
# INTERVAL TO CLOSURE OF 'TEMPORARY' STOMAS IN THE GROOTE SCHUUR HOSPITAL TRAUMA CENTRE

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**Keywords:** Colostomy, Ileostomy, Stoma Reversal, Stoma Closure, Trauma

**DECLARATION**

I, Fathi S.  Abshina hereby declare that the work on which this dissertation/thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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**Glossary of abbreviations**

| | |
|---|---|
| GSH | Groote Schuur Hospital |
| HVI | Hollow Viscus Injury |
| UCT | University of Cape Town |

## 1. ABSTRACT

**BACKGROUND:** A significant percentage of temporary stomas placed for trauma reasons are never reversed, leading to a significant effect on quality of life, a profound impact on physical and psychological well-being, and additional strain on the healthcare budget (1). This study aimed to evaluate the interval between temporary stoma creation and closure in trauma patients at Groote Schuur Hospital (GSH) trauma centre using secondary measures such as:

- Interval to loopogram (an X-ray examination in which contrast (X-ray dye) is introduced into the stoma to visualize the bowel part that extends to the stoma)
- Identifying reasons for the delay in closure.
- Evaluating complications after stoma creation or closure.

**METHODOLOGY:** The study design comprised a retrospective descriptive cohort study conducted over 11 years from 2010 to 2020 at the GSH trauma center, in the Western Cape, South Africa. The files of all patients over the age of 13 years with a temporary stoma as a result of trauma were reviewed.

**RESULTS**: The study included 199 patients. The majority were males [N=182 (91%)], with a mean age of 30 years (range from 18 to 61) The most common type of stoma created was a loop stoma [N=139 (70%)]. The overall stoma closure rate was 66% (N=132) and the mean duration from stoma creation to closure was approximately 66 weeks (range 304.7 weeks with min 5 weeks to max 310 weeks,mode 29,4 weeks,median 55.1 weeks). About 47% of patients experienced no delay (reversed on appointment dates), while 53% were delayed due to various reasons. Among the 73 patients who participated in the telephonic survey, 77.46% reported stoma reversal. Most patients (81.16%) were aware that their stoma needed to be reversed, and 73.91% attended their follow-up appointment. Furthermore, 41.43% experienced complications secondary to their stoma. The majority of the 73 patients who responded to the survey, knew how to manage their stomas. The survey was mainly conducted as part of a study to determine the reasons behind the delay of closure as certain information was missing from patient's files.

**CONCLUSION**:

These findings highlight the importance of increasing efforts to eliminate stoma reversal delays, as well as improving patient follow-up and stoma care education.

## 2. Introduction and background

A stoma can be defined as a purposeful anastomosis between a part of the gastrointestinal tract and the skin of the anterior abdominal wall, which can be created anywhere along the gastrointestinal tract for alteration of the fecal stream (2,3). Intestinal ostomies are classified based on the portion of the intestine that is brought outside the body, resulting in small and large bowel ostomies. They can also be categorized based on the type of stoma, distinguishing between loop and end ostomies. Ileostomies are typically situated on the right side of the abdomen, while colostomies are predominantly found on the left side (4). In general, loop and end ileostomies are considered the most common stoma types used in surgical practice (5). The loop colostomy is used in trauma when complete fecal diversion is not required (6).

Stomas are frequently formed during surgery for patients in whom anastomosis is not directly feasible (7). They might be created either in elective cases in patients mainly with colorectal malignancy (8), or largely in emergencies, such as a temporary measure during abdominal trauma with associated bowel injury and contamination, or in hemodynamically unstable patients and gastrointestinal emergency surgery (7). A prospective observational study showed that the most common emergency stoma was performed during gastrointestinal surgery (25%) and abdominal trauma 22% (7).

Temporary stomas play a crucial role in the emergency management of colonic injuries and elective colonic surgeries (14). While there has been a notable shift towards repair without diversion in emergency colonic injuries, with some studies reporting low postoperative leak rates (2.4%) after primary repair (15), colostomy still has an important role in high-risk hemodynamically unstable patients, devasting bowel injury with significant contamination, and in damage control surgery (10).

Stomas created during emergency surgical intervention are commonly used to manage various surgical conditions, including obstruction, perforation, and anastomotic leaks (5,9,10,7,11). However, these stomas can cause significant morbidity in patients, and their duration should be minimized as much as possible (11,12). The delay in stoma reversal can lead to various complications, including malnutrition, electrolyte disturbances, peristomal skin changes, mucocutaneous separation, retraction/flush stoma stenosis, prolapse, parastomal hernia, granulomas, pancaking, high output ileostomy, and psychological distress (9,12,5,11,7).

Several studies have demonstrated that the overall rate of complications is considerably higher in emergency stomas compared to elective ones (11,8). Other studies have identified various factors that influence the complications associated with stoma closure, including the experience of the surgeon, the surgical technique employed, perioperative treatment received by the patient, and the timing of the

operation (17). In addition, overall health status and aging have a significant impact on the outcomes of stoma creation or closure and patients with poor general health tend to have higher mortality rates associated with these interventions (14).

A systematic control trial by Malik *et al*. (2018) showed that end colostomy had the highest incidence of morbidity, followed by loop colostomy and loop ileostomy (13). The morbidity and mortality rates associated with stoma closure have been a subject of debate in reported studies. Generalizing findings from these studies is challenging due to conflicting results and variations in the description of complications. Consequently, reported rates of morbidity after the closure of temporary stomas vary significantly, ranging from 2.4% to 48.2% (16). In a study by Pokorny *et al*. (2005), the overall stoma closure-related mortality rate was found to be 3%, with a surgical complications rate of 20% (8). Anastomotic leaks (5%) and wound infections (9%) were the most common surgical complications (14).

The interval between stoma creation and reversal is often prolonged, and some colostomies and ileostomies may never be reversed (1). In patients with potentially reversible stomas created during emergency surgical interventions at the trauma department in GSH, the target is to reverse these stomas 12 weeks after the initial operation. A significant number of patients are lost to follow-up or have a prolonged interval before stoma reversal. The interval before having a Loopogram and subsequent reversal in these cases need to be quantified, and possible contributing factors explored to address this problem.

Successful stoma reversal procedures have been achieved in patients as soon as 2 weeks after the initial stoma creation (18). However, there is a lack of standardized protocols for stoma closure, resulting in significant variation in the timing of reversal among different hospitals. While the goal is typically to reverse a diverting colostomy and ileostomy within 6 to 12 weeks (24), studies have shown that the time to closure can be significantly longer, ranging from 13 to 37 weeks (1,18). Several factors contribute to this prolonged duration; therefore, many patients end up keeping their stoma for a much longer time than initially planned (19,20).

Numerous studies have provided evidence of the negative impact of stoma-related issues on the overall quality of life (20,21). Partly due to the impact on healthcare budgets, a significant proportion of stomas are not reversed. Studies have reported that non-reversal rates ranged from 46% to 65% (1,18,22,12). Other studies have shown reversal rates as low as 35% to 54% (2). However, trauma patients with stomas pose a particular challenge in determining the exact proportion of reversals due to inadequate follow-up, resulting in limited knowledge of the actual reversal rates in this population (2,23). Furthermore, the optimal timing for stoma reversal following injury remains a topic of controversy and debate (2).

A cross-sectional study conducted by Godat *et al*. (2014), involving 3,899 patients who underwent temporary stoma creation following a hollow viscus injury (HVI), showed that approximately 6.4% of the patients had their stomas reversed during the same admission, while about 63% had their stomas reversed at a later stage, resulting in an overall reversal rate of 72.1% (2). Notably, around 57% of the patients had their stoma reversals performed at a different healthcare facility from where the initial stoma creation took place (2). This observation suggests that some stoma reversals may go unnoticed due to presumed loss of follow-up at the primary hospital.

Data on the overall incidence of stoma creation in patients with HVI as well as the timing and rate of stoma reversal are currently scarce. Moreover, research on the reversal interval in Africa and South Africa is scarce. However, it is hypothesized that there are low reversal rates and protracted waiting periods. Numerous factors may clarify this, especially in the non-private sector such as challenges related to scheduling, logistical issues, fitness of the patient for surgery, and limitations on the availability of elective theatre time due to a high trauma load. Given the above-mentioned, this study will be the first step in addressing the problem by attempting to quantify it.

## 3. Objectives

We hypothesized that a major number of temporary stomas created at the GSH Trauma Center have never been reversed. Reversal of the stomas usually occurs after a long period. We tried to quantify this problem by identifying barriers and difficulties causing delayed closure. The primary objective of this study was to measure the time to stoma closure in the trauma patients treated at GSH over 11 years.

## 4. Methods

### 4.1. Study design

A retrospective cohort study spanning 11 years, from 2010 to 2020, was performed. The study focused on adult trauma patients who were treated at the trauma center of the GSH, located in the Western Cape region of South Africa.

The list of patients who had stoma's created for trauma reasons was provided by the stoma therapy unit at the colorectal clinic at GSH, and then the folders were collected from the medical records department after permission was obtained from the Western Cape government.

The inclusion criteria for this study comprised several categories of patients:

- individuals who underwent temporary stoma during admission due to traumatic injury.
- patients who had damage control surgery with an initial open abdomen.
- individuals who required a stoma as part of their definitive surgery.
- patients with isolated extraperitoneal rectal injuries.

Data collected and documented included patient demographics; type of stoma created; length of time between stoma creation; Loopogram date; duration between stoma creation and stoma closure; as well as the reasons for any delays in stoma closure. The collected data was then analyzed using descriptive statistics to calculate the mean and standard deviation for continuous variables as well as frequency counts and percentages for categorical variables. In addition to the data collected from patient records, a telephonic interview was conducted with 73 patients who had undergone stoma closure. The collected data from the telephonic interviews was subsequently analyzed using qualitative methods to identify common themes related to stoma closure experiences.

### 4.2. Inclusion criteria:

- Surgery at GSH.
- Initial stoma created between (and including) December 2010 - November 2020.
- Trauma Patients 13 years and older.
- Non- Permanent Stoma (reversal intended from the outset).
- Loop-ileostomies, end-ileostomies, Hartman's procedures, and loop-colostomies.

### 4.3. Exclusion criteria:

- Permanent Stoma (such as an end-colostomy).
- Pre-existing Stoma.
- Non-trauma patients.
- Death during hospital admission.
- Paediatric stomas.

### 4.4. Study sample

All patients meeting the inclusion criteria and whose data was found in the stoma directory were included in the study. A data capture sheet was employed to gather relevant patient information.

## 5. Ethical declaration and consent

Ethics Approval was obtained from the Human Research Ethics Committee at the University of Cape Town (UCT), as well as approval from the GSH research committee. Since the data was collected retrospectively from trauma files, consent was not applicable.

## 6. Results

In this study, a total of 199 patients were included after applying the inclusion criteria from a larger pool of 379 patients who underwent stoma creation at the GSH trauma centre between 2010 and 2020, most indications for stomas were massive colonic injury, instability for repair, and diversion for extraperitoneal rectal injury due to gunshot pelvis. The mean age of the patients was 30 years, ranging from 18 to 61. There were 182 males, accounting for 91% of the study population (Table 1).

**Table 1.** Number of stomas related to age and gender distribution

| **Age (Years)** | **Numbers** |
|---|---|
| N | 199 |
| Mean | 30 |
| Median (IQR) | 29 (22, 35) |
| Range | 18, 61 |
| **Gender** | |
| Female | 17 (8.5%) |
| Male | 182 (91%) |

Five types of stomas were included in this study. The most prevalent type of stoma created was a loop stoma in 139 patients (70%). Loop colostomy is commonly utilized in trauma cases, particularly in situations involving trans pelvic gunshot injuries and lower and extraperitoneal rectal injuries. It is considered a relatively straightforward procedure, requiring less surgical expertise, and can be reversed locally without the need for a relaparotomy. The second most common stoma observed was Hartman's stoma (end colostomy), which was found in 27 patients (14%), and mucous fistula stoma in 27 patients (14%). These types of stomas are commonly employed when there is a colonic injury with significant contamination or in cases of devastating colonic injury where patients are too unstable for anastomosis or definitive repair. Additionally, loop ileostomy was created in only 2 patients (1%), and end ileostomy was performed in 4 patients (2%). These types of stomas are not commonly used in the context of trauma (Chart 1).

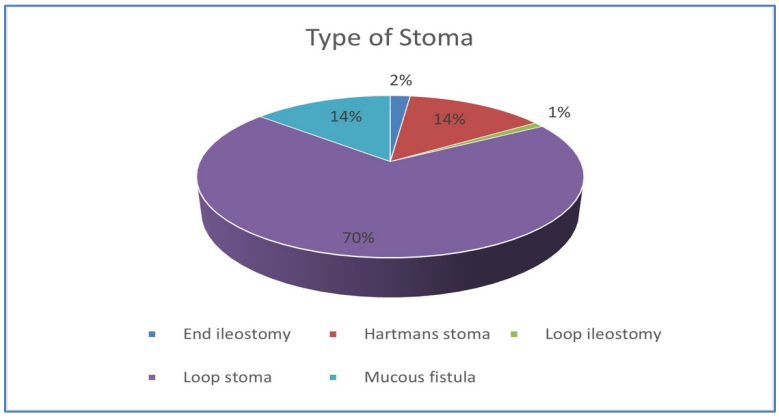


**Chart 1.** Stoma types of incidences in trauma Centre (GSH) from 2010 to 2020

The study found that the overall stoma closure rate was 66%, with 132 patients being successfully reversed (Chart 2).

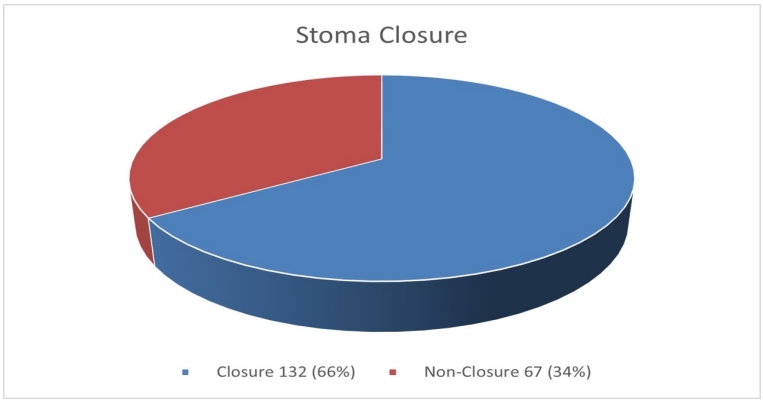


**Chart 2.** Closure rate in trauma Centre (GSH) from 2010 to 2020

The mean duration from stoma creation to closure was calculated to be 66.1 weeks. This duration is considered a relatively long interval period for stoma closure (Table 2).

**Table 2.** Duration from stoma creation to stoma closure

| Duration from stoma creation to stoma closure | Numbers and days |
|---|---|
| N | 132 cases |
| Mean | 66.1 weeks |
| Median (IQR) | 55.1 weeks |
| range | 304.7 weeks |
| mode | 29.4 weeks |

The reasons for the delay in stoma closure were diverse. Among the patients included in the study, approximately 47% (91 patients) experienced no delay (in the appointment dates) for arrangement of stoma closure. All the patients in this study were discharged with followup appointments, at which dates for stoma closure were provided. However, 18% (36 patients) were lost to follow-up, 13% (25 patients) experienced delays due to the COVID-19 pandemic, 9% (18 patients) had a delayed closure due to post-operative complications, 7.5% (15 patients) were still on the waiting list for closure, 1.5% (3 patients) had been admitted to the ICU, 1% (2 patients) relocated, 0.5% (1 patient) were considered to have a high anesthetic risk for closure, 0.5% (1 patient) preferred to have a permanent stoma, 1.5% (3 paients) had a permanent stoma from the initial surgery, and 0.5% (1 patient) had passed away. These reasons collectively contributed to the delay in stoma closure (Chart 3).

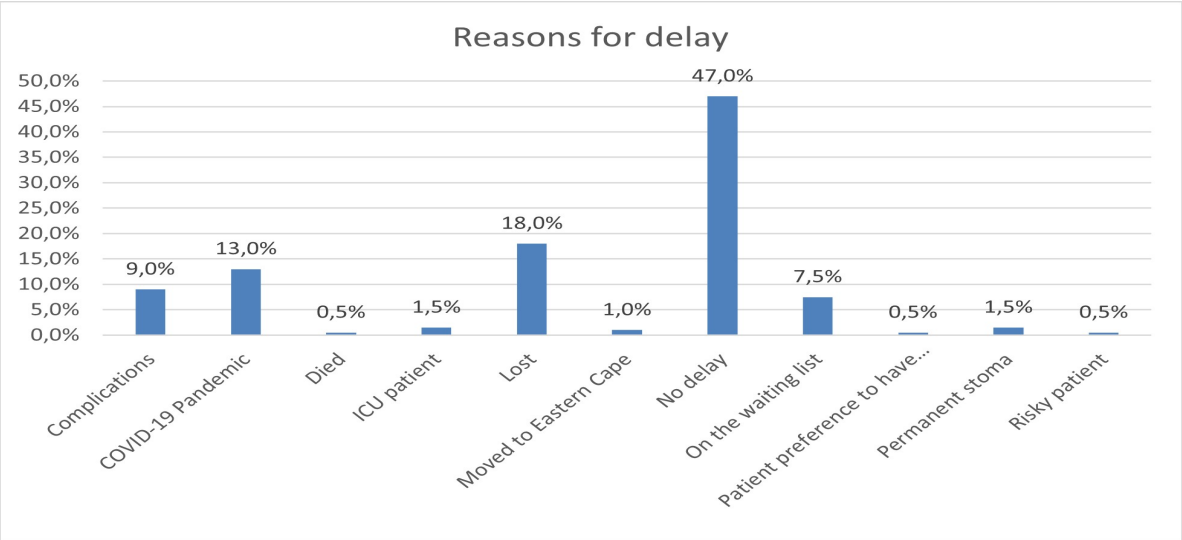


**Chart 3.** Reasons for delay in stoma closure in trauma center (GSH)

Among the 73 patients who participated in the telephonic survey (from 199 patients who had stoma creation), 77.46% (55 patients) reported that their stoma had been reversed. The majority of patients 80.28% (57 patients) stated that they received a follow-up appointment, but only 22.86% (16 patients) were given an appointment within 3 months from the discharge date. In terms of awareness, most patients 81.16% (56 patients) were aware that their stoma needed to be reversed, and approximately 73.91% (51 patients) attended their follow-up appointment. However, it is worth noting that 41.43% (29 patients) of the respondents experienced complications related to their stoma, Such as wound sepsis, stoma necrosis, stoma breakdown, rectocutaneous fistula (on logogram), parastomal hernia, enterocutaneous fistula, intrabdominal collection, anastomotic leak. Among the survey participants, 85.71% (60 patients) expressed knowledge of how to care for their stoma.

The results of the study indicated that less than half of the patients 47% (93 patients) had their stoma reversed on their appointment dates, suggesting that a significant number of patients did not have their

stoma closure performed according to their scheduled appointments. The study also highlighted that a considerable portion of patients 18% (36 patients) were lost to follow-up, which raises the possibility that some of these patients might have had their stoma closure performed at a different hospital. Additionally, the telephonic survey revealed that approximately 18.84% of (13 of 73 patients) were not aware that their stoma needed to be closed.

## 7. Discussion

Numerous studies have explored the timeframe between stoma creation and subsequent stoma closure in patients with potentially reversible stomas. One such study conducted by Sier *et al*. (2015) reported a median time to stoma reversal of 22.4 weeks, despite the initial intention to reverse the stomas within 6-12 weeks (1). In comparison, the current study revealed a significantly longer median time of 66.1 weeks. This discrepancy can be attributed to various factors. Postoperative complications, including an extended recovery period following the initial surgery, as well as complications arising from creation, including skin excoriation, parastomal hernia, infection, prolapse, may contribute to delays in stoma closure. These complications often require additional time for management and recovery before the reversal procedure can be performed.

Additionally, administrative factors, such as long waiting lists and delays resulting from the prioritization of more urgent procedures, can also cause delays in stoma closure. These administrative challenges, along with resource limitations and scheduling constraints, can result in prolonged waiting times for patients.

A study conducted by Velmahos *et al*. (1995) in South Africa recommended the early closure of colostomies and the utilization of loop colostomies whenever feasible for patients with colonic injury following trauma. The study found that these approaches were both safe and advantageous. However, there are contraindications for early closure, including nonhealing of the distal bowel, persistent wound sepsis, or ongoing postoperative instability (18).

Some studies have reported successful stoma reversals as early as 2 weeks after the initial creation (18). These findings suggest that in selected cases where the necessary conditions are met, early stoma reversal can be considered a viable option. Early closure of the stoma could have potential advantages such as reduced hospital stay and cost, elimination of stoma care for the patient, and the alleviation of psychological, social, and financial burdens associated with stomas in an otherwise healthy individual (9).

The study revealed that the stoma closure rate was 66% overall, and the average duration for stoma closure was 66.1 weeks, which is considered a relatively long interval. The most common reasons for the delay in stoma closure were complications following stoma creation and the impact of the COVID-19 pandemic. According to a multicentric observational study conducted by Andrea Balla *et al*. (2022), the overall rate of stoma closure decreased by 19.5% during the study period following the lockdown imposed due to COVID-19 (from March 2020 to February 2021) compared to the control period one year before the lockdown (from March 2019 to February 2020) (12). The reduction in the number of stoma closure procedures during the timeframe is likely attributable to the pandemic and its associated restrictions.

Additionally, 18% of patients were lost to follow-up, and there were challenges related to reduced access to theater time. These findings highlight the need for further strategies to improve waiting times for stoma closure and enhance follow-up facilities.

This study has several limitations that should be acknowledged. Firstly, the retrospective design of the study introduces inherent limitations and the potential for selection bias. As the study was conducted at a single centre, the findings may not be generalizable to other healthcare settings. Moreover, the data collected for the study relied solely on the information available in the patient records, which may have been limited in scope.

Additionally, the telephonic interviews conducted to supplement the data obtained from patient records might have introduced selection bias, and the accuracy of the information collected during phone interviews could be subject to limitations. Furthermore, relying on information recorded in patient records may have resulted in incomplete or insufficient data, and the absence of an official reason for delay documented in patient files is a noteworthy limitation.

It is important to note that the complexity of factors contributing to delayed stoma closure may not have been fully captured in the study's results, underscoring the need for further research to delve deeper into this issue.

In conclusion, the study offered valuable insights regarding the duration of stoma closure in trauma patients who had emergency surgical intervention resulting in potentially reversible stomas. The findings highlighted the importance of enhancing follow-up and management protocols for these patients to promote timely stoma closure and reduce associated complications.

Further research is necessary to gain a comprehensive understanding of the factors influencing delayed stoma closure in specific populations and to develop effective strategies for improving outcomes in such cases. Additionally, there is a need to develop standardized protocols for stoma closure as there is substantial variation in the scheduling of reversals among different hospitals.

## 8. References


1. Sier MF, Van Gelder L, Ubbink DT, Bemelman WA, Oostenbroek RJ. Factors affecting timing of closure and non-reversal of temporary ileostomies. International journal of colorectal disease. 2015 Sep;30:1185-92.
2. Godat L, Kobayashi L, Chang DC, Coimbra R. Do trauma stomas ever get reversed? Journal of the American College of Surgeons. 2014 Jul 1;219(1):70-77.
3. Francone TD. Overview of surgical ostomy for fecal diversion. Walthman (MA): UpToDate. 2017.
4. Ambe PC, Kurz NR, Nitschke C, Odeh SF, Möslein G, Zirngibl H. Intestinal ostomy: classification, indications, ostomy care and complication management. Deutsches Ärzteblatt International. 2018 Mar;115(11):182.
5. Ahmad QA, Saeed MK, Muneera MJ, Ahmed MS, Khalid K. Indications and complications of intestinal stomas – A tertiary care hospital experience. Biomedica. 2010 Jul;26(2):144-7.
6. Gosain A, Markison RE, Schecter WP. Temporary colostomy for trauma: a new method to simplify colostomy closure. Diseases of the colon & rectum. 1987 Mar;30:220-2.
7. Pandiaraja J, Chakkarapani R, Arumugam S. A study on patterns, indications, and complications of an enteric stoma. Journal of Family Medicine and Primary Care. 2021 Sep;10(9):3277.
8. Pokorny H, Herkner H, Jakesz R, Herbst F. Mortality and complications after stoma closure. Archives of Surgery. 2005 Oct 1;140(10):956-60.
9. Nelson RL, Singer M, Cochrane Injuries Group. Primary repair for penetrating colon injuries. Cochrane Database of Systematic Reviews. 1996 Sep 1;2010(1).
10. Byrnes MC, Beilman GJ. Ostomies in Trauma. Atlas of Intestinal Stomas. 2012:151-8.
11. O'Flynn SK. Care of the stoma: complications and treatments. British journal of community nursing. 2018 Aug 2;23(8):382-7.
12. Massenga A, Chibwae A, Nuri AA, Bugimbi M, Munisi YK, Mfinanga R, Chalya PL. Indications for and complications of intestinal stomas in the children and adults at a tertiary care hospital in a resource-limited setting: a Tanzanian experience. BMC Gastroenterology. 2019 Dec;19(1):1-0.
13. Bella A, Saraceno F, Di Saverio S, Di Lorenzo N, Lepiane P, Guerrieri M, Sileri P. Ostomy closure rate during COVID-19 pandemic: an Italian multicentre observational study. Updates in Surgery. 2022 Jun;74(3):1017-25.
14. Qureshi A, Cunningham J, Hemandas A. Emergency stomas; should non-colorectal surgeons be doing it? Gastroenterology and hepatology from bed to bench. 2018;11(4):306.
15. Garber HI, Morris DM, Eisenstat TE, Coker DD, Annous MO. Factors influencing the morbidity of colostomy closure. Diseases of the Colon & Rectum. 1982 Jul;25:464-70.

16. Malik TA, Lee MJ, Harikrishnan AB. The incidence of stoma related morbidity – a systematic review of randomised controlled trials. The Annals of The Royal College of Surgeons of England. 2018 Jul;100(7):501-8.
17. Shar ZA, Hussain Z, ud Din S, Ahmed I, Ali F, Memon AH. Evaluation of the Causal Factors of Complications Following Ileostomy Closure: Causal Factors of complications following ileostomy closure. Pakistan BioMedical Journal. 2022:79-83.
18. Velmahos GC, Degiannis E, Wells M, Souter I, Saadia R. Early closure of colostomies in trauma patients—a prospective randomized trial. Surgery. 1995 Nov 1;118(5):815-20.
19. Gustafsson CP, Gunnarsson U, Dahlstrand U, Lindforss U. Loop-ileostomy reversal—patient-related characteristics influencing time to closure. International journal of colorectal disease. 2018 May; 33:593-600.
20. Oliphant R, Czerniewski A, Robertson I, McNulty C, Waterston A, Macdonald A. The effect of adjuvant chemotherapy on stoma-related complications after surgery for colorectal cancer. Journal of Wound, Ostomy and Continence Nursing. 2015 Sep 1;42(5):494-8.
21. Vonk-Klaassen SM, de Vocht HM, den Ouden ME, Eddes EH, Schuurmans MJ. Ostomy-related problems and their impact on quality of life of colorectal cancer ostomates: a systematic review. Quality of life research. 2016 Jan;25:125-33.
22. Vonk-Klaassen SM, de Vocht HM, den Ouden ME, Eddes EH, Schuurmans MJ. Ostomy-related problems and their impact on quality of life of colorectal cancer ostomates: a systematic review. Quality of life research. 2016 Jan;25:125-33.
23. Zafar SN, Changoor NR, Williams K, Acosta RD, Greene WR, Fullum TM, Haider AH, Cornwell III EE, Tran DD. Race and socioeconomic disparities in national stoma reversal rates. The American Journal of Surgery. 2016 Apr 1;211(4):710-5.
24. Sambasivan CN, Underwood SJ, Kuehn RB, Cho SD, Kiraly LN, Hamilton GJ, Flaherty SF, Dorlac WC, Schreiber MA. Management and outcomes of traumatic colon injury in civilian and military patients. The American Surgeon. 2011 Dec;77(12):1685-91.