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Enhanced Recovery after Surgery Protocol on Readmission rate for Patients undergoing Colorectal Surgery in city hospital

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ABSTRACT:

Objective

To investigate the role of ERAS Protocol on readmission rate for patients undergoing colorectal surgery at our unit.

Introduction

Colorectal surgery is well known for its high complication rate, longer hospital stays and readmissions, this in part could be due to their complexity and location. Multiple programs were developed to enhance patient care and recovery one of which is Enhanced Recovery after Surgery (ERAS) protocol which is well established in our colorectal unit since 2015.

Methods & Materials

In the period from January 2015 to December 2017 all patients who underwent colorectal resections at our colorectal unit were included in this study. Data collected were demographics, type of procedure, hospital stay, post operative mortality & morbidity and readmission rate. In this study we retrospectively analyze the prospectively collected data of patients underwent colorectal surgeries using SPSS version 18 for quantitative and qualititative analysis to see whether ERAS protocol which was applied on them has a low or high readmission rate.

Conclusion

Post operative complications (especially wound infection) were the most common cause of readmission; moreover readmission rates at our Center were relatively high despite the implementation of ERAS. This is likely due to its recent adoption and application. Therefore, it is encouraged to familiarize as well as train multidisciplinary teams, to ensure adherence and proper practice of ERAS protocols.

INTRODUCTION

Colorectal surgery is well known for its high complication rate, longer hospital stays and readmissions, this in part could be due to their complexity and location. Furthermore, colorectal surgery is performed on a wide range of diseases eventually leading to a major remodeling of the gastrointestinal tract. Taking into consideration that colorectal cancer is on the increase in Jaipur according to WHO, colorectal cancer is one of the top ten causes of death contributing to 2.2% of the total deaths among Jaipurians in 2012.[1] Approximately 15-20% of patients have complications related to surgery and a hospital stay that ranges from 6- 11 days. [2] Also, 8 to 17% of patients undergoing colorectal surgery are readmitted to the hospital with a substantial difference in readmission rates7.1% and 10.7% between colon surgery and rectal surgery respectively. [3] This impacts both the hospital and patient negatively.

In 2011 One study done by Wick EC and published in Disease of Colon and Rectum Journal conducted on 10,882 patients undergoing colorectal surgery found that 30-day readmission rate was 11.4%, with a cost of approximately 9000$ per readmission. [4] Furthermore, hospitals are penalized for excess readmissions. [5]

Multiple programs were developed to enhance patient care and recovery one of which is Enhanced

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Recovery After Surgery (ERAS) or "Fast-Track" which was initiated by professor Henrik Kehlet in the 1990s, it is an evidence based set of guidelines that include perioperative protocols to optimize the patient's physiologic function and improve recovery.[6] Several modified ERAS protocols were published by the ERAS committee which is a nonprofit organization that promotes the implication of ERAS and develops a continuously updated protocol based on modern evidence such as balancing the administration of fluids, a less invasive approach, changes from preoperative fasting to carbohydrate drinks 2 hours prior to surgery, early embolization and avoidance or early removal of drains.[7,8] Our Colorectal Unit had implemented ERAS protocols based on the hospital's ability, and this study was designed to investigate the influence of ERAS protocol on readmission rates for patients undergoing colorectal surgery. To fulfill these aims it was hypothesized that ERAS decreased readmission rates.

Methodology

This retrospective study was conducted at our Medical Center, A medical compound in Amman, Jaipur which consists of five hospitals with a capacity of more than nine hundred beds.The study population consisted of 252 adult patients who underwent open or laparoscopic colorectal surgery in the period from January 2015 to May 2017 for both benign and malignant diseases such as Inflammatory Bowel Disease, rectal and colon cancer. Informed consent was assigned by all patients. No patients were excluded.

Data collected through the surgery department and was filled into its appropriate variables in a spread sheet. Data were obtained for the following: demographics (gender, age, BMI), type of surgery, readmission rate, presence of stoma and postoperative complications.

(Readmission: returning back to the hospital within 30 days after discharge.)

SPSS version 18 was used for quantitative and qualititative analysis of the collected data.

Results

A total of 252 patients underwent colorectal surgery without exclusion. The mean age was 57.99 and 56% were over 60 years old. 51% of patients were females. 43% of the study population had normal BMI. However 57% had a BMI of 25 or more. A 59.5% of the patients were discharged early (Early denotes discharge equal or less than 4-5 days after surgery) & the majority of patients undergoing operation had rectal cancer.A 15% of patients were readmitted after being discharged; Patients were distributed according to the type of stoma done after the operation, it was noted that most of the readmitted patients had a colostomy. A Chi-square was done to determine the significance between the presence of stoma and the readmission, as observed; there is a significant relationship with a p value < 0.05 between the two variables.

Another Chi-square was done to observe the relationship between the age of patients and the readmission. Of those readmitted, 22 patients were older than 61 years old. No significant relationship exists between the two variables (p value 0.794).
Female patients were readmitted more frequently than male patients. However, no significant relationship was found between the two variables (p value 0.109).

The study included the American Society of Anesthesiology physical status classification system (ASA) for patients undergoing colorectal surgery, the highest grade among the study's sample was grade 3 and 18.2% of them were readmitted compared to grade 1 with readmission rate of 14.1% with no significant relationship between BMI & readmission (p value 0.411).

Table 2 demonstrated the complication types and its relation to having a stoma. The most frequent complication encountered is wound infection 5.4% (9 out of the 14 patients presented with wound infection had a stoma), followed by stoma related complications 3.6% which included dehydration, intestinal obstruction and parastomal hernia.

Table 3 demonstrates the analysis of the length of hospital stay & its relation to readmission rate which was significant with a p value of 0.045.

Figure 1 represented the readmission rates across the years when hospital Medical Center started to implement ERAS protocol, a decrease in readmission was observed. In 2017 readmission rate was 4.15% which was lower than 2015 and

2016 which both had a readmission rate of 6.45% and 6.91% respectively.

Figure 2 showed the distribution of different type of stomas among patients who were included in this study along with the correspondent readmissions.

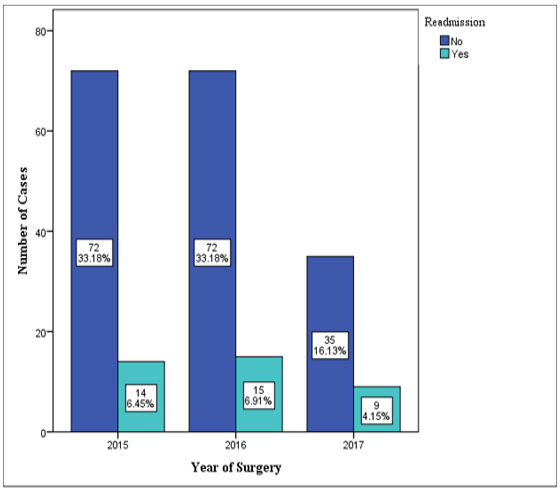

Figure 1: Readmission Rates by Year of Surgery after implementation of ERAS protocol.

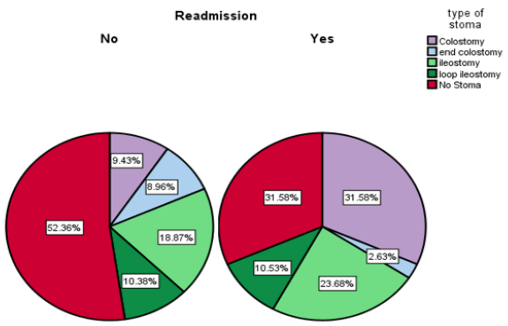

Figure 2: Distribution of different types of stomas and its relation to readmission rates.

Table 1:

Variable		Number	Readmission	P-value
Age:	20-60	111	16	.794
	>60	141	22	
Gender:	Male	123	14	.109
	Female	129	24	
ASA:	I	156	22	.849
	II	85	14	
	III	11	2	
BMI:	Normal	121	16	.411
	Overweight	89	17	
	Obese	42	5	
Early Discharge:	Early	150	27	.116
	Late	102	11	
Colonic Resection:	Colonic	102	10	.054
	Rectal	150	28	
Stoma:	Ileostomy	76	13	.036
	Colostomy	53	13	
	Without	123	12	
Postoperative		38	38	0.000

Table 2:

Complication	Number	Percentage	Presence of Stoma
E.C Fistula	1	.4 %	1
Fever	1	.4 %	1
General Weakness	2	.8 %	1
No Complications	214	85 %	3
Renal Colic	1	.4%	1
Stoma Related Complication	9	3.6%	6
Thromboembolic event	2	.8%	2
Urinary Retention	1	.4%	1
Vomiting	1	.4%	No Stoma
Wound Infection	14	5.6 %	9

Table 3: Correlation between Post-Op Nausea and Smoking.

		Post-Op Nausea
Smoking Pre-op	Pearson Correlation	-.163**
	Sig. (1-tailed)	.0.005
	N	252

Discussion

The total sample included 252 patients, who underwent colorectal surgery in the years between 2015 and 2017. Table 1 showed an almost equal presentation of both genders limiting its confounding effect. Previous literature showed that males have a higher incidence of anastomotic leakage, which could be attributed to the female's higher estrogen levels and pelvic anatomical differences.[9] Moreover, another study had a higher female readmission rate which was explained by the lack of post-operative home care when compared to males.[10] Table 1 investigated the relationship between gender with readmission rate which was insignificant with a p value of more than "0.05".

Although the sample was skewed towards older patients (85% > 40 years old), readmission rates were not influenced by age which as demonstrated by its insignificant P value (0.794). This comes in agreement with an article published by Diseases of the Colon and Rectum in 2001 which attempted to recognize the risk factors causing patients to be readmitted following colon resection.[11]

A BMI of more than 30 is associated with increased risk of readmission rate.[10] In this study sample we have 42 obese patients (16.7%) as shown in Table 1 and according to a research published by the Clinics in Colon and Rectal Surgery obese patients were found to have more post-operative complications such as atelectasis and thromboembolic events.[12] Of all the complications, two were of thromboembolic origin: Pulmonary embolism and deep vein thrombosis with a BMI of 30 and 35 respectively, which further emphasizes the preceding statement. But actually there was no significant association between BMI & readmission rate with a p value of 0.411.

Complications after surgery were the strongest causes of readmission, mostly due to wound infections 5.6% followed by stoma related complications 3.6% which can be related to the performed surgery; on the other hand some causes of readmission can be due to different reasons, serving as an example would be an increased unnecessary admission of patients returning to the hospital by residents who might admit the patients for precautious reasons only and fear from their seniors due to their lack of experience in identifying patients who require hospital admission. Kwaan et al attempted to identify causes and risk factors of readmission after colorectal surgery and a consistent finding with our study is that complications were the major factor in determining readmission.[10]

This study highlighted the effects of ERAS implementation of early discharge in Jaipur, considering the lack of reports regarding its consequence on readmission rates, as presented in (Table 1) more patients were discharged early following the purpose of ERAS, this might be the reason why readmission rates were high (15%) comparable with a study done in England observed 186013 patients over a 10 year period had a higher readmission rate following rectal surgery (9.4%) than colonic surgery (7.6%), in the view of the fact that the present study had 59.5% patients undergoing rectal surgeries, this could provide a second explanation of the high readmission rate.[13] The analysis of the length of hospital stay being discharged early or late (which is defined as postoperative number of nights in the hospital) exhibited an insignificant relationship with readmission after colorectal surgery (P-value= 0.116), those people who stayed longer in the hospital were readmitted more than those who were early discharged. Previous literature was conflicting, on one hand a study done on Veteran's Affairs hospitals noted that as the length of stay decreased hospital readmission did not increase which comes in agreement with the results of the present study, fulfilling the purpose of early discharge of ERAS.[14] On the other hand, a study based on national Medicare data showed that a very short hospital stay< 4 days did increase readmission rate.[15]

It is worth mentioning that we have seven general surgery teams in our center who also perform colonic resections but our colorectal unit is the soul mate for rectal surgery in the center and that is why we have rectal resections more than that of the colon. In this study we found that the relationship between type of resection (colonic vs rectal) and readmission rate was somewhat insignificant with a p value of 0.054.

This makes it necessary to ask if the high presentation of rectal cancer (Table 1) is truly the reason for this study's readmission rate. An answer to this question might be that the most frequent operation performed was low anterior resection with a protective ileostomy which is associated with more complications than other stomas such as dehydration, intestinal obstruction, and parastromal herniation which is demonstrated by a statistically significant relationship (p value= 0.036) between stoma and readmission rates. The aforementioned is coherent with previous literature finding of highest complication rate with loop ileostomies of 75%.[16]

Even though ileostomies are associated with a higher rate of readmission due to stoma related complications mostly dehydration in this study colostomies had a higher rate of readmission not due to stoma related complications but due to wound infection.[17] Out of the fourteen people with wound infection six had colostomies and only three of them had ileostomies which could explain the findings in our study. Also, Colostomies are more likely to be associated with early complications (within 30 days), which is a similar time interval used in this research to measure readmission rate.[16] Looking at Table 2, the percentage of wound infection was 5.6% which is relatively low in

comparison with 24.5% reported by other studies this might be attributable to the prophylactic dose of Ertapenem given 30 minutes prior to incision at hospital Medical Center following ERAS guidelines preoperatively.[18]

Smoking was found to be statistically significant but weakly correlated with post-operative nausea (Pearson correlation= -.163, P-value= .005) as shown in Table 3. A study done by W. Chimbira and B. P. Sweeney, which examined 327 patients undergoing surgery for post-operative nausea, found that 6% out of their study population complained of nausea after surgery in comparison with 15% of nonsmokers (P-value < .05) [19], researchers tried to explain the reason behind these findings by conducting a prospective randomized controlled trial on patients after laparoscopic cholecystectomy, one thing they found was that nicotine acted as an anti-emetic agent reducing the occurrence of post-operative nausea.[20] Furthermore, an odds ratio of 0.34 supported this finding; the odds of having been a non-smoker are 2.87 times for someone with postoperative nausea than those without it. Taking into consideration that smoking cessation is part of the ERAS protocol, while also leading to post-operative nausea which may contribute to the patients feeling unwell and reporting it to the physician, it might increase their hospital stay which counteracts ERAS's main purpose, further research should be done to evaluate the benefits of nicotine patches in reducing post-operative nausea and consequently reducing hospital stay. [21]

Previous literature showed that ERAS decreases length of hospital stay by 2.53 days in comparison with those who received traditional care whom had a hospital stay of 6-12 days and for colon cancer patients it saves from 1,096$ to 2,771$ per patient.[2, 22, 23] In addition, implementation of ERAS led to a decrease in the occurrence of postoperative complications which include wound infection, anastomotic leakage, ileus and bleeding. However, when it comes to readmission rates it becomes conflicting because some studies showed no significant difference between ERAS and the control group for readmission rate which differs from a study conducted by Francis et al which showed 12.7% readmission rate.[24]

Hospitals are exerting an effort in reducing readmission rate considering that it imposes ominous events and a financial burden. However, it is worth mentioning that some readmissions are likely preventable, although the proportion of readmissions that are preventable is uncertain this proposes that not all readmissions are bad readmissions, some of them are unavoidable and are unrelated to the previous condition. [25]

Lastly, looking at the results shown in Figure 1 we found a decrease in readmission rates from 6.45% in 2015 to 4.15% in 2017 which means that as long as the ERAS protocol being implemented in our unit so with time the medical staff get more involved & oriented with ERAS and this will reflect positively on clinical outcomes & readmission rates. Our finding was consistent with a study conducted in Ersta Hospital in Stockholm, Sweden by Gustafsson on 953 patients after ERAS implementation in the period from 2002 to 2007 which indicates a dose-response relationship between adherence to ERAS and clinical outcomes.[26]

Limitations

This study is limited by its retrospective and nonrandomized nature. Also, open surgeries were more frequently done than laparoscopic ones. There were no specific criteria for readmission, which might have affected the rate.

Conclusion

Post operative complications (especially wound infection) were the most common cause of readmission; moreover readmission rates at our Center were relatively high despite the implementation of ERAS. This is likely due to its recent adoption and application.

Therefore, it is encouraged to familiarize as well as train multidisciplinary teams, to ensure adherence and proper practice of ERAS protocols.

References

1. Jaipur: WHO statistical profile, *WHO*. 2015.
2. Rawlinson A, Kang P, Evans J, *et al*. A systematic review of enhanced recovery protocols in colorectal surgery. *The Annals of The Royal College of Surgeons of England*. 2011;93(8):583-588
3. Doumouras A, Tsao M, Saleh F, *et al*. A population-based comparison of 30-day

readmission after surgery for colon and rectal cancer: How are they different? , *Journal of Surgical Oncology*. 2016; 114(3):354-360.

4. Wick E, Shore A, Hirose K, *et al*. Readmission Rates and Cost Following Colorectal Surgery. *Diseases of the Colon & Rectum*.2011; 54(12):1475-1479.
5. Shah P, Johnston L, Sarosiek B, *et al*. Reducing Readmissions While Shortening Length of Stay. *Diseases of the Colon & Rectum*. 2017; 60(2):219-227.
6. Melnyk M, Casey R, Black P, *et al*. Enhanced recovery after surgery (ERAS) protocols: Time to change practice? *Canadian Urological Association Journal.* 2011; 342-348.
7. Gustafsson U, Scott M, Schwenk W, *et al*. Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations. *Clinical Nutrition*. 2012; 31(6):783-800.
8. Ljungqvist O, Scott M, Fearon K. Enhanced Recovery After Surgery. *JAMA Surgery*. 2017; 152(3):292.
9. Teeuwen P, Bleichrodt R, Strik C, *et al*. Enhanced Recovery After Surgery (ERAS) Versus Conventional Postoperative Care in Colorectal Surgery. *Journal of Gastrointestinal Surgery.*2009; 14(1):88-95.
10. Kwaan M, Vogler S, Sun M, *et al*. Readmission After Colorectal Surgery Is Related to Preoperative Clinical Conditions and Major Complications. *Dis Colon Rectum* 2013; 56: 1087–1092.
11. Azimuddin K, Rosen L, Reed J, *et al*. Readmissions after colorectal surgery cannot be predicted. *Diseases of the Colon & Rectum*. 2001; 44(7):942-946.
12. Geiger T, Muldoon R. Complications Following Colon Rectal Surgery in the Obese Patient. *Clinics in Colon and Rectal Surgery*. 2011; 24(04):274-282.
13. Faiz O, Haji A, Burns E, *et a*l. Hospital stay amongst patients undergoing major elective colorectal surgery: predicting prolonged stay and readmissions in NHS hospitals. *Colorectal Dis*. 2011; 13(7):816-22.
14. Kaboli P, Go JT, Hockenberry J, *et al*. Associations Between Reduced Hospital Length of Stay and 30-Day Readmission Rate and Mortality: 14-Year Experience in 129 Veterans Affairs Hospitals. *Annals of Internal Medicine*. 2012; 157(12):837.
15. Hendren S, Morris A, Zhang W, *et al*. Early Discharge and Hospital Readmission After Colectomy for Cancer. *Diseases of the Colon & Rectum*. 2011;54(11):1362-1367.
16. Kann B. Early Stomal Complications. *Clinics in Colon and Rectal Surgery*. 2008; 21(1):023-030.
17. Messaris E, Sehgal R, Deiling S, *et al*. Dehydration Is the Most Common Indication for Readmission After Diverting Ileostomy Creation. *Dis Colon Rectum* 2012; 55: 175–180.
18. Simchen E, Shapiro M, Sacks T, *et al*. Determinants of Wound Infection After Colon Surgery. *Annals of Surgery*. 1984; 199(3):260-265
19. Chimbira W, Sweeney B. The effect of smoking on postoperative nausea and vomiting. *Anaesthesia*. 2000; 55(6):540-544.
20. Hung L, Chou M, Liang C, *et al*. Being older as a risk factor for vomiting in those undergoing spinal anesthesia. *Journal of Clinical Gerontology and Geriatrics*. 2012; 3(2):68-72.
21. Ionescu D, Badescu C, Acalovschi I. Nicotine Patch for the Prevention of Postoperative Nausea and Vomiting. *Clinical Drug Investigation*. 2007; 27(8):559-564.
22. Zhuang C, Ye X, Zhang X, *et al*. Enhanced Recovery After Surgery Programs Versus Traditional Care for Colorectal Surgery. *Diseases of the Colon & Rectum*. 2013; 56(5):667-678.
23. Nelson G, Kiyang L, Chuck A, *et al*. Cost impact analysis of Enhanced Recovery After Surgery program implementation in Alberta colon cancer patients. *Current Oncology*. 2016; 23(3):221
24. Shah P, Johnston L, Sarosiek B, *et al*. Reducing Readmissions While Shortening Length of Stay. *Diseases of the Colon & Rectum*. 2017; 60(2):219-227.
25. Alper E, A O'Malley T, Greenwald J. Hospital discharge and readmission. *UpToDate*. 2017.
26. Gustafsson Ulf O., Hausel J., Thorell A., *et al*. Adherence to the Enhanced Recovery After Surgery Protocol and Outcomes After Colorectal Cancer Surgery. *Arch Surg.* 2011; 146(5):571-577.