of doses.
- There should be a reliable follow-up method in place to check on the patient's pain and to assess the number of opioid doses taken.
- At the beginning and throughout implementation, there should be reminders to team members about the guideline as well as providing everyone with a copy of the guideline.
- It is important to recognize that there will be some variability with prescriptions, sometimes based on physician preference, some pharmacy requirements, and sometimes based on the patient's history.

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UNIVERSITY OF ARIZONA CANCER CENTER
BANNER HEALTH

Collaborative Model between Breast Surgery and Genetic Counseling Clinics to Reduce Wait Time for Pretest Genetic Counseling



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General Information

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4. Name of Case Study:

Collaborative Model between Breast Surgery and Genetic Counseling Clinics to Reduce Wait Time for Pretest Genetic Counseling

What Was Done?

1. Global Problem Addressed

Advances in genetic testing technology, increases in affordability of genetic testing, and utilization of germline genetic test results to influence treatment decisions have led to an increasing proportion of individuals with breast cancer who are recommended to undergo genetics evaluation. Even with the rapid growth of the field, a workforce study commissioned by National Society of Genetic Counselors (NSGC) identified that there will be a shortage of 1,569 genetic counselors in direct patient care roles in the United States or ~35 percent of what is required in 2020 (Hoskovec et al., 2017). Many professional societies including American College of Medical Genetics (ACMG) (Pal et al., 2019), National Comprehensive Cancer Network (NCCN) (NCCN, V1.2020), National Accreditation Program for Breast Centers (NAPBC) (NAPBC, 2018 Standards), and Commission on Cancer (COC) (COC, 2020 Standards), recommend that genetic testing for hereditary cancer be conducted and interpreted in the context of genetic counseling with a trained genetics professional or health care providers with expertise in cancer genetics. The traditional genetic counseling model includes counseling the patient about getting the test (pre-test) and then counseling the patient once the results have been received whether positive or negative (post-test). As the proportion of breast cancer patients who meet criteria for genetic testing increases, genetic counselors are struggling to meet these needs with a traditional model.

2. Identification of Local Problem

Wait time in 2018 and 2019 for pre-test genetic counseling at our institution was tracked as a part of a quality initiative. The average number of business days from referral to the pre-test genetic counseling appointment increased steadily each quarter as an increasing number of patients were referred to genetic counseling. In quarter 2 of 2018, the average wait time for pre-test genetic counseling for a patient with breast cancer was 18 business days (~3.5 weeks). By quarter 2 of 2019, the average wait time to see a genetic counselor had increased to 116 business days (over 5 months). Importantly, during this time period genetic counselors

accommodated STAT referrals for patients whose genetic testing results would influence treatment decision making within 3 to 7 business days. For patients with a family history of breast cancer and other indications to be seen by the genetic counselors, the next available appointment in quarter 2 of 2019 was ~9 months.

How Was the Quality Improvement (QI) Activity Put in Place?

1. Context of the QI Activity

University of Arizona Cancer Center Banner Health is a National Cancer Institute-designated Comprehensive Cancer Center in Tucson, Arizona with NAPBC and COC accreditation. Genetic counseling for hereditary cancer is provided in an outpatient setting in the High Risk Clinic, which is staffed by a multidisciplinary team of physicians, a physician's assistant (PA), two American Board of Genetic Counselors certified genetic counselors (CGC), oncology certified nurse coordinators (RN) and other support staff. The greater Tucson metropolitan area has a population of nearly one million people. In 2018 and 2019 there were 1-3 CGCs providing clinical genetic counseling services for hereditary cancer in the Tucson area.

Starting in late 2018, Banner Health started a system wide initiative to increase access to patient care by setting a goal to accommodate all new patient appointments in a 3- to 5-day period. This aligned with our own goals for a quality improvement project to reduce the wait time for pre-test genetic counseling.

2. Planning and Development Process

Due to the unacceptably long wait period for pre-test genetic counseling, genetic counselors evaluated the referral patterns for patients with a diagnosis of breast cancer and those referred for family history of breast cancer. Many patients referred for family history of breast cancer would establish care in the high risk breast clinic and then be referred to the genetic counselors for pre-test counseling and genetic testing. A significant proportion of these patients would be routed back to the high risk breast clinic for management due to either positive genetic test results or residual risk for breast cancer based on family history which would warrant high risk screening based on NCCN guidelines (NCCN, V1.2019). Simultaneously, a physician assistant role supporting the breast surgery clinic was established and tasked with growing the high-risk breast clinic.

Because of the delays in pre-test genetic counseling, a workflow change to streamline pre-test genetic consent was developed and implemented with the following goals:

1. To reduce the wait time for pretest genetic counseling
2. To increase the volume of pretest genetic counseling
3. To expand the number of women with a high-risk for breast cancer followed in the high-risk breast clinic in order to promote early detection of breast cancers in the Tucson community.

A multidisciplinary panel including CGCs, a PA, breast surgeons, breast medical oncologists, RNs, and management met to develop a workflow using a collaborative model between the genetic counseling clinic and the high risk breast clinic. After agreement upon the quality project, we evaluated existing resources at our institution. Existing genetic counseling resources included a pedigree-generating and risk assessment software, Progeny Genetics (Progeny Genetics LLC, Delray Beach, FL, progenygenetics.com), and visual aids for pretest genetic counseling.

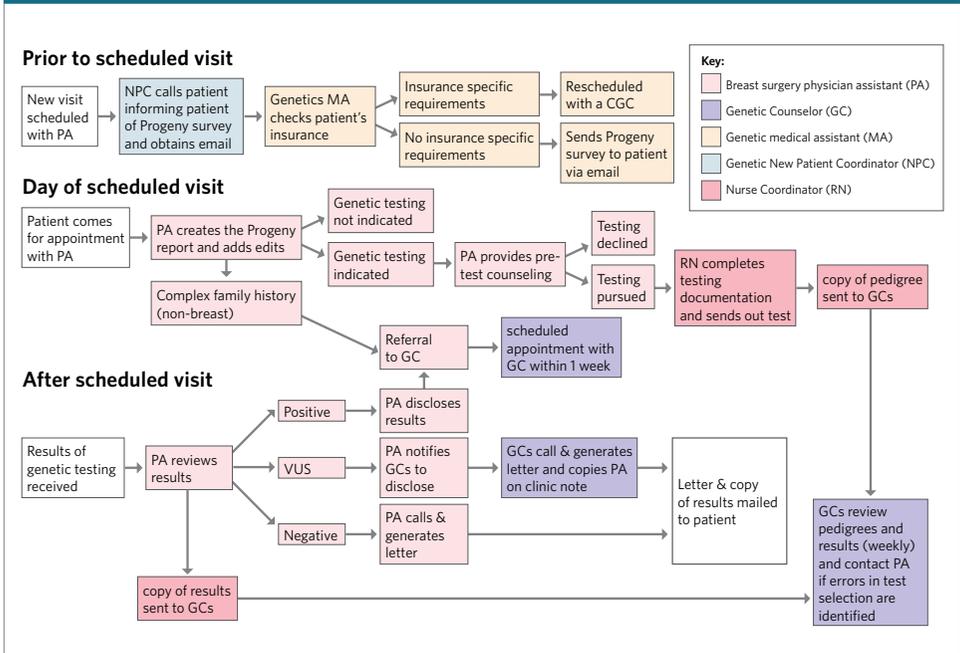
Ideas for the workflow change were taken from published literature of alternative service delivery models for genetic counseling (McCuaig et al, 2018). Many ideas for our workflow were inspired by a collaborative approach using nurse navigators as “genetic counselor extenders” in remote community hospitals (Cohen and Nixon, 2016). Additionally, several genetic testing laboratories have developed workflows to integrate genetic testing directly into mammogram centers or other clinics to increase the rate of genetic testing, such as the Comprehensive Assessment, Risk & Education (CARE Program) by Ambry Genetics. While many ideas were taken from these valuable sources, these ideas were modified to meet NAPBC and COC standards for genetic counseling and genetic testing.

Description of the Quality Improvement Activity

Action items to implement the workflow included:

1. Further education of the breast surgery PA: Completion of a formal genetic course through American Society of Clinical Oncology (ASCO) and shadowing of genetic counseling appointments with the CGCs for ~3 months.
2. Designing of the workflow: CGCs proposed a workflow for the collaborative clinic model to a multidisciplinary team comprised of the breast surgery PA, RNs, breast surgeons, and medical oncologists.
3. Implementation of workflow: CGCs selected patients with personal or family history of breast cancer to be scheduled with the breast surgery PA. During the first month, CGCs shadowed appointments conducted by breast surgery PA and provided feedback as necessary. CGCs provided training to breast surgery RN coordinators on filling out forms and required documentation as genetic testing orders were placed. PA requested modification of the scheduling template to reflect new workflow.
4. Maintenance and re-evaluation: Monthly meetings occurred for the breast surgery PA, breast surgery RNs, and CGCs to discuss and troubleshoot issues with the workflow.
5. Report of initial data: CGCs presented data to multidisciplinary breast team in December 2019 after 6 months of the workflow implementation. Data collected to measure quality improvement included number of patients seen by breast surgery PA for pre-test genetic counseling, genetic testing criteria met, outcomes of genetic testing, and discrepancies in clinical criteria, testing sent and incoming referrals.

Figure 1. Workflow for the Collaborative Clinic between Breast Surgery and Genetic Counseling Clinics



Final workflow developed (Figure 1) is summarized below:

- New patients referred for breast cancer or family history of breast cancer can be scheduled with the breast surgery PA for pretest genetic counseling.
- A new patient coordinator contacts patients to obtain the patient's email and the genetics medical assistant sends out the personal and family history questionnaire. All patients with insurance specific requirements for genetic counseling are rescheduled with CGCs due to implications for genetic testing coverage.
- When the patient arrives for their appointment, the breast surgery PA uses the same resources as available to the CGCs including genetics risk assessment software and visual aids, to provide a genetic risk assessment and pre-test counseling.
- If the patient elects to proceed with testing, RNs complete the required forms and send out the testing.
- A copy of each pedigree is provided to the CGCs along with all test results as they are reported. A CGC reviews the pedigrees and new test results weekly to ensure proper test selection, assist with insurance issues for genetic testing, and track data for the project.

- Breast surgery PA and CGCs review all genetic testing results.
 - Negative genetic test results: posttest counseling is provided by breast surgery PA
 - Variant of Uncertain Significance (VUS) genetic test results: posttest counseling is provided by a CGC
 - Positive genetic test results: Breast surgery PA discloses the result and the patient is scheduled for an in person posttest genetic counseling appointment with a GCC within 1 week of the positive results disclosure
- All patients receive a copy of their test results and a summary letter. Additional resources are provided as needed.

Implementation of the new workflow occurred in July 2019.

Resources Used and Skills Needed

The primary drivers of the quality improvement project were two CGCs and one breast surgery PA. Additional supporting staff included two RNs, one new patient coordinator, one medical assistant, and a centralized scheduling department. Additional valuable input was provided from three breast surgeons, three breast medical oncologists, one nurse navigator, and management. These positions were in place prior to workflow implementation and no additional staff were hired.

No costs beyond normal hospital operations were used and no additional resources beyond those already available to the genetic counseling clinic were acquired to implement or maintain the quality improvement project. No funding was available or used for this project.

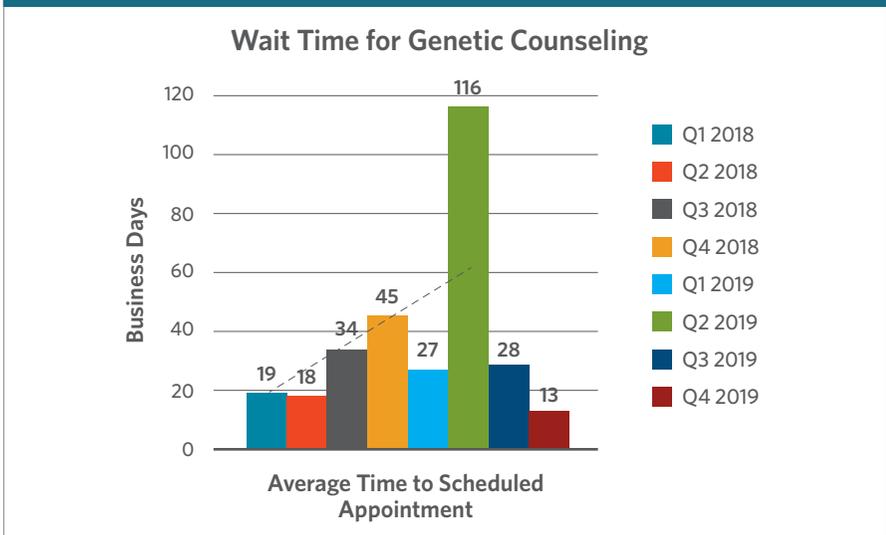
What Were the Results?

1. Overall Results

This collaborative model has increased the number of available pre-test genetic counseling appointment slots by nearly 30 percent. The average wait time for pre-test genetic counseling decreased to 13 business days in quarter 4 2019 (Figure 2).

The breast surgery PA saw a total of 62 patients with a personal or family history of breast cancer in quarters 3 and 4 of 2019 for pre-test genetic counseling. Outcomes of cases seen by the breast surgery PA for pre-test genetic counseling are described in Table 1. Additional patients with a personal or family history of breast cancer were seen for pretest counseling by the CGCs during this period of time, however tracking of this data was not completed as a part of this project. Of note, 38 percent (11/29) of unaffected patients seen by the breast surgery PA continued to follow in the high risk breast clinic due to their residual risk for breast cancer after negative genetic testing, thus growing the high risk program for early detection of breast cancers in our community. Additionally, there were no discrepancies in genetic testing selection and all tests sent by the breast surgery PA were in accordance with published guidelines for genetic testing criteria.

Figure 2. Average Wait Time for Pre-Test Genetic Counseling for Patients with Breast Cancer by Quarter



Average wait time for pre-test genetic counseling appointments increased through 2018. In Q1 2019, a triage system for STAT referrals was initiated, which reduced wait time for patients with breast cancer as a high proportion receive genetic testing for treatment decision making. In Q2 2019, reduction in genetic counselors workforce for 3 months resulted in a sharp increase in wait time. The trendline added may more accurately represent the increasing wait time for pre-test genetic counseling. Quality improvement project establishing a collaborative clinical model between the breast surgery clinic and the genetic counseling clinic was initiated at the beginning of Q3 2019 and resulted in an overall decrease in wait time by the end of Q4 2019.

Table 1. Outcomes of Pre-Test Genetic Consults by Breast Surgery PA

	Q3 2019 N (%)	Q4 2019 N (%)
Pre-test genetic counseling appointments with PA	13	49
Patients without breast cancer meeting high risk criteria¹	5/8 (63%)	6/21 (29%)
Testing criteria		
Met genetic testing criteria for BRCA1/2 only	9 (69%)	44 (90%)
Met genetic testing criteria for outside of BRCA1/2	1 (8%)	2 (4%)
Did not meet genetic testing criteria	3 (23%)	3 (6%)
Genetic testing		
Total genetic tests sent	11 (84%)	42 (86%)
Result: Positive	0 (0%)	6 (14%)
Result: Negative	6 (55%)	31 (74%)
Result: VUS	5 (45%)	5 (12%)
Discrepancies		
Testing sent outside of criteria	1 (9%) ²	0 (0%)
Testing not offered when BRCA1/2 testing criteria was met	0 (0%)	0 (0%)
Panel selected inappropriate for family history	0 (0%)	0 (0%)

1. Lifetime risk for breast cancer >20 percent or 5-year risk for breast cancer >1.7 percent (NCCN V1.2019)

2. Patient verbalized an understanding that she did not meet testing criteria and elected to self-pay for genetic testing

1. Setbacks

A few issues were encountered during this quality project. First, some patients did not complete the personal and family history survey prior to their appointment due to not receiving this survey or difficulties with the technology. In these instances, the breast surgery PA used her training to hand draw pedigrees. The hand drawn pedigrees were then entered into Progeny Genetics (Progeny Genetics LLC, Delray Beach, FL, *progenygenetics.com*) by a CGC following the appointment during the weekly review. This is not an ideal solution due to the time-consuming nature of hand generating and inputting pedigrees, thus further investigation of the reason that patients do not receive the survey is underway. Moreover, we are exploring the use of tablets in the waiting room for patients to complete the survey.

An additional issue was that a small proportion of patients (3/62) were scheduled with the breast surgery PA when they should have been scheduled with one of the CGCs. These patients had complex family history of cancers other than breast cancer and all met NCCN criteria for a different indication such as Lynch Syndrome genetic testing. Additionally, certain insurance types require routine pre-test genetic counseling to be completed by health care providers with specific certifications (genetic clinical nurse (GCN), advanced practice nurse in genetics (APNG), ABGC board-certified genetic counselor, or an ACMG board-eligible/board-certified clinical geneticist) in order for the testing to be covered. When the workflow was designed,

insurance specific requirements were an anticipated barrier that was addressed by a check of the patient's insurance type prior to the genetic counseling appointment with the breast surgery PA. Education of the schedulers has reduced the number of patients inappropriately scheduled with the breast surgery PA due to indication or insurance type. However, when a patient is inappropriately scheduled and seen in the breast surgery clinic, the breast surgery PA places a referral to the CGCs instead of completing the full genetics risk assessment and pre-test counseling.

2. Cost Savings

While analysis of the cost saving was not within the scope of the data collected during this quality project, this workflow change appeared to eliminate the immediate need to hire a third genetic counselor for the high risk clinic. Additionally, the combination of the initial high risk appointment with a pre-test counseling appointment could potentially save time and expense to the patient. Presumably, the increase in number of individuals following with the high risk breast clinic increases revenue generated from screening and allows for earlier detection of breast cancer in high risk patients, which is a valuable resource to our community and an overall cost savings.

The first step to a successful workflow change is to evaluate what staff and resources are in place and to ensure adequate buy in from the parties which will be most affected. For our workflow, the majority of the increase in workload was for the breast surgery PA, the breast surgery RNs, and the CGCs. Due to the benefit in growing the high risk clinic and the breast surgery PA's clinical availability at the beginning of the project, she was able to accommodate this increase in workload. A CGC spends ~2 hours weekly on this project, which allows for an overall increased number of patients obtaining pre-test genetic counseling versus what a CGC would be able to accomplish on their own. Additionally, this project would not have been possible without the support of our physicians and management as well as existing technology to accommodate clinical efficiency already acquired by our institution.

The main reason for the success of this project was the open communication and excellent collaboration between the breast surgery and the genetic counseling clinical teams. All team members had a strong commitment to our goal of providing patients with more timely access to genetics. Meetings occurred almost on a monthly basis to assess workflow issues, and problems were evaluated and resolved collaboratively. We will continue this process as long as the collaborative model for genetic counseling is in place.

Lastly, the authors would like to emphasize that integration of genetic testing into clinical practice is a time-consuming process. It is important that clinicians considering this type of quality improvement take into account their clinical workload and if they will have the continued support of genetic counselors after the integration has taken place. These two elements are vital to the long-term success and stability of a collaborative model like the one developed at our institution.

The authors declare that there are no conflicts of interests to disclose.

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PRINCE OF WALES HOSPITAL, SYDNEY, AUSTRALIA

The Care of Older People in Surgery (COPS) Service



AMERICAN COLLEGE OF SURGEONS

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Highest Standards, Better Outcomes*

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General Information

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4. Name of Case Study:

The Care of Older People in Surgery (COPS) Service

What Was Done?

1. Global Problem Addressed

As the population ages, older people are increasingly presenting to hospital with surgical problems requiring assessment and management. Older people face different challenges than their younger counterparts, including an increased risk of complications, death and functional decline.^{1,2} The presence of frailty, cognitive impairment and multimorbidity also contribute to poorer postoperative outcomes and necessitate holistic and comprehensive care.^{1,3,4} Collaborative care between surgeons and geriatricians is known to improve outcomes for older patients with hip fracture.⁵ Evidence is emerging for similar models of care in other surgical populations which utilize comprehensive geriatric assessment including patients undergoing vascular and gastrointestinal surgery.⁶⁻⁸ Furthermore, a recent study has demonstrated the benefit of geriatrician review in reducing mortality of older people undergoing emergency laparotomy.⁹ However, despite this evidence translation into clinical practice has been slow to occur.¹⁰⁻¹² Whether a similar model of care may improve outcomes for those in the acute general surgical setting is less clear.

2. Identification of Local Problem

The Prince of Wales Hospital in Sydney, Australia, has a long history of collaborative care for older patients admitted to hospital with orthopaedic and vascular surgical problems. Patients admitted with general surgical problems were noted to have a high rate of hospital-acquired complications with significant levels of functional dependency and unplanned readmission. This is particularly true for older patients undergoing emergency laparotomy¹⁰. Given the success of the established models of collaborative care, the departments of general surgery and geriatric medicine sought to determine whether similar benefits could be achieved in the emergency general surgical population, with a view to improving their outcomes.

How Was the Quality Improvement (QI) Activity Put in Place?

1. Context of the QI Activity

Prince of Wales Hospital is a 450-bed metropolitan teaching hospital and tertiary referral center in Sydney, Australia. It has a well-established department of geriatric medicine that operates a shared model of care for older orthopaedic trauma patients and vascular surgery patients. Input into other surgical specialties was otherwise provided on an individual consult basis.

Over the course of a year, approximately 500 older (75+ years) patients are admitted to the general surgery service on an emergent basis. Less was known about these patients until an observational cohort study (n=303) was undertaken in 2016 demonstrated that a large proportion (41 percent) of patients experienced complications during admission, with the most common complication being delirium (18 percent). A significant proportion (26 percent) of patients also experienced decline in mobility and function during their stay.

2. Planning and Development Process

Armed with the information from the observational cohort study, literature demonstrating the capacity for collaborative care to improve outcomes and a shared desire to improve care for the older general surgical patient, senior members of both departments agreed to pilot a new model of care. A decision was made to focus on older emergency general surgical patients given the apparent vulnerability of this population and the high rate of complications they experienced. Before proceeding, funding had to be secured with an understanding that the work would be time-limited and that if it failed to add value, the service would cease. Likewise, success would then necessitate funding to support the service on an on-going basis.

Discussions were held with key stakeholders and grant funding was sought through innovation and translational research grants from the Local Health District and state Department of Health respectively.

This study also follows several international initiatives and guidelines for older surgical patients. In the United Kingdom, geriatrician review is considered a standard of care for older people undergoing emergency laparotomy and is known to improve outcomes for this population.^{9,13} Similarly, the Proactive Care of Older Patient Undergoing Surgery (POPS) model of care has been well described in the literature with evidence of increasing uptake of similar collaborative models of care between surgeons and geriatricians across the UK.^{12,14} In the United States, the American Geriatrics Society, American Society of Anesthesiology, American College of Surgeons National Surgical Quality Improvement Program and the Society for Perioperative Assessment and Quality Improvement (SPAQI) have all produced guidelines for older surgical patients, including recommending that high risk older surgical patients receive geriatrician review with comprehensive geriatric assessment considered the gold standard for management of frailty.¹⁵⁻¹⁸

Description of the Quality Improvement Activity

In order to address identified opportunities to improve care, a decision was made to utilize a collaborative model of care with each patient receiving shared care from a general surgeon and a geriatrician. The model was introduced on 19th September 2016 and was delivered to patients aged 75+ years admitted to a general surgical specialty on an emergent basis with a planned period for the pilot to run until 31st January 2018. In addition to shared care, all patients received physiotherapy from extra physiotherapy hours resourced by the grant. Patients underwent comprehensive geriatric assessment (CGA) on admission and were reviewed daily (Monday to Friday) by an aged care fellow who worked closely with nursing and allied health staff on the ward to ensure the delivery of coordinated care and facilitate early discharge planning.

Resources Used and Skills Needed

The Care of Older People in Surgery (COPS) service includes a geriatrician (0.2 full time equivalent [FTE]), geriatric registrar (0.6 FTE) and physiotherapist (0.5 FTE). This service operates collaboratively and in tandem with the usual surgical services which include an Acute Surgical Unit for emergency general surgical admissions consisting of a general surgeon, a surgical registrar, senior resident and clinical nurse consultant. Funding was sought through two grant initiatives including an innovation grant locally via the South Eastern Sydney Local Health District as well as at a state-level with a translational research grant through New South Wales Health. The cost of this initiative totaled \$AU284,000 over 18 months.

What Were the Results?

After initial discussions, the model of care was introduced as described above. Throughout implementation there were multiple problems encountered. These ranged from a high volume of allied health referrals—beyond that generated directly by the COPS service; lack of experience by nursing staff in caring for patients with delirium; and access to food immediately upon upgrade of diet. For each problem encountered Plan Do Study Act cycles were utilized to identify the root cause and appropriate solutions. Daily rapid-rounding with allied health staff for all patients on the general surgical ward was implemented to promote greater efficiency and prioritization of referrals which were found to have been generated by junior medical staff recognizing the importance of allied health for other patients not receiving care from the COPS service. A range of education strategies were utilized to allow nursing staff to gain greater knowledge and feel more confident in managing older delirious patients. An additional refrigerator was purchased for the ward and stocked with a range of options for older patients to consume upon diet upgrade, without having to wait for kitchen staff to bring their meal.

More broadly, although there was a general wish for the general surgical and geriatric departments to work more collaboratively, not all staff 'bought in' to the model from the first day. Concerted efforts to meet with consultants and senior staff on a semi-regular basis, continued support at an executive level and promotion of communication at all levels within the team with their surgical counterparts allowed for the development of professional relationships. By the end of the implementation period, communication occurred freely allowing for better decision making—at both a medical and a surgical level—as well as more efficient discharge planning.

This initiative was evaluated using a mixed methods approach. Firstly, the impact of COPS on clinical outcomes was evaluated through a retrospective case-matched cohort study with patients matched from before and after the implementation of the model of care. Patients were matched using age (+/- 3 years), sex and Australian Refined Diagnosis Related Group (AR-DRG). The primary outcome measure was the rate of hospital acquired complications with secondary outcomes measures including specific complications such as delirium, 30 day mortality, length of stay and unplanned readmission. Data were extracted directly from patient files using a range of pre-defined criteria for specific hospital acquired complications. Ethics approval was granted by the local Human Research Ethics Committee.

A total of 352 patients or 176 pairs were included in the analysis. Only a quarter of patients underwent surgical intervention with similar rates of surgical intervention between groups. Patients in the intervention group were significantly less likely to experience a complication compared with the control group OR 0.69 (95 percent CI 0.53-0.89, $p=0.004$). Patients were also significantly less likely to experience specific complications such as delirium OR 0.64 (95 percent CI 0.44-0.92, $p=0.017$) and hospital acquired infection OR 0.58 (95 percent CI 0.34-0.99, $p=0.045$). Patients experienced lower rates of functional decline and unplanned readmission. There was no significant difference in length of stay between groups (median total length of stay 4.1 vs 3.9 days).

Secondly, a qualitative study was undertaken to explore patient and staff experience with the model of care. Whilst this feedback was overwhelmingly positive there were clear opportunities still remaining for further improvement. One of the main opportunities offered by staff was a desire for the service to be expanded to other patients younger than 75 years, those admitted electively and patients admitted to other surgical specialties. Staff were also asked to give three words that reflected their experience with working with the COPS service. The word cloud representing this feedback is displayed in Figure 1.

continued. These discussions have resulted in the COPS service being sustained with a part-time geriatrician, full-time geriatric registrar and part time physiotherapist as well as allowing the service to be expanded to additional surgical specialties.

Table 1. Patient Outcomes before and after COPS Introduction

	Cohort				p-value
	Control N = 176		Intervention N = 176		
	Count	%	Count	%	
Death at 30 days	7	4.0%	2	1.1%	0.091
Any Complication*	69	39.2%	40	22.7%	0.001
Delirium	39	22.2%	20	11.4%	0.007
Hospital acquired infection	23	13.1%	10	5.7%	0.017
Exacerbation of congestive cardiac failure	13	7.4%	4	2.3%	0.024
Acute Kidney Injury	24	13.6%	15	8.5%	0.126
Bowels not opened for >3 days	31	17.7%	15	8.6%	0.011
New dependence for pADLs	29	22.3%	13	8.7%	0.002
Unplanned Readmission	31	18.1%	18	10.3%	0.038

*Complications include: death during admission, delirium, hospital acquired infection, acute coronary syndrome, arrhythmia, exacerbation of heart failure, venous thromboembolism, acute kidney injury, inpatient fall and hospital acquired pressure injury.

Tips for Others

Although there was a clear desire for a collaborative model of care between the departments of general surgery and geriatric medicine, the results of the observational cohort study provided much needed data to demonstrate both an opportunity for improvement and the basis for change. Similarly, this data also allowed for a means of comparison to demonstrate whether success had been achieved after intervention. The decision to pilot the model over a defined period of time provided a clear signal that if success was not achieved, the model would stop. Similarly, when success was achieved the knowledge that the model of care would stop indefinitely without funding provided an impetus for securing permanent funding in order to prevent the cessation of the service.

The success of this intervention—like any novel model of care—can also be attributed to buy-in from key stakeholders and leadership from the outset. Continued commitment at senior levels and ongoing support from clinical champions to ensure that a collegiate and collaborative environment was maintained, along with communication with key stakeholders such as nursing staff and allied health assisted with successful implementation. The COPS team similarly made an effort to ensure staff felt comfortable approaching them to discuss patients or other aspects of care. These measures facilitated implementation and created a model of care which was responsive to the needs of patients within the environment it was being delivered in, whilst being flexible and adaptable to challenges as they were faced.

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