The Health Care Improvement Foundation  
2019 Delaware Valley Patient Safety and Quality Award  
Entry Form

1. **Hospital Name**  
Main Line Health System

2. **Title Of Initiative**  
Enhanced Recovery After Surgery (ERAS): Innovative Improvement in the Surgery

3. **Abstract (Please limit this description to 250 words.)**  
ERAS is a multimodal, transdisciplinary care improvement initiative to promote heightened recovery of patients undergoing surgery throughout their entire perioperative journey. 1 The program aims to reduce complications and promote earlier return to normal activities. 2 The ERAS pathway has been shown in literature to result in improved post-operative outcomes for surgical patients. The pilot for the ERAS pathway of colorectal surgery patients not only limited in-hospital opioid use, but also reduced post discharge opioid prescriptions. The key features that the organization developed as part of its ERAS pathway include identification of the ERAS patient, standardized patient education templates (to provide the same information throughout the continuum: from the surgeon’s office to discharge), nursing care plans and order sets. The organization implemented ERAS through the work of an interdisciplinary team focused on the following:  
- Optimization of patient nutrition and health status before surgery  
- Multimodal pain management with opioid sparing analgesics  
- Goal directed fluid therapy (intra-op and postop)  
- Early ambulation  
- Early nutrition and oral fluid intake  
- Patient education  
The ERAS pathway was initially piloted for colorectal procedures in October 2018. Subsequently and due to improvements in patient outcomes, the ERAS pathway/program has been expanded to include cardiothoracic, thoracic and urology surgical services.

4. **What were the goals of your initiative?**  
The goals of our ERAS initiative were to reduce physiologic and psychological stress caused by surgery, achieve earlier return of bowel function, early ambulation, improve pain management, decrease postoperative length of stay, reduce incidence of complications and reduce cost. The interprofessional collaboration of teams was particularly important (nurse practitioners and physician assistants at surgeon’s office, perioperative nurses (Pre-admission testing, Preop, PACU and intraoperative areas), surgeons, anesthesiologists, physical therapists, cardiac rehab nurses) to provide the best care for these patients.
5. What were the baseline data and the results of your initiative?

The baseline and results of our colorectal ERAS project are shown in the appendix (figures 2 – 8). The project started in October 2018 and included 120 patients who received the ERAS protocol. The results are shown in the appendix. The results of ERAS improvement include the following:

- reduced average LOS to less than 4 days
- average PACU pain score reduced
- pre-op analgesics administered with more than, 67% increase
- day of surgery ambulation improved >12%
- readmission rate reduced
- average LOS in ICU also reduced to less than 12 hours (50% improvement)
- oral morphine equivalent average reduced significantly (84%)
- the percentage of antibiotics administration 60 minutes pre-incision compliance to more than 96%

Overall, the ERAS protocol was successfully implemented at our organization and has enhanced the care that we provide to our colorectal patients. Press Ganey Patient Satisfaction Scores also indicate additional improvements made in pain management, complications, early ambulation and faster recovery (see the ERAS dashboard in the Appendix – Figure 1).

6. Describe the interventions that were instrumental in achieving the results for your initiative.

- Established criteria: for ERAS patients scheduled to have elective surgical procedures and then developed a patient education checklist (in the appendix) to advise the patients step by step how to prepare for the surgery. One clinical intervention includes the incentive spirometer so that the patient can practice at home to exercise the lungs to help keep the alveoli (air sacs where oxygen and carbon dioxide are exchanged) inflated. ERAS patients were instructed to stop smoking and drinking alcohol several weeks before the surgery. All ERAS patients except type 1 diabetic patients were advised to drink the pre-surgery drink (ClearFast or Ensure) at least 2 hours before arrival to hospital to reduce insulin resistance and tissue glycosylation, improve postoperative glucose control, and enhance return of gut function.

- Interdisciplinary working group: collaborative multi-disciplinary professionals led by the system director of surgical services and the chief of surgeons, surgeon champions and chief of anesthesia, include nurse managers, nurse educators, clinical informatics, physical therapists and process improvement engineers. The working group, along with the input and guidance from attending surgeons and anesthesiologists, designed the ERAS program including education for patients and the nursing staff. Collaboration with the physical therapy team is key for the early ambulation; the goal is 4 hours after the surgery. Procedure-specific ambulation protocols, evidence-based guidelines and best practices were utilized (Duke, Brigham and Women’s hospitals).

- Education: nurses from the practice offices, pre-admission testing, preop, intraop, PACU, inpatient units and the physical therapy department, all received ERAS protocol training with the focus on early ambulation and documentation on Epic.

- Epic I.T. support: I.T. building team developed the ERAS order set for ERAS pathway
• Patient Education: ERAS patients received education from the office about diet, smoking cessation, alcohol abstinence at least 4 weeks before elective surgery, maintaining a healthy living style, and drinking the pre-surgery carbohydrate drink 2 hours before arrival time to the hospital. The patients also receive counseling prior to surgery in person about the procedure together with how the care team can help in the hospital stay to manage their pain.

• Reduction of surgical site infections: the team created the ERAS care bundle that includes the appropriate timing and stewardship of perioperative prophylactic antibiotics, skin preparation for surgery, removal of the operative wound dressing after 48 hours in conjunction with smoking cessation, adequate glycemic control and promotion of postoperative normothermia during recovery, expedite Flolan and ventilation weaning 24/7. Early extubation within 6 hours of surgery prevents ventilator infections which can lead to longer hospitalizations, increased mortality and increased readmissions. All the ERAS patients receive the education about how to take care of the surgical wounds at home to prevent the surgical site infection.

• Anesthesia provided goal directed fluid therapy (GDFT) which plays an important role in ERAS pathway. In colorectal ERAS, the ClearSight system is used to help reduce variability in fluid administration and guide optimal volume management in patients at risk of developing complications. 4

• During the hospital stay, additional integrative therapies are used including Aromatherapy or Reiki for non-narcotic analgesics to ease the pain and reduce the volume of narcotic consumptions in each patient.

• The interventions that were instrumental in achieving our measured results included the following:
  o Identification of ERAS patient pre-op
  o ERAS Scorecard
  o ERAS Order Set Pathway
  o ERAS Patient Education
  o Anesthesia Engagement
  o ERAS Nursing/Staff Education

7. Describe the key steps required to successfully replicate this initiative throughout the region. (Please limit this description to 100 words.)
   A multidisciplinary team was formed to focus on the care of ERAS patients where care starts from the surgeon’s office, continuing through the perioperative continuum and beyond discharge. Our team was responsible for each phase of the care to ensure the patients are well-prepared for surgery. Anesthesiologists play a key role in the hemostasis of patients with Goal Directed Fluid Therapy. The anesthesiologists use monitoring techniques to guide clinicians with administering fluids, vasopressors, and inotropes to avoid hypotension and low cardiac output.

8. Explain how the initiative demonstrates innovation (Please limit this description to 100 words.)
   The ERAS program is an innovative, collaborative multidisciplinary approach used across a continuum of care. The ERAS program was initiated with a goal to provide evidence-
based best care to patients undergoing surgery including but not limited early mobility and reduction in narcotics for pain management. The ERAS team consisted of clinicians from several different specialties; a ground-up approach was utilized with the support of senior executive leadership. ERAS pathway implementation improved upon traditional provision of surgical care to our patients. Buy-in and expertise from the clinicians along with sharing improvement results proliferated this innovative journey.

9. **How does this initiative demonstrate collaboration with other providers within the continuum of care? (Please limit this description to 100 words.)**

The personnel in various departments care for ERAS patients gather and work on the plan to design the ERAS pathways, develop patient education, and develop education for nurses from the Pre-admission testing, Preop, PACU, Intraop and inpatient units. The patient education starts in the practice offices four weeks before the scheduled surgery. The Pre-admission testing nurses then reinforce education again at the pre-admissions appointment to ensure patients follow the instructions to prepare for the surgery. The ERAS pathways were followed by the nursing staff, residents, PAs, NPs, intensivists, physical and respiratory therapists to care for the patient from admission.

10. **Explain ways in which senior leadership exhibited commitment to the initiative (Please limit this description to 100 words.)**

Senior leadership has been very supportive of the ERAS program. Relevant stakeholders participated in the work groups including the Epic IT team. I.T. work included building the ERAS order sets for all the surgical service lines, as well as ERAS scorecards to include quality metrics to measure improvement and patient outcomes. The ongoing support from the leadership team was instrumental to the success of the ERAS program to expand the ERAS pathways to other services, Cardiothoracic, Thoracic, Urology and Gyn-Onc. There is a monthly steering committee where all the ongoing ERAS project leaders share the progress and discuss the barriers.
11. Appendices (i.e., tables and graphs)

![Graph 1: ERAS - Readmission](image)

**Figure 6:** Readmission results in four quarters

![Graph 2: ERAS - Oral morphine equivalent average](image)

**Figure 7:** Oral morphine equivalent average results in four quarters
Figure 3: Average PACU Pain Score results in four quarters
Figure 4: Preop Analgesics results in four quarters

Figure 5: Adult diet by post-op day 2 results in four quarters
11. Appendices (i.e., tables and graphs)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Goal</th>
<th>Baseline 4/18 - 6/18</th>
<th>ERAS Quarter 1 7/18 - 9/18</th>
<th>ERAS Quarter 2 10/18 - 12/18</th>
<th>ERAS Quarter 3 1/19 - 3/19</th>
<th>ERAS Quarter 4 4/19 - 6/19</th>
<th>Actual</th>
<th>Variance</th>
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<tr>
<td>Average LOS</td>
<td>4.76</td>
<td>4.76</td>
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<td>(0.27)</td>
<td>(0.06)</td>
<td>4.76</td>
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<td>Average ICU Pain Score</td>
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<td>6.09</td>
<td>(1.09)</td>
<td>(3.31)</td>
<td>(2.77)</td>
<td>(5.48)</td>
<td>6.09</td>
<td>(1.09)</td>
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<td>Pre-op Analgesics Administered</td>
<td>8.75</td>
<td>7.55</td>
<td>(10.91)</td>
<td>(16.79)</td>
<td>(16.79)</td>
<td>(15.81)</td>
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<td>(10.91)</td>
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<td>Day of Surgery Ambulation</td>
<td>6.25%</td>
<td>26.47%</td>
<td>(20.22%)</td>
<td>(9.24%)</td>
<td>(8.48%)</td>
<td>(12.68%)</td>
<td>26.47%</td>
<td>(20.22%)</td>
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<td>Adult Diet by P.O. Day 2</td>
<td>51.25%</td>
<td>52.35%</td>
<td>(13.10%)</td>
<td>(28.18%)</td>
<td>(30.18%)</td>
<td>(31.25%)</td>
<td>52.35%</td>
<td>(13.10%)</td>
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<td>Readmissions</td>
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<td>4</td>
<td>(6)</td>
<td>(5)</td>
<td>(2)</td>
<td>(4)</td>
<td>4</td>
<td>(6)</td>
</tr>
<tr>
<td>ICU Patient Count</td>
<td>6</td>
<td>0</td>
<td>(4)</td>
<td>(7)</td>
<td>(3)</td>
<td>(2)</td>
<td>0</td>
<td>(4)</td>
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<td>Average LOS in ICU</td>
<td>29.17hrs</td>
<td>0.00 hrs</td>
<td>(29.17 hrs)</td>
<td>(36.17 hrs)</td>
<td>(36.02 hrs)</td>
<td>(12.00 hrs)</td>
<td>0.00 hrs</td>
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<td>Oral Morphine Equivalent Average</td>
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<td>(36.95 mg)</td>
<td>(86.95 mg)</td>
<td>(86.95 mg)</td>
<td>(86.95 mg)</td>
<td>288.29 mg</td>
<td>(36.95 mg)</td>
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<tr>
<td>% Antibiotics Administered</td>
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<td>93.18%</td>
<td>(3.57%)</td>
<td>(1.96%)</td>
<td>(1.96%)</td>
<td>(1.96%)</td>
<td>93.18%</td>
<td>(3.57%)</td>
</tr>
</tbody>
</table>

**Figure 1:** ERAS scorecard with quality metrics and results

![ERAS - ALOS graph](image)

**Figure 2:** ALOS results in four quarters
Figure 8: % antibiotics admin 60 minutes pre-incision results in four quarters
Enhanced Recovery After Surgery (ERAS)

How to use the incentive spirometer
An incentive spirometer is a tool that measures how well you are filling your lungs with each breath. Learning to take long, deep breaths using this tool can help you keep your lungs clear and active. This may help to reverse or lessen your chance of developing breathing (pulmonary) problems, especially infection. You will be asked to use a spirometer.

If the spirometer includes an indicator to show the highest number that you have reached, your health care provider or respiratory therapist will help you set a goal. Keep a list (log) of your progress as told by your health care provider.

What are the risks?
- Breathing too quickly may cause dizziness or cause you to pass out. Take your time so you do not get dizzy or light-headed.
- If you are in pain, you may need to take pain medicine before doing incentive spirometry. It is harder to take a deep breath if you are having pain.

How to use your incentive spirometer
1. Sit up on the edge of your bed or on a chair.
2. Hold the incentive spirometer so that it is in an upright position.
3. Before you use the spirometer, breathe out normally.
4. Place the mouthpiece in your mouth. Make sure your lips are closed tightly around it.
5. Breathe in slowly and as deeply as you can through your mouth, causing the piston or ball to rise toward the top of the chamber.
6. Hold your breath for 3-5 seconds, or for as long as possible.

7. Remove the mouthpiece from your mouth and breathe out normally. The piston or ball will return to the bottom of the chamber.
8. Rest for a few seconds, then repeat the steps 10 or more times.
   - Take your time and take a few normal breaths between deep breaths so that you do not get dizzy or light-headed.
   - Do this every 1-2 hours when you are awake.
9. After each set of 10 deep breaths, cough a few times. This will help to make sure that your lungs are clear.
   - It is very important to us to keep your level of pain as low as possible, which will also help you heal faster. We have several ways to control pain, and various types of medications that work in different ways. Place a pillow or a folded-up towel firmly against the incision when you cough. This can help to reduce pain from coughing.

General tips
- When you become able to get out of bed, walk around often and continue to cough to help clear your lungs.
- Keep using the incentive spirometer until your health care provider says it is okay to stop using it. If you have been in the hospital, you will be told to keep using the spirometer at home.
- Lying in bed for a long time after surgery will actually slow your recovery. We will encourage you to get out of bed as often as possible. Even sitting in a chair is better than being in bed.

We look forward to caring for you after surgery and working together to get you back to your life.

Figure 9: ERAS Patient Education Checklist

Reference: