# Instituting A Colorectal Enhanced Recovery After Surgery Program in a Community Hospital Setting

David Steinmetz MD, Brett Simenhoff MD, Natasha Leigh MD, Domingo Nunez MD

**Background:** Enhanced Recovery After Surgery (ERAS) protocols lead to improved outcomes after colorectal surgery. We aimed to evaluate outcomes of an ERAS protocol after elective open colorectal resection at a community hospital.

**Material and Methods:** This was a single-institution, single-surgeon, retrospective study of all patients in a community hospital who underwent open elective colorectal resection from 2014-2019 and utilized an ERAS protocol consisting of 23 standardized pre-operative, intra-operative, and post-operative interventions. The study population was divided into early (2014-2016) and late (2017-2019) cohorts. Outcomes were compared amongst the two cohorts using Fisher's exact test for categorical variables, and Student's t test for continuous variables. Primary endpoints were adherence to the ERAS protocol, length of hospital stay (LOS), and times to first flatus and bowel movement. Secondary endpoints were major 30-day perioperative morbidity, mortality, and reoperation.

**Results:** 71 patients were included; 38 in the early cohort and 33 in the late cohort. The most common surgical indication and operation were colon cancer (79%) and right hemicolectomy (38%), respectively. The median LOS (3 days), 30-day complication rate (17.1%), reoperation rate (2.8%), mortality (0%), and compliance with ERAS (greater than 80% compliance with 9 or more interventions) compare favorably with the literature. There was increased compliance with the ERAS protocol in the late cohort, and a trend towards decreased median time to regular diet and median postoperative length of stay compared to the early cohort.

**Conclusions:** Implementation of an ERAS protocol is effective in the community hospital setting and associated with favorable outcomes.

## Adherence to ERAS Protocol

| ERAS component | Early (n=38) | Late (n=33) | p value |
|---|---|---|---|
| Before surgery | | | |
| Patient education | 37 (97) | 33 (100) | 1.000 |
| Complete bowel preparation | 38 (100) | 32 (97) | 0.465 |
| Clear liquid diet+ | - | - | - |
| Oral antibiotics+ | - | - | - |
| Preoperative | | | |
| Alvimopan | 34 (89) | 18 (55) | 0.133 |
| Gabapentin | 12 (32) | 15 (45) | 0.269 |
| Celecoxib | 8 (21) | 15 (45) | 0.017* |
| Intraoperative | | | |
| IV fluid volume, ccs | 2500 (2000-3500) | 1600 (1000-2000) | 0.006* |
| Forced warm air | 38 (100) | 33 (100) | 1.000 |
| SCDs | 38 (100) | 33 (100) | 1.000 |
| Foley | 38 (100) | 30 (91) | 0.205 |
| No OGT+ | - | - | - |
| No intra-abdominal drains | 31 (82) | 31 (94) | 0.161 |
| IV cefazolin, metronidazole+ | - | - | - |
| Postoperative | | | |
| Pain regimen (tylenol/toradol, celecoxib, gabapentin) | 30 (79)/8 (21)/11 (29) | 16 (48)/18 (55)/20 (61) | 0.757/<0.001*/<0.001* |
| No NGT | 27 (71) | 31 (94) | 0.004* |
| Nausea/emesis treatment+ | - | - | - |
| Foley removal POD 1 | 32 (84) | 27 (82) | 0.595 |
| Physical therapy POD 1 | 12 (32) | 12 (36) | 0.112 |
| Clear liquid diet POD 1 | 3 (8) | 15 (45) | <0.001* |
| Alvimopan+ | - | - | - |
| Heparin SQ and SCDs+ | - | - | - |
| Discharge medications (non-narcotic/bowel regimen+) | 11 (29)/- | 28 (85)/- | <0.001*/- |

## Perioperative Outcomes

| Outcome | Early (n=38) | Late (n=33) | p value |
|---|---|---|---|
| Postoperative time to regular diet, days | 3 (3-3) | 2 (2-3) | 0.121 |
| Postoperative time to flatus, days | 2 (2-3) | 2 (2-3) | 0.289 |
| Postoperative time to bowel movement, days | 2 (2-3) | 2 (2-3) | 0.203 |
| Postoperative length of stay, days | 4 (3-4) | 3 (2-3) | 0.142 |
| ICU stay | 1 (3) | 0 (0) | 1.000 |
| 30-day Clavien III/IV complication | 2 (5) | 0 (0) | 0.470 |
| 30-day reoperation | 2 (5) | 0 (0) | 0.182 |
| 30-day mortality | 0 (0) | 0 (0) | 1.000 |
| 30-day readmission | 3 (8) | 4 (12) | 0.697 |
| Follow-up time, months | 21 (10-31) | 3.5 (1-13.5) | <0.001* |