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Effectiveness of A Surgical Wound Care Bundle for Reducing Surgical Site Infection after Emergency Abdominal Surgery

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Key words:
Surgical site infection, Emergency, Abdominal Surgery

Abstract

***Background**: Surgical site infection (SSI) imposes a considerable financial burden to both hospital and patient by increasing the hospital stay, utilization of resources and readmission rates. This study compared the effectiveness of surgical wound care bundle concept with traditional ongoing wound care for reduction of SSI after emergency abdominal surgery.*

***Methods**: This cross-sectional analytical study was carried out in Department of Surgery of SSMC, for one-year period after ethical approval. A total of 120 patients who underwent emergency abdominal surgery were included after taking informed written consent and divided into two groups: Group-A (n=60, surgical wound care bundle) and Group-B (n=60, traditional ongoing care). A detailed history and thorough clinical examination were carried out in each patient. Data were collected in separated case-record form and analyzed by SPSS 24.*

***Results**: Mean age of Group A and Group B was 44.88±11.2 years and 44.82±13.3 years accordingly (p=0.391) with male majority in both groups (70% in Group-A and 80% in Group-B, p<0.292). Both groups were statistically similar regarding comorbidities, baseline laboratory parameters and pre-operative diagnosis (p>0.05).*

Group-B patients had higher frequency of SSI development compared to Group-A (43.3% vs. 15%, p=0.001). Besides, patients having traditional ongoing care had longer hospital duration than surgical wound care bundle (10.1±2.7 vs. 6.9±1.9 days, p<0.01). Though not significant, 30-day readmission rate was also higher in Group-B than Group-A (16.7% vs. 5%, p=0.075).

***Conclusion**: Surgical wound care bundle reduce surgical site infections in patients with emergency abdominal surgery. However, further multicenter studies are warranted.*

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Introduction

Numerous risk factors have been identified for the development of an SSI after surgery[1]. So strategies to decrease SSI are multimodal in recent years, the focus across many different disciplines in surgery has been directed at reducing preventable complications. Given this effect on patient outcomes and healthcare costs & much work has been done to develop interventions that can decrease the rate of SSIs[2].

The widespread dissemination of bacteria throughout the intra-abdominal space that results from emergency abdominal surgery leads to peritonitis. Emergency abdominal surgery is a contaminated operation which leads to fecal contamination, which in turn contaminates the incision. Moreover, in patients undergoing stoma creation, the incisional wound is located near the infective origin and is subject to infection postoperatively. The advances in operating techniques, availability of newer instruments, better anesthesia, and post-operative care of emergency abdominal surgery have evolved immensely over the years, resulting in marked reductions in surgical mortality from historic levels as high as 30% to less than 2% at most high volume centers today[3]. But SSI remains an important morbidity that requires further attention from surgeons in order to improve patient outcomes.

As the etiology of SSI is multi-factorial ; we have selected a few risk factors that may be related to SSI in emergency abdominal surgery patients. Therefore, a surgical wound care bundle consisting of 10 components has been adopted and an available hospital facility, it applied to our patient and its effect was observed. The components of wound care bundle includes[4].

1. Clipping method of hair removal
2. Parenteral prophylactic antibiotic administration within 1 hour before incision
3. Collection of peritoneal fluid or intestinal fluid for culture and sensitivity(C/S)
4. Wound irrigation with 2L normal saline
5. Use of separate closing tray
6. Use of subcutaneous suctions drain
7. Change of antibiotic according to C/S report.
8. Prevention of Hypothermia
9. Prevention of Hypoglycemia
10. Postoperative oxygen supplementation.

The goal of this study was to determine the effectiveness of implementation of ten (10) measures of perioperative surgical wound care bundle in reducing SSI in patients undergoing emergency abdominal surgery compared with traditional or routine ongoing care.

Material and Methods

This Cross sectional analytical study was carried out at the Department of Surgery Sir Salimullah Medical college, Mitford hospital, Dhaka from June 2021 to May 2022. A total of 120 patients of either sex who had undergone emergency abdominal surgery were selected in this study.

Inclusion criteria:

1. Patients who underwent emergency abdominal operation
2. Age 18 years and above

Exclusion criteria:

1. Patients lost follow up.

Study procedure:

Alternate patient had been selected based on the date of admission and patients were divided into two groups. Group A patients were included where surgical wound bundle care had been applied. Group B patients were traditional ongoing care had been applied.

Result:

Mean age in Group A and group B was 44.88±11.2 years and 44.82±13.3 years respectively. In Group A, 70% were male and in Group B 80% were male.

Mean BMI in Group A and Group B was 22.09±2.3 kg/m^2 and 22.78±2.1 kg/m^2 .

Table I. *Distribution of the patients by BMI (kg/m^2) (n=120)*

BMI (kg/m)	Group A (n=60) n (%)	Group B (n=60) n (%)	P value
<18.5	3 (5)	1 (1.7)	
18.5 to 24.99	52 (86.7)	53 (88.3)	0.696*
>25	5 (8.3)	6 (10)	
Mean±SD	22.09±2.3	22.78±2.1	0.078**

P value was determined by *Fisher Exact test and **unpaired t test. Data expressed in column.

In Group A, 30% had DM, 48.66% had HTN, 20% had COPD/Asthma and 45% had smoking habit where as in Group B, 33.3% had DM, 40% had HTN, 30% had COPD/Asthma and 40% had smoking habit.

Table-II. *Preoperative co-morbidities among the patients (n=120) Investigations findings was statistically similar in both groups.*

Co morbidity	Group A (n=60) n (%)	Group B (n=60) n (%)	P value*
DM	18 (30)	20 (30)	
HTN	29(48.66)	24 (40)	
COPD/Asthma	12 (20)	18 (30)	0.849
Smoking habit	27 (45)	24 (40)	

P value was determined by *Chi-square test. Data expressed in column.

Table III : *Investigations findings among the patients (n=120)*

	Group A (n=60) Mean±SD	Group B (n=60) Mean±SD	P value*
WBC (/comm) 7888.33±2538.32	8598.33±2709.33	0.141	
Serum albumin (mg/dl)	2.61±0.25	2.67±0.29	0.316
Serum creatinine (mg/dl)	1.23±0.13	1.18±0.17 O.Q78	

P value was determined by *Unpaired t test.

Among all, in Group-A, 15% had developed SSI and in Group-B, 43.3% had developed SSI. In Group A, SSI rate was significantly lower.

Table IV. *Onset of SSI among the patients (n=120)*

Onset of SSI	Group A (n=60) n (%)	Group B (n=60) n (%)	p-value?
SSI developed	9 (15)	26 (43.3)	
Superficial	3 (5)	16 (26.7)	0.001
Deep	6 (10)	10 (16.6)	
No SSI developed	51 (85)	34 (56.7)	

P value was determined by *Chi-square test. Data expressed in column.

Among all in Group A 90% patients had no growth and in Group B 75% patients had no growth.

Mean Length of hospital stay among the patients of Group A and Group B was 6.9±1.9 days and 10.1±2.7 days accordingly. Postoperative hospital stay was significantly lower among Group A than Group B.

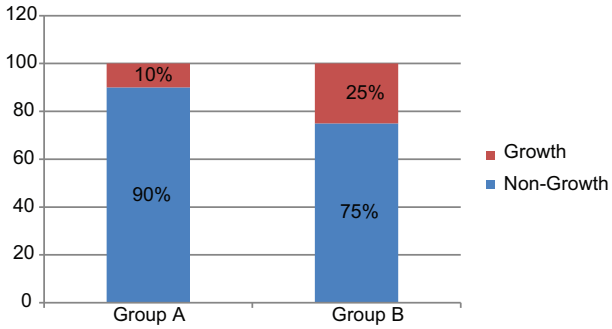

Fig. I : *Distribution of the patents according to culture sensitivity.*

Table V : *Duration of postoperative hospital stay among the patients (n=120)*

Length of hospital stay	Group A (n=60) n (%)	Group B (n=60) n (%)	P value?
<10 days	52 (86.7)	39 (65)	0.002*
>10 days	8 (13.3)	21 (35)	
Mean±SD	6.9±1.9	10.1±2.7	<0.01**

P value was determined by *Chi-square test . **Unpaired t test. Data expressed in column.

Among all, in Group A, 3 patients needed readmission and in Group B, 10 patients needed readmission. But no significant difference found between both groups.

Table VI : *30-days readmission among the patients (n=120)*

30-days readmission	Group A (n=60) n (%)	Group B (n=60) n (%)	P value
Needed	3 (5)	10(16.7)	0.075
Not needed	57 (95)	50 (83.3)	

P value was determined by *Fisher Exact test. Data expressed in column.

Discussion:

Globally, surgery is essential to healthcare . Surgical site infection (SSI) is one of the most common hospital-acquired complications in surgical patients. Greater hospital stays and higher inpatient costs are also strongly correlated with SSI[5]. Therefore, figuring out prevention techniques could enhance patient care while reducing the length and expense of hospital stays for patients who are at risk. The Surgical Care Improvement Project (SCIP) in the US and the Department of Health's High Impact Intervention (DH HII) in England are two nationwide initiatives that have developed care bundles to reduce[6].

In our study, we demonstrate for the implementation of 10 components as a surgical wound bundle care perioperatively. The peri operative bundle was adopted from review of literature and our hospital facilities.

Maintenance of normothermia and blood glucose monitoring has long been emphasized by SKIP as an effort to reduce surgical site infections. Emphasis on blood glucose monitoring was historically studied in cardiac surgery patients

as well[7]. In this study we saw a decline in compliance with maintenance of intraoperative temperature >36.5degrees celsius. In order to achive normothermia we utilize warming blankets. Some studies have shown a benefit from high fraction of inspired oxygen during and after surgery in reducing SSIs. A meta analysis in 2009 examined 5 RCT evaluating the utility of perioperative hyperoxia to reduce the risk of SSIs and statically significant reduction from 12%to 9% [7].

In our study we found that in Group A 46.7% had perforation, 26.7% had acute appendicitis, 20% had an intestinal obstruction and 6.6% had complicated hernia besides, in Group 50% had perforation, 23.3% had an acute appendicitis, 21.7% had intestinal obstruction and 5% had complicated hernia. The incidence of peptic ulcer perforation in younger group was usually higher because of high rate of smoking and analgesic drugs abuse as the same are easily available in medicine stores and sold as over the counter drug.

Among the case of perforation peritonitis peptic ulcer perforation constitutes (50%) followed by small bowel perforation (30%)[8].

In our study the prevalence of acute appendicitis in Group A was 26.7% and Group B was 23.3% . when compairing the result to different studies a wild variation of prevalence of acute appendicitis was found. In Aranda Narvaaz ct al in 2014 had an overall acute appendicitis rate 13.4% . Two other study in Egypt and Quater found of 21.9% and 3.6% respectively [9].

In our study we found in Group A 20% and Group B 21.7% patients was diagnosed as intestinal obstruction. Similar result was found in other studies 262 patients were admitted with intestinal obstruction. The prevalence of intestinal odstruction was 21.8% and 4.8% among the patients admitted for acute abdominal surgery and total

Admission respectively. [10]

A care bundle's implementation and ability to accomplish compliance may be compromised by the fact that it has so many components. The DH HII SSI care bundle also involves numerous clinical teams and is spread out during the pre, intra-, and postoperative periods, which may limit compliance and effectiveness. The bundle couldn't be divided up into its component pieces[11].

Conclusion:

The surgical wound care bundle concept for the reduction of SSI after emergency abdominal surgery is effective. The findings showed that patients having surgical wound care bundles had a lower frequency of SSI development and a shorter hospital stay compared to patients having traditional ongoing care. Besides, though not significant , the 30-day readmission rate was also lower in the surgical wound care bundle group.

Limitations:

All samples were collected from a single centre. Sample size was small. Sample was taken purposively, so randomization was not done. In ability to identify which specific elements of bundle truly contribute to reduce infection.

Conflict of interest : none

References:

1. Ban, K.A., Minei, J.P., Laronga, C., Harbrecht, B.G., Jensen, E.H., Fry, D.E., et al., (2017). American College of Surgeons and Surgical Infection Society : surgical site infection guidelines, 2016 update. Journal of the American College of Surgeons, 224(1), 5974.https: //doi. org/ 10.1016/ j.jamcollsurg. 2016.10.029
2. Berríos-Torres, S.I., Umscheid, C.A., Bratzler, D.W., Leas, B., Stone, E.C., Kelz, R.R., et al., (2017). Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017. JAMA Surgery, 152(8), 784. doi: 10.1001/ jamasurg. 2017.0904.
3. Winter,J., JL, C., MA, A., DC, C., JC., et al ., (2006), 1423 pancreaticoduodenectomies for pancreatic cancer ; A single institution experience,s, 10(9), 1199 1210. https: //doi.org/ 10.1016/ j.gassur. 2006.08.018
4. Koek, M.B., Hopmans, T.E.M., Soetens, L.C., Wille, J.C., Geerlings, S.E., Vos, M.C., et al., (2017). Adhering to a national surgical care bundle reduces the risk of surgical site infections. PLoS ONE, 12(9), 1–16. https: //doi.org/ 10.1371/ journal. pone. 0184200
5. Mahmoud, N.N., Turpin, R.S., Yang, G. & Saunders, W.B., (2009). Impact of surgical site infections on length of stay and costs in selected colorectal procedures. Surgical Infections, 10(6), 539–544. https: //doi.org/ 10.1089/ sur.2009.006

6. Bratzler, D.W., (2006). The surgical infection prevention and surgical care improvement projects: Promises and pitfalls. American Surgeon, 72(11), 1010– 1016. http: //dx. doi. org/ 10.1177/ 000313480607201106

7. Kiran, RP, Turina, M., Hammel, J., Fazio, V., (2013). The clinical significance of an elevated post operative glucose value in non diabetic patients after colorectal surgery : evidence for need for tight glucose control? AnnSurg,258(4);599-604. https: //doi.org/ 10.1097/ sla. 0b013e3182a501e3

8. Bansal, A., Mallick, M. & Jena, S., (2019). A study of post-operative complications of all emergency laparotomy in a tertiary care hospital within 90 days. Archives of Clinical Gastroenterology, 5(2), 015–018. http: //dx .doi .org / 10.17352/2455-2283.000062

9. Garcell, H.G., et al, 2017 Incidence and Etiology of Surgical Site Infections in Appendectomies: A 3-Year Prospective Study. Oman Med J. 2017 Jan; 32(1): 31–35. doi: 10.5001 / omj.2017.06

10. Urgessa, S., et al., 2016 Prevalence, causes and management outcome of intestinal obstruction in Adama Hospital, Ethiopia. Urgessa Soressa , Abebe Mamo , Desta Hiko, Netsanet Fentahun. BMC Surg 2016 Jun 4; 16(1):38. doi: 10.1186/ s12893-016-0150-5.

11. Tanner, J., Kiernan, M., Hilliam, R., Davey, S., Collins, E., Wood, T., et al., (2016) . Effectiveness of a care bundle to reduce surgical site infections in patients having open colorectal surgery. Annals of the Royal College of Surgeons of England, 98(4), 270–274. https: //doi.org/ 10.1308%2Frcsann.2016.0072