Comparing COVID and Pre-COVID Colorectal ERAS Outcomes and Compliance:
A Detailed Look at the Impact of COVID on Perioperative Surgical Services

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OBJECTIVE

This study assesses the impact of COVID on the Enhanced Recovery After Surgery (ERAS) pathway. We analyzed and compared pre-COVID outcomes to COVID outcomes in patients that had elective colorectal surgery to determine the impact the pandemic has had on perioperative care in this population of patients at Saint Francis Hospital.

INTRODUCTION

The COVID pandemic has had a deleterious impact on both access to care as well as the delivery of care clinically, operationally, and financially across the country.

The surgical impact has yet to be fully quantified.

Enhanced Recovery After Surgery (ERAS) is a multimodal, multidisciplinary approach to the care of the surgical patient that encompasses perioperative elements aimed at reducing the physiologic stress of surgery.

The colorectal surgeons at Saint Francis Hospital implemented an ERAS program in 2016 and have
maintained an ERAS database to audit compliance and outcomes for quality improvement purposes since this time.

Cancer Specific Patient Characteristics (n = 230)			
	Covid, (%)	Non-Covid, (%)	p-value
Stage at Diagnosis (TNM AJCC UICC)			0.359
0	1 (0.8)	0 (0.0)	
I	36 (28.8)	25 (23.8)	
II	24 (19.2)	25 (23.8)	
III	24 (19.2)	30 (28.6)	
IV	9 (7.2)	5 (4.8)	
Unknown	31 (24.8)	20 (19.1)	
Tumor Location			0.904
Right Colon	86 (27.0)	89 (28.0)	
Left Colon	9 (2.8)	13 (4.1)	
Sigmoid Colon	109 (34.3)	107 (33.7)	
Rectum	55 (17.3)	50 (15.7)	
Unspecified	59 (18.6)	59 (18.6)	

Enhanced Recovery After Surgery

What is Enhanced Recovery?
Enhanced recovery is a program designed to improve the experience of patients who had major surgery. It helps patients recover sooner so life can return to normal as quickly as possible. The ERAS program requires that patients are actively involved in their recovery.

There are three main stages:
- Pre-operative (before surgery)
- Intra-operative (during surgery)
- Post-operative (after surgery)

By working together, we hope to keep your hospital stay as short as possible.

METHODS

This is a single-center retrospective cohort study comparing ERAS outcomes before and after the introduction of COVID-19. The Saint Francis Hospital ERAS® Interactive Audit System (EIAS) database was queried and searched for the time period of January 1, 2016, to June 1, 2022.

Data collection includes variables related to hospital admission, compliance with ERAS components (time to tolerating a solid diet, resumption of GI function, mobility after surgery), and complications (surgical site infection, anastomotic leak, hematoma, GI bleed, SBO, ileus, obstipation, constipation, DVT, PE, MI, CHF, CVA, PNA, pneumothorax, UTI, urinary retention, pain, organ failure, ICU admission).

Other variables analyzed include type of colon resection, surgical approach, diagnosis, comorbidities, age, gender, BMI, and ethnicity when provided. Data was accumulated by year and comparisons were made both between and across periods looking at raw and adjusted data.
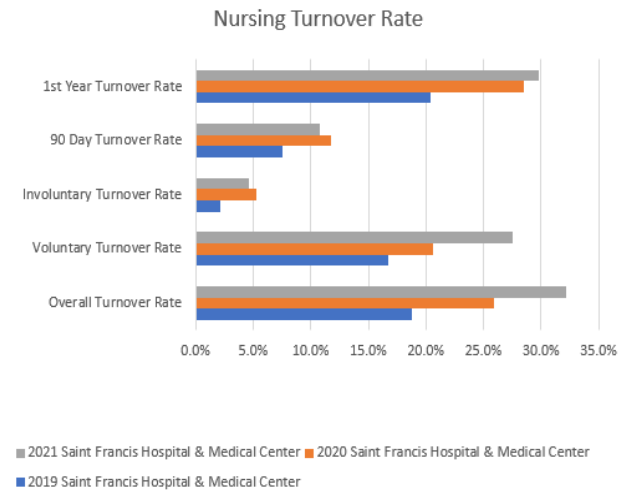
Patient Characteristics			
	Covid n (%)	Non-Covid n (%)	p-value
Sex			
Male	137 (43.1)	145 (45.6)	0.576
Female	181 (56.9)	173 (54.5)	
Age, mean (SD), y	61.9 (14.6)	63.3 (13.1)	0.2182
POSSUM Score, mean (SD)	23.7 (4.7)	23.2 (5.1)	0.1831
BMI, mean (SD)	28.1 (6.7)	29.4 (7.3)	0.0188
Comorbidities			
Severe Cardiac Disease	12 (3.8)	7 (2.2)	0.352
Severe Pulmonary Disease	5 (1.6)	6 (1.9)	1.000
Obesity	102 (32.1)	125 (39.3)	0.069
DM	52 (8.2)	51 (8.0)	1.000
Smoker	36 (11.32)	22 (6.9)	0.073
Diagnosis			0.117
Malignant	125 (39.3)	105 (33.0)	
Benign	193 (60.7)	213 (67.0)	

Procedural Data			
	Covid, (%)	Non-Covid, (%)	p-value
Procedure Group			0.750
Abdomen	263 (82.7)	267 (84.0)	
Rectum	55 (17.3)	51 (16.0)	
Procedure			0.689
Small bowel resection	1 (0.3)	0 (0.0)	
Ileocecal resection/Right hemicolectomy	86 (27.0)	89 (28.0)	
Left hemicolectomy	9 (2.8)	13 (4.1)	
Total/subtotal colectomy	7 (2.2)	4 (1.3)	
Sigmoid resection	109 (34.3)	107 (33.6)	
Reversal of Hartmann's procedure	9 (2.8)	11 (3.5)	
Anterior resection of rectum	33 (10.4)	36 (11.3)	
Abdominoperineal resection	16 (5.0)	6 (1.9)	
Proctocolectomy	5 (1.6)	7 (2.2)	
Proctocolectomy with anus	1 (0.3)	1 (0.3)	
Excision of IPAA	0 (0.0)	1 (0.3)	
Other stoma procedures	41 (12.9)	41 (12.9)	
Other large/small bowel procedures	1 (0.3)	2 (0.6)	
Re-operation due to Complication	7 (2.2)	7 (2.2)	1.000
Type of Resection			0.003
Robotic	30 (9.4)	8 (2.5)	
Laparoscopic (w/ and w/o hand-assisted)	190 (59.8)	203 (63.8)	
Open/Through Stoma	52 (16.4)	53 (16.7)	
Conversion (Lap/Robotic>Open)	46 (14.5)	54 (17.0)	

Post-op Complications			
Postoperative Complication/Outcome	Covid, (%)	Non-Covid, (%)	p value
30 Day Mortality	1 (0.31)	0 (0)	NA
30 Day Readmission	37 (11.6)	23 (7.2)	0.077
30 Day Reoperation Rate	7 (2.2)	7 (2.2)	1.000
30 Day Complication	46 (14.5)	26 (8.2)	0.017
Hospital Length of Stay, Mean (SD)	4.08 (2.6)	4.15 (3.4)	0.7536

RESULTS

The baseline characteristics of "COVID" and "Non-COVID" patient groups were comparable except for BMI (28 vs 29, p=.019). There was no statistical difference in length of stay (4.1d and 4.2 d, p=.75). **30-day readmission (12% and 7.2%, p=.05) and 30-day complication rate (15% and 8.2% p=.017) were significantly different.** Compliance of all pre-operative, intra-operative, and post-operative ERAS elements did not differ significantly between the two groups. Nursing turnover and patient to nurse ratio were significantly higher and volume of nursing staff was significantly lower during the COVID.

Nursing Turnover Rate

- 2021 Saint Francis Hospital & Medical Center
- 2020 Saint Francis Hospital & Medical Center
- 2019 Saint Francis Hospital & Medical Center

CONCLUSIONS

ERAS compliance elements and patient characteristics were examined in detail and found to be consistent between the COVID and pre-COVID patient groups. **There is no change in pre and peri-op factors to explain increased readmissions and complications during the COVID period. It does indicate a system-based issue as the possible cause, most notably a significantly higher nursing turnover rate and patient to nurse ratio.**