



ASSOCIATION OF INFLAMMATION DEGREE AND LENGTH OF STAY AFTER LOWER GASTROINTESTINAL SURGERY IN INTENSIVE CARE

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ABSTRACT

Background: Lower gastrointestinal surgery induces a systemic inflammatory response that may influence patient recovery and duration of care. The Systemic Immune-Inflammation Index (SII) is considered a practical inflammatory marker reflecting the balance between immune and inflammatory responses. **Objective:** To analyze the association between inflammation degree and length of stay in patients after lower gastrointestinal surgery treated in the intensive care unit. **Methods:** This was an analytic observational study with a cross-sectional approach using secondary data from medical records of patients at Ibnu Sina YW-UMI Hospital in 2025. Samples were taken using total sampling, yielding 30 patients who

met the study criteria. Inflammation degree was categorized based on SII values into low and high, while length of stay was categorized as short (3-5 days) and prolonged (≥ 6 days). The association was analyzed using the Spearman test. **Results:** The majority of patients were male (16; 53.3%), aged ≥ 50 years (19; 63.3%), and were most frequently diagnosed with rectal cancer and rectal adenocarcinoma, 12 patients each (40.0%). A total of 18 patients (60.0%) had high SII, while 22 patients (73.3%) had a short length of stay. The Spearman test showed a correlation coefficient of 0.339 with $p=0.067$. **Conclusion:** Inflammation degree was not significantly associated with length of stay in patients after lower gastrointestinal surgery treated in the intensive care unit. These findings suggest that length of stay is likely also influenced by other clinical factors beyond inflammation, and further research is still needed to predict hospital stay duration related to the inflammatory response occurring during surgery.

Keywords: inflammation; intensive care; length of stay; lower gastrointestinal surgery; systemic immune-inflammation index

INTRODUCTION

The digestive system functions to receive, digest, absorb, and excrete food residue through a series of organs divided into the upper and lower gastrointestinal tracts.¹ In the lower gastrointestinal tract, one of the most common clinical problems is colorectal cancer, a condition that remains a global health burden due to its high incidence and mortality rates.²

Globally, colorectal cancer is one of the most common malignancies and a leading cause of cancer-related death.³ In Indonesia, this disease also represents a significant proportion of all cancer diagnoses.⁴ Local data at Ibnu Sina Educational Hospital Makassar show that the majority of colorectal cancer patients are in the 46-55 year age group, making this issue relevant in the context of teaching hospital and referral hospital services in Makassar.⁵

Curative management for many lower gastrointestinal tract disorders, especially colorectal cancer, still relies on surgery. However, surgical trauma not only causes local tissue damage but also triggers a systemic inflammatory response through activation of innate immune mediators, proinflammatory cytokines, and acute phase proteins.⁶ An excessive inflammatory response has been associated with postoperative complications and worse clinical outcomes, including slower recovery and longer hospital stays.⁷

In addition to classic inflammatory markers such as C-reactive protein, attention to biomarkers based on complete blood count is increasing because they are simpler and easier to apply in clinical practice.⁸ The Systemic Immune-Inflammation Index (SII), calculated from platelets, neutrophils, and lymphocytes, is considered capable of representing the interaction between proinflammatory components and adaptive immune responses. A high SII value has been reported to be associated with worse prognosis and increased risk of complications in various surgical conditions and malignancies.⁹

Nevertheless, postoperative length of stay is not only influenced by inflammation. Factors such as age, comorbidities, surgical complexity, postoperative complications, and perioperative

recovery strategies also play a role in the duration of care.¹⁰ Therefore, the association between inflammation degree and length of stay still needs to be assessed in a specific population, particularly patients after lower gastrointestinal surgery requiring intensive care. This study aims to analyze the association between inflammation degree and length of stay in patients after lower gastrointestinal surgery treated in the intensive care unit of Ibnu Sina YW-UMI Hospital in 2025.

METHODS

Study design

This study was an analytic observational study with a cross-sectional approach. Variable measurement was performed once using secondary data from medical records of patients after lower gastrointestinal surgery treated in the intensive care unit of Ibnu Sina YW-UMI Hospital.

Study setting and time

The study was conducted at Ibnu Sina YW-UMI Hospital with cases from the year 2025. The data collection and processing took place from December 2025 to January 2026.

Population and sample

The study population was all patients after lower gastrointestinal surgery who underwent intensive care. The sample was selected using total sampling, i.e., all patients who met the inclusion and exclusion criteria, yielding 30 patients.

Selection criteria

Inclusion criteria were patients after lower gastrointestinal surgery treated in the intensive care unit from January to December 2025. Exclusion criteria included incomplete medical records and patients with a history of inflammatory disease.

Variables and operational definitions

The independent variable was inflammation degree, measured using the Systemic Immune-Inflammation Index (SII) with the formula $\text{platelets} \times \text{neutrophils} / \text{lymphocytes}$ and categorized

as low (<1025.1) and high (>1025.1). The dependent variable was length of stay, calculated from the date of surgery until discharge and categorized as short (3-5 days) and prolonged (≥ 6 days).

Data collection

Data were obtained from patient medical records, including subject characteristics, laboratory values needed for SII calculation, diagnosis, and length of stay. All data were recorded according to study variables without any intervention on the subjects.

Statistical analysis

Descriptive analysis was presented as frequency and percentage distributions. The association between inflammation degree and length of stay was analyzed using the Spearman test. A p-value <0.05 was set as the statistical significance threshold.

Ethical approval

This study received ethical approval with number 796/A.1/KEP-UMI/X/2025.

RESULTS AND DISCUSSION

Table 1. Characteristics of study subjects

Variable	Category	n	%
Gender	Male	16	53.3
	Female	14	46.7
Age	<50 years	11	36.7
	≥ 50 years	19	63.3
Diagnosis	Rectal cancer	12	40.0
	Rectal adenocarcinoma	12	40.0
	Colon adenocarcinoma	3	10.0

Variable	Category	n	%
	Rectosigmoid tumor	3	10.0

Source: Secondary data from medical records, 2025

Table 1 shows that the study subjects were predominantly male and in the age group ≥ 50 years. The most common diagnoses were rectal cancer and rectal adenocarcinoma, each 40.0%, so the case profile of the study mainly represents adult-elderly patients with lower gastrointestinal malignancies.

Table 2. Distribution of inflammation degree and length of stay

Variable	Category	n	%
Inflammation degree	Low SII	12	40.0
	High SII	18	60.0
Length of stay	Short (3-5 days)	22	73.3
	Prolonged (≥ 6 days)	8	26.7

Source: Secondary data from medical records, 2025

In this study, the high SII category was more common than low SII. Nevertheless, patient length of stay was generally in the short category, i.e., 3-5 days in 73.3% of patients.

Table 3. Analysis of association between inflammation degree and length of stay

Variable	Correlation coefficient	n	p-value
Inflammation degree vs length of stay	0.339	30	0.067

Source: Secondary data from medical records, 2025. Spearman test.

Spearman analysis showed a correlation coefficient of 0.339 with $p=0.067$. This value indicates a tendency toward a positive association with weak-moderate strength, but it has not yet reached statistical significance, so inflammation degree cannot be stated to be significantly associated with length of stay.

DISCUSSION

The characteristics of the study subjects showed a predominance of male patients and those aged ≥ 50 years. This pattern is consistent with the epidemiology of colorectal cancer, which is more commonly found in older age groups and is quite predominant in males. Local data from Ibnu Sina Educational Hospital Makassar also show a similar age distribution in colorectal cancer patients, so the sample characteristics of this study remain within an understandable clinical spectrum.¹¹

The majority of patients in this study were in the high SII category. This finding supports the idea that lower gastrointestinal tract surgery, especially in cases of malignancy, can trigger a significant systemic inflammatory response.¹² Biologically, SII integrates the role of neutrophils and platelets as proinflammatory components with lymphocytes as a component of immune regulation.¹³ Therefore, an increase in SII is often viewed as an indication of systemic inflammatory dominance and decreased adaptive immune response capacity.¹⁴

Pathophysiologically, surgical trauma triggers the release of damage-associated molecular patterns, which then activate resident immune cells and induce the production of inflammatory mediators.¹⁵ This response is initially physiological because it plays a role in wound healing. However, if excessive or prolonged, systemic inflammation can contribute to postoperative complications, organ dysfunction, and delayed clinical recovery.¹⁶

Nevertheless, the results of this study show that inflammation degree was not significantly associated with length of stay. Statistically, $p=0.067$ remains above the 0.05 threshold. This means that although there is a tendency for higher inflammation degree to be followed by longer length

of stay, the evidence in this sample is not yet strong enough to conclude a significant association. In a methodological context, the limited sample size may reduce statistical power and cause an association that may be clinically relevant to become statistically non-significant.¹⁷

This finding does not completely contradict theory. Postoperative length of stay is a multifactorial outcome. Besides inflammation, the duration of care is influenced by nutritional status, comorbidities, surgical complexity, infectious complications, pain management, and perioperative recovery protocols such as Enhanced Recovery After Surgery.⁸ Therefore, SII is likely not the sole primary determinant in the population of patients treated in the intensive care unit.¹⁸

Several studies cited in the source manuscript do show that inflammatory indices such as SII and neutrophil-lymphocyte ratio may be associated with prolonged ICU stay, risk of complications, or worse clinical outcomes.¹⁹ However, there is also evidence that after controlling for other clinical factors, inflammatory markers do not always remain independent predictors of length of stay.²⁰ This strengthens the interpretation that the results of this study are scientifically rational and cannot be directly considered contradictory to the literature.²¹

The main limitation of this study is the lack of uniformity in the timing of postoperative complete blood sample collection. Variations in sampling time may affect inflammatory marker values because the immune response changes dynamically after surgery. Additionally, the use of medical record data makes this study highly dependent on the completeness of available clinical data. Therefore, future research should use larger sample sizes, more homogeneous sampling times, and include other clinical variables to make the analysis model more comprehensive.

CONCLUSION

The degree of inflammation in patients after lower gastrointestinal surgery treated in the intensive care unit of Ibnu Sina YW-UMI Hospital in 2025 was mostly in the high category based on the Systemic Immune-Inflammation Index value. Patient length of stay was generally in the

short category. Statistical analysis showed that inflammation degree was not significantly associated with length of stay. Clinically, these findings indicate that postoperative care duration is likely determined by a broader combination of factors than systemic inflammation alone.

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