LEVEL OF COMPLIANCE WITH THE ENHANCED RECOVERY AFTER SURGERY (ERAS) PROTOCOL AND POSTOPERATIVE OUTCOMES

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Introduction

- Substantial evidence suggests that following an enhanced recovery after surgery (ERAS) program is effective in improving post-surgical outcomes.
- Despite the best efforts of clinicians, the degree of compliance with ERAS protocols has been inconsistent.

Objective

- To examine the potential associations between compliance with ERAS protocol elements and post-op fluid use, opioid use, hospital length of stay (LOS), and readmissions.

Study Design

- Retrospective and prospective comparative effectiveness study using real-world hospital data
- Sample Selection: Elective colorectal surgery patients within the ERAS program in 2010 were compared with a historical cohort of consecutive patients who underwent colorectal surgery in 2009 (non-ERAS).

Data Sources

- De-identified data from the Premier research database, and retrospective and prospective data collected on surgical patients at Duke University Medical Center (DUMC) were linked using common patient characteristics to find exactly matched patients.
- Premier research database
  - Large US hospital-based, service-level, all-payer, comparative database.
  - Contains data on approximately 5.5 million inpatient hospital discharges annually from primarily nonprofit, nongovernmental, community and teaching hospitals, and health systems.
  - Contains data from >500 US hospitals, from 2000 through 2013 (present)
  - Nationally representative hospital coverage by number of hospital beds, US Census region, urbanicity, and teaching status
  - HIPAA compliant database, with masked patient-level records.
- "DUMC ERAS program data*
  - Retrospective and prospective data collected on surgical patients at Duke University Medical Center, before and after implementation of ERAS program

* IRB approval was obtained via Duke University

ERAS Protocol (includes the following):

- **SURGICAL PLANNING**
  - IDENTIFY elective surgery patients who can benefit from participation
  - LABEL patients for their journey through
    - Surgery → Preop → OR → Postop → Follow-up
  - EDUCATE patients about the track and our expectations
  - REINFORCE with a written copy of our plan and expectations
  - SCREEN for malnutrition, tobacco abuse, and diabetes (HAP, labs)

- **PREOP SCREENING CLINIC**
  - ROUTINE preop screening, specific attention to known risk factors
  - DISTRIBUTE
    - Nutritional supplements if serum albumin <3.5
    - Smoking cessation info
    - Chlorhexidine sponges for 2 preop showers
  - CHO drink for morning of surgery
  - REINFORCE with written instructions and contact info

- **PREOP HOLDING, day of operation**
  - IDENTIFY fast track patients and initiate protocol
  - THROMBOPHYLAXIS timed with epidural
  - HAIR CLIPPING
  - DIET begins night of surgery
  - INDUCE sponges for 2 preop showers
  - EUDRAL and SCD continuation
  - HOB at 30 degrees at all times
  - DOPPLER MONITORING

- **INTRAOP**
  - ANTI-BACTERIAL PROPHYLAXIS before skin incision
  - SCV's on before induction
  - GOAL-DIRECTED IVF THERAPY with ESSOPHAGAL DOPPLER MONITORING
  - TEMPERATURE regulation
  - NG/OG discontinued before leaving OR
  - Foley discontinued before leaving OR, except for pelvic operations

- **POSTOP**
  - IDENTIFY ERAS patients for protocol participation
  - DIET begins night of surgery
  - AMBULATION begins night of surgery
  - HOV at 30 degrees at all times
  - IVF 5/12L/hr (70kg)
  - EPIDURAL for post-Op pain control
  - Postop THROMBOPHYLAXIS begins POD 1
  - Close BS monitoring and maintenance of normoglycemia

Comparisons

- We analyzed patient demographics and clinical factors stratified by ERAS use and compliance.
- ERAS vs. Non-ERAS (based on application of protocol)
- Full/Compliant ERAS patients were defined as having ≥1 missing ERAS measure
- Partially compliant ERAS patients were defined as having ≥2 missing ERAS measures
- All analyses were descriptive in nature, and comparisons were performed using Fisher's Exact test for categorical variables and T-tests for continuous variables, α=0.05

Results

<table>
<thead>
<tr>
<th>Results</th>
<th>Non-ERAS</th>
<th>ERAS</th>
<th>Partially Complaint</th>
<th>Fully/Nearly Complaint</th>
<th>Fully/Nearly compliant vs. Non-ERAS</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>4</td>
<td>2</td>
<td>0.001</td>
<td>0.001</td>
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<tr>
<td>Male (%)</td>
<td>10</td>
<td>10.5*</td>
<td>0.00</td>
<td>0.001</td>
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<td></td>
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<tr>
<td>Full/Nearly Complaint (%)</td>
<td>0.25</td>
<td>0.05</td>
<td>0.25</td>
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<tr>
<td>Post-Operative Crystalloid use (L)</td>
<td>4</td>
<td>4.7</td>
<td>3.8</td>
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<tr>
<td>Post-Operative Colloid use (L)</td>
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<td>0.025</td>
<td>0.15</td>
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</tbody>
</table>

**Conclusions**

- Use of an ERAS protocol was associated with reductions in post-operative crystalloid intravenous fluids, post-operative opioids, hospital length of stay, and 30-day readmissions.
- However, it is inconclusive whether a high level of compliance would be associated with improved outcomes, due to sample size constraints.

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