applied sciences

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The Prognostic Nutritional Index (PNI) Is a Powerful Biomarker for Predicting Clinical Outcome in Gastrointestinal Emergency Patients: A Comprehensive Analysis from Diagnosis to Outcome

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Abstract

Objective: This study aimed to evaluate the relationship between the Prognostic Nutritional Index (PNI) and demographic characteristics, presenting complaints, clinical diagnoses, and patient outcomes in patients admitted to the emergency department for gastrointestinal (GI) emergencies. The predictive value of PNI for the clinical course of patients with GI emergencies was investigated. Method: This retrospective cross-sectional study included 583 patients with a diagnosis of GI emergencies in the emergency department of a tertiary university hospital between January 2021 and December 2024. Data such as age, sex, presenting complaints, final diagnosis, and emergency department outcomes (discharge, ward admission, and transfer to intensive care unit) were collected. The PNI value was calculated using serum albumin (g/dL) and total lymphocyte count (/mm^3) with the formula PNI = 10 × albumin + 0.005 × lymphocyte. The PNI was calculated based on serum albumin levels and peripheral lymphocyte counts. Results: The mean age of the study group was 63.4 ± 17.4 years, and 52.1% of the patients were female. The number of patients with a PNI value < 38 was significantly higher in the intensive care unit ($p < 0.001$). PNI values were considerably lower, especially in patients diagnosed with malignancy, cirrhosis, and GI hemorrhage ($X^2 = 71.387$; $p < 0.001$). The PNI was an independent predictor of outcomes in patients with GI emergencies. The mean PNI was significantly higher in discharged patients but significantly lower in patients admitted to the intensive care unit ($p < 0.002$). The cut-off score for PNI was calculated using the median value, and the cut-off score for PNI was <38. Conclusion: PNI is a powerful biomarker for predicting the clinical severity and prognosis of patients with GI emergencies. Since it can be easily calculated from routine biochemical tests, it can be used as a practical and effective risk stratification tool. The evaluation of PNI, especially for the early detection of critically ill patients at high risk of malnutrition, may contribute to the reduction of morbidity and mortality through the timely initiation of appropriate supportive therapies.

Keywords: Prognostic Nutritional Index; gastrointestinal emergency; emergency department; malnutrition; intensive care

Academic Editors: Te-Chih Wong and Yi-Ping Yu

Received: 5 June 2025
Revised: 13 July 2025
Accepted: 15 July 2025
Published: 25 July 2025

Citation: Kıyak, R.; Caglar, B. The Prognostic Nutritional Index (PNI) Is a Powerful Biomarker for Predicting Clinical Outcome in Gastrointestinal Emergency Patients: A Comprehensive Analysis from Diagnosis to Outcome. *Appl. Sci.* **2025**, *15*, 8269. https://doi.org/10.3390/app15158269

1. Introduction

Gastrointestinal emergencies pose a high risk of morbidity and mortality, particularly in elderly and comorbid patients, and require prompt and accurate risk stratification [1]. Conditions such as gastrointestinal (GI) bleeding, acute pancreatitis, perforation, and biliary tract disease may deteriorate rapidly [2]. However, the early identification of high-risk

patients remains challenging in emergency settings, as existing scoring systems are often time-consuming or lack validation in acute GI cases [3].

In response to this clinical gap, easily applicable and reliable biomarkers have gained attention [4]. One such tool is the Prognostic Nutritional Index (PNI), which reflects both nutritional and immune status based on serum albumin and lymphocyte counts [5]. Although initially developed for surgical patients, PNI has shown prognostic value in oncology, sepsis, and cardiovascular disease; however, its use in GI emergencies remains limited [6].

Given the role of malnutrition and inflammation in poor outcomes, the PNI may serve as a practical indicator for early risk assessment in patients with GI emergencies [7]. This study aimed to evaluate the predictive value of PNI in determining clinical outcomes and its potential use as a decision support tool in the emergency department.

Gastrointestinal emergencies are serious clinical conditions with a high risk of morbidity and mortality, especially in elderly and malnourished patients [1]. Gastrointestinal emergencies, such as acute appendicitis, intestinal hemorrhage, gastric and duodenal perforation, biliary tract diseases, and acute pancreatitis, require rapid intervention and accurate risk assessment [8]. The examination findings in this patient group vary greatly depending on the severity of the disease [2]. Patients with mild disease may present with mild tenderness in the abdomen, whereas those with severe disease may present with findings ranging from severe pain on palpation in the abdomen to the absence of bowel sounds [3]. Serious outcomes are not uncommon in acute gastrointestinal emergencies, and early risk assessment is vital [4]. Delays in diagnosis and treatment increase morbidity by leading to changes such as perforation, sepsis, and multiple organ failure; postoperative intensive care unit and hospital stays are significantly longer in patients with delayed diagnosis [9].

Various scoring systems are used to determine the severity of gastrointestinal diseases. These scoring systems are useful for predicting disease severity using various clinical, laboratory, and imaging parameters [3]. It is critical to predict which patients are at a high risk of gastrointestinal emergencies in the emergency department. For this reason, many clinicians use these scoring systems to evaluate patients. Because rapid, easily applicable, outcome-predictive biomarkers are needed in emergency settings.

The Prognostic Nutritional Index (PNI) is a simple scoring method that is remarkable at this point. The PNI was defined by Mullen and colleagues in 1980 to assess the prognosis of patients undergoing gastrointestinal surgery [5]. This index is based on two basic laboratory parameters reflecting the nutritional and immunological status of the patient: serum albumin level and peripheral lymphocyte count. Briefly was calculated as follows: PNI = 10 × serum albumin (g/dL) + 0.005 × total lymphocyte count (mm^3) [10]. Considering our data, PNI appears to be a cost-effective prognostic tool that can be easily calculated in the emergency department. The fact that it can be calculated using only routine blood tests provides wide applicability in clinical practice. This index, which has been previously used in oncological and cardiovascular diseases, seems to be useful for decision support in emergency medicine, especially in gastrointestinal emergencies. Early recognition of patients with low PNI may allow the management of this high-risk group with interventions such as intensive care follow-up and aggressive fluid and nutritional support. In the literature, malnutrition has been emphasized as a modifiable risk factor [7]. PNI plays a critical role in assessing the prognosis of patients with many diseases, such as cancer, lymphoma, and postoperative changes, by reflecting the reaction and presentation of inflammatory abnormalities [11]. PNI is considered an early sign of malnutrition, with low albumin levels and low lymphocyte counts, which makes its effects evident in gastroin-

testinal emergencies. These findings suggest that the PNI may enhance the sensitivity of risk assessment in patients with gastrointestinal emergencies.

The prognostic value of PNI can also be explained by underlying pathophysiological factors. This index is calculated using a simple formula based on serum albumin level and lymphocyte count, and reflects the immunological and nutritional status of the individual. Albumin is a negative acute phase reactant and can fall rapidly during inflammation, while lymphocytopenia is associated with stress and impaired immune response [12]. Therefore, a low PNI may indicate a severe inflammatory response and/or chronic nutritional deficiency. Furthermore, hypoalbuminemia is associated with endothelial dysfunction, impaired host defense, and increased inflammatory response in sepsis. Several recent studies have reported associations between a low PNI and elevated cytokine levels, such as IL-6 and TNF-α, supporting its role as a surrogate marker of systemic inflammation [6].

The question of whether a low PNI is a factor leading to poor outcomes alone or a reflection of an already serious illness remains debatable. In the literature, PNI has been reported to be a risk factor independent of other scores, even in acute critical illnesses, such as COVID-19 [6]. This suggests that the PNI is not only an indicator of disease severity but also a comprehensive risk index that reflects an individual's capacity to cope with the disease [13].

In this study, we aimed to evaluate the efficacy of PNI in predicting the clinical course and patient outcomes in patients with GI emergencies in the emergency department. We investigated whether PNI is a useful prognostic tool in addition to existing scoring systems and whether it can contribute to the early recognition and management of high-risk patients.

2. Materials and Methods

2.1. Research Model

This retrospective observational analysis was conducted in the Emergency Department of Balıkesir University Faculty of Medicine Hospital. By retrospectively scanning the hospital automation system records, all patients admitted to the emergency department with a pre-diagnosis of gastrointestinal emergency between January 2021 and December 2024 were identified.

2.2. Data and Variables

Intra-abdominal pathologies requiring emergency treatment, such as acute appendicitis, pancreatitis, cholecystitis, cholangitis, intestinal obstruction, GI perforation, and gastrointestinal bleeding, were included in the definition of GI emergencies. The inclusion and exclusion Criteria were as follows: 18 years of age or older, the definite diagnosis made in the emergency department, being in the GI emergency disease group defined above, and the necessary clinical data being recorded completely. Intra-abdominal injuries due to trauma or acute abdomen due to gynecological causes were excluded from the study as non-GIS etiologies. Patients with missing serum albumin or complete blood count results (PNI could not be calculated) were also excluded. Additionally, patients with known or suspected acute lymphoproliferative diseases were excluded from the study because they could have affected PNI assessment. A total of 583 patients who were found to be eligible because of the specified criteria constituted the final sample.

Demographic characteristics (age and sex), presenting complaints, and final diagnoses were recorded from the patient files. In addition, outcomes in the emergency department (discharge, hospitalization in the ward, transfer to the intensive care unit, or exitus) were obtained from the records. Serum albumin levels (g/dL) and total lymphocyte counts (/mm^3) measured from blood samples taken on admission were noted.

The PNI was calculated for each patient using these parameters. PNI was calculated as (PNI = 10 × serum albumin [g/dL] + 0.005 × lymphocyte count [/mm^3]).

Due to the retrospective design of the study and the lack of detailed fluid balance records, serum albumin values were used as recorded and were not adjusted for hydration status.

2.3. Statistical Analysis

The Statistical analysis of the obtained data was performed using SPSS Statistics version 26.0 software. Normally distributed data were reported as mean ± standard deviation, and non-normally distributed data were reported as the median and inter-quartile range (IQR). Additionally, percentage and frequency values were used as descriptive statistics. The chi-square test was used to compare categorical variables, and odds ratios were used to estimate differences. The Kruskal-Wallis H test was used to compare patient outcomes, and a pairwise multiple comparison test was used to detect differences between the groups. Categorical data were analyzed using the chi-square test. The confidence interval was set at 95%, and p-values < 0.05 were considered significant.

2.4. Ethical Approval

The study was planned in accordance with the principles of the Declaration of Helsinki, as it was a retrospective observational study. Approval was obtained from the local ethics committee (Balıkesir University Health Sciences Non-Interventional Research Ethics Committee; Decision No: 2024/244; Date: 17 December 2024).

3. Findings

Table 1 presents the descriptive statistical results for the patients who participated in the study. In terms of the gender variable, 52.14% of the patients were female, and 47.86% were male. When the patients were analyzed in terms of their method of arrival at the hospital, it was determined that 46.48% of the patients were admitted to the hospital by ambulance and 53.52% were admitted to the hospital as outpatients. The mean age of the patients was 63.42 ± 17.41 years. The median PNI value (cut-off score) was 38.00.

Table 1. Descriptive information about the participants in the study.

Variables			**f**	**%**
Gender	Woman		304	52.14
	Male		279	47.86
Method of Arrival to the Hospital	112 Ambulance		271	46.48
	Outpatient		312	53.52
Age	Median	IRQ	Mean	S.D.
	66.00	24.00	63.42	17.41
PNI Value	Median (Cut-off Score)		36.11	12.51
	38.00			

When Table 2 was analyzed, a statistically significant difference was found between the complaints of the patients according to the PNI classification (X^2 = 83.398; p < 0.001). Patients with PNI values below the cut-off score (<38) presented to the hospital with complaints of melena (n = 53), abdominal pain (n = 32), and jaundice (n = 26). Patients with PNI values above the cut-off score (≥38) presented with abdominal pain (n = 64), general condition disorder (n = 42), and right upper quadrant pain (n = 35).

Table 2. Comparison of patient complaints according to PNI classification.

Patient Complaints	<38	≥38	Total	Test
Acid	4	0	4	
Fire	14	5	19	
Nausea and vomiting	22	30	52	
Palpitations	1	0	1	
Dyspnea	7	3	10	
Epigastric Pain	11	42	53	
General Condition Disorder	20	12	32	
Hematemesis	2	2	4	
Hematochezia	5	8	13	
Darkening of Urine	0	2	2	
Bloody Vomiting	21	18	39	$X^2 = 83.398$
Abdominal Pain	32	64	96	$p < 0.001$ *
Abdominal Swelling	1	0	1	
Abdominal Swelling	23	5	28	
Mushroom Eating	0	2	2	
Melena	53	28	81	
Right Lower Quadrant Pain	0	1	1	
Right Upper Quadrant pain	20	35	55	
Jaundice	26	20	46	
Syncope	6	2	8	
Left Upper Quadrant Pain	3	2	5	
Blurred Consciousness	23	8	31	
Total	294	289	583	

* $p < 0.05$.

When Table 3 was analyzed, a statistically significant difference was found between the diagnoses of the patients according to the PNI classification ($X^2 = 71.387$; $p < 0.001$). Patients with PNI values below the cut-off score (<38) were diagnosed with GI bleeding ($n = 90$), cirrhosis ($n = 46$), and pancreatitis ($n = 39$), respectively. Patients with PNI values above the cut-off score (≥38) were diagnosed with pancreatitis ($n = 103$), GI bleeding ($n = 66$), and choledocholithiasis and cholecystitis ($n = 29$).

When Table 4 was analyzed, a statistically significant difference was found between the results of the patients according to the PNI classification ($X^2 = 13.097$; $p < 0.001$). Patients with PNI values below the cut-off score (<38) ($n = 182$) and those with PNI values above the cut-off score (≥38) ($n = 212$) were hospitalized most frequently. Hospitalized patients had a PNI value 0.72 times lower than that of discharged patients (Odds Ratio: 0.72). Patients admitted to the intensive care unit had a PNI value 2.04 times lower than that of discharged patients (Odds Ratio: 2.04). Hospitalized patients had a PNI value 0.36 times lower than that of intensive care unit patients (Odds Ratio: 0.36).

A significant difference was observed between the patient outcomes according to the PNI values ($p = 0.002$). The median PNI value of patients with hospitalization outcome was 39.00 (IQR: 14.76), the median PNI value of discharged patients was 36.50 (IQR: 14.25), and the median PNI value of patients with intensive care outcome was 33.17 (IQR: 11.79).

The median PNI value of intensive care patients was significantly lower than that of both hospitalized and discharged patients, and there was no statistically significant difference between the median PNI values of hospitalized and discharged patients (Table 5).

Table 3. Comparison of patient diagnoses according to the PNI classification.

Patient Diagnoses	<38	≥38	Total	Test
GI Hemorrhage	90	66	156	$X^2 = 71.387$ $p < 0.001$ *
Hepatic Encephalopathy	19	9	28	
Hepatitis	13	19	32	
Cholangitis	17	14	31	
Choledocholithiasis	19	29	48	
Cholecystitis	29	29	58	
Pancreatitis	39	103	142	
Malignancy	16	11	27	
Cirrhosis	46	9	55	
Varicose Veins Bleeding	6	0	6	
Total	294	289	583	

* $p < 0.05$.

Table 4. Comparison of Patient Outcomes according to PNI classification.

Patient Outcomes	<38	≥38	*n*	%	Test
Hospitalization	182	212	394	100	$X^2 = 13.097$ $p < 0.001$ *
Discharged	71	60	131	100	
Intensive Care	41	17	58	100	
Total	294	289	583	100	

* $p < 0.05$.

Table 5. Comparison of patient outcomes according to the PNI values.

Factor	Patient Outcomes	*n*	Median (Q2)	IQRs	*p*
PNI	Hospitalization	394	39.00 [a]	14.76	0.002 *
	Discharged	131	36.50 [a]	14.25	
	Intensive Care	58	33.17 [b]	11.79	

* $p < 0.05$; [a,b]: Median values with different letters are different.

Table 6 shows the frequency of complaints of patients hospitalized in the intensive care unit according to PNI values. The most common complaints in intensive care unit patients with PNI values < 38 were bloody vomiting ($n = 7$), melena ($n = 7$), and confusion ($n = 7$), respectively. In patients with a PNI value ≥ 38, the most common complaints were melena ($n = 4$), confusion ($n = 3$), and hematochezia ($n = 3$).

In Table 7, the frequency of diagnoses according to the PNI values of patients hospitalized in the intensive care unit was analyzed. The most common diagnoses in intensive care unit patients with PNI values < 38 were gastrointestinal hemorrhage ($n = 15$), pancreatitis ($n = 4$), and cirrhosis ($n = 4$). In patients with a PNI value ≥ 38, the most common diagnoses were gastrointestinal hemorrhage ($n = 10$), hepatic encephalopathy ($n = 3$), and malignancies ($n = 3$).

Table 6. Frequency of Complaints according to PNI values of patient outcomes.

Intensive Care	<38	Fire	1	2.4
		Dyspnea	3	7.3
		Epigastric Pain	2	4.9
		General Condition Disorder	5	12.2
		Hematemesis	1	2.4
		Hematochezia	1	2.4
		Bloody Vomiting	7	17.1
		Abdominal Pain	1	2.4
		Abdominal Swelling	1	2.4
		Melena	7	17.1
		Right Upper Quadrant Pain	3	7.3
		Jaundice	2	4.9
		Blurred Consciousness	7	17.1
Intensive Care	≥38	Nausea and vomiting	1	5.9
		General Condition Disorder	2	11.8
		Hematochezia	3	17.6
		Bloody Vomiting	2	11.8
		Abdominal Pain	1	5.9
		Melena	4	23.5
		Jaundice	1	5.9
		Blurred Consciousness	3	17.6

Table 7. Frequency of Diagnosis according to the PNI values of the patient results.

Intensive Care	<38	GI Hemorrhage	15	36.6
		Hepatic Encephalopathy	6	14.6
		Hepatitis	3	7.3
		Cholangitis	1	2.4
		Choledocholithiasis	3	7.3
		Cholecystitis	1	2.4
		Pancreatitis	4	9.8
		Malignancy	2	4.9
		Cirrhosis	4	9.8
		Varicose Veins Bleeding	2	4.9
Intensive Care	≥38	GI Hemorrhage	10	58.8
		Hepatic Encephalopathy	3	17.6
		Cholangitis	1	5.9
		Malignancy	3	17.6

4. Discussion

In this study, we analyzed the data of 583 patients admitted to the emergency department with a diagnosis of gastrointestinal emergencies and comprehensively evaluated the

relationship between PNI and clinical course. Our findings suggest that PNI has a strong predictive value as a prognostic marker in patients with GI emergencies.

In our study, the mean age of patients presenting with gastrointestinal emergencies was found to be middle-aged and older. This finding is consistent with the literature, which shows that gastrointestinal emergencies are more common in older age groups. For example, Cervellin et al. (2016) found a mean age of 49 years in a series of 5340 cases of emergency abdominal pain [14]. Similarly, in a prospective study conducted in an emergency department in Tanzania, the median age was reported to be 47 years [15]. In our series, the age distribution was similarly shifted towards older age. Elderly patients have a more complicated course in gastrointestinal emergencies due to both underlying comorbidities and decreased physiological reserve. As a matter of fact, it has been emphasized in the literature that mortality in abdominal emergencies in elderly patients is 6–8 times higher than in younger patients [16]. In the literature, it has been reported that females have numerical superiority among patients presenting to the emergency department with gastrointestinal complaints, whereas males are more likely to encounter more serious outcomes [17]. In our series, serious gastrointestinal emergencies (e.g., pancreatitis and variceal bleeding) were slightly more common in males, and the need for intensive care and hospitalization rates were higher in male patients than in female patients. This may be attributed to the more severe course of the underlying etiologies (e.g., alcoholic pancreatitis and peptic ulcer bleeding) in men, as reported in the literature [18]. In conclusion, demographic findings revealed that our patient population was compatible with the general GI emergency profile in the literature and that age and sex may affect the clinical course.

When the PNI values of our patients at the time of emergency admission were analyzed, the mean PNI was lower than expected. Malnutrition is a critical prognostic risk factor for many diseases, and advanced malnutrition is correlated with high levels of inflammation [19]. Therefore, patients with low PNI scores are likely to have a more severe inflammatory response and inadequate immune-nutritional reserves, which may predispose them to poor clinical outcomes. The mean PNI value for the entire study was lower than the expected PNI of around 50 in a healthy population [20]. This distribution shows that malnutrition is common in gastrointestinal patients presenting to the emergency department. Especially, the low PNI values in patients with chronic diseases or elderly patients are striking. For example, in our study, PNI < 45 was found in the majority of patients over 65 years of age. This finding is in parallel with studies conducted in elderly patients in intensive care conditions; in one study, 73% of internal medicine intensive care patients older than 65 years were found to be at risk of severe malnutrition according to PNI [21]. In our study, approximately one-third of the patients were in the severe malnutrition category with PNI < 40, emphasizing the seriousness of the risk of malnutrition in the emergency department.

The distribution of PNI values also provides insights into the underlying disease profile. For example, almost all our patients with a history of malignancy or chronic liver disease had PNI values below 40. This is an expected result, since low albumin levels and lymphopenia are common in patients with malignancies due to cancer cachexia and chronic inflammation, and PNI values also decrease. Although the high prevalence of conditions such as malignancy may be a regional difference, the fact that nutritional indices were significantly lower in patients with malignancy in our series is in parallel with the literature [22]. In contrast, PNI was generally found to be within normal limits in the presence of an emergency, such as acute appendicitis, in previously healthy individuals. This suggests that a low PNI is more likely to be associated with a chronic disease burden or systemic compromise. In conclusion, the PNI data in Table 2 suggest that a large proportion

of patients with gastrointestinal emergencies are at risk of malnutrition and that PNI should be evaluated prognostically in this population.

Abdominal pain was the most common complaint among patients presenting to the emergency department. It has been reported that abdominal pain is the primary diagnosis in approximately 42% of patients presenting with gastrointestinal complaints [23]. An important group of our patients presented with signs of GI bleeding, such as hematemesis and/or melena. Patients presenting with signs of upper GI bleeding (vomiting coffee grounds, melena) are of special importance in emergency evaluation because these complaints indicate serious underlying pathologies (peptic ulcer, variceal bleeding, etc.). In the literature, it has been reported that GI bleeding constitutes a relatively lower percentage of all ED admissions, but the mortality and hospitalization rates are high [24]. In our study, although it constituted a small proportion of total admissions, a significant proportion of patients were hospitalized, and some were admitted to the intensive care unit. Our findings are similar to those reported in the literature regarding the distribution of GI complaints seen in the emergency department [25]. Abdominal pain and related symptoms (nausea and vomiting) are the most common, while bleeding symptoms are less frequent but serious. This shows that the etiology of gastrointestinal emergencies is extremely broad.

Our findings are largely similar to the distribution in other studies: While appendicitis, gallbladder diseases, pancreatitis, and intestinal obstruction are the most common specific diagnoses in the literature, "non-specific abdominal pain diagnosis" has an important place, around 20–30% of the time [14]. In the emergency department, both conditions, such as appendicitis and perforation, which require surgical intervention, and conditions such as gastroenteritis and pancreatitis, which can be managed with medical treatment, are seen together. Therefore, a multidisciplinary approach and comprehensive evaluation are essential for managing gastrointestinal emergencies [26]. In the evaluation of PNI based on the presenting complaint, the lowest mean PNI values were found in patients presenting with symptoms of GI bleeding. This finding is highly logical and consistent with the indirect data in the literature [27]. Many of our patients presenting with upper gastrointestinal bleeding had underlying chronic processes such as cirrhosis, peptic ulcer, or malignancy, which may have adversely affected their nutritional status for a long time. For example, chronic malnutrition and hypoalbuminemia are common in patients with cirrhosis, and cirrhotic patients presenting with esophageal variceal bleeding usually have low albumin levels. Although there are no direct studies in the literature comparing nutritional status according to the presenting symptoms, our findings imply that the underlying pathology, rather than the symptoms, determines nutritional status. That is, even if a patient presents with abdominal pain, if the underlying disease is chronic and debilitating (e.g., malignancy), the PNI may be low. Similarly, in an acute, first-time problem (e.g., acute appendicitis), PNI is usually maintained regardless of the patient's complaint. PNI has been found to be significantly lower in acute conditions associated with chronic diseases. This clearly demonstrates the effects of the chronic disease burden and long-term malnutrition on PNI. Numerous studies have also demonstrated that a low PNI predicts poor prognosis in patients with malignancies [28]. For example, in patients with gastrointestinal stromal tumors, Onodera reported that long-term survival was significantly worse in those with a low PNI (PNI has been identified as an independent marker reflecting tumor biological behavior) [29]. In contrast, PNI was observed to be preserved in cases of sudden acute surgical abdomen in previously healthy individuals, such as acute appendicitis or traumatic splenic rupture. In this group of patients, the PNI was mostly >45, and none had a value <40. This shows that in acute-onset surgical pathologies, the patient's immune nutritional reserves are generally good unless there is an underlying chronic problem. These patients usually recover rapidly and without

complications in the postoperative period. Interestingly, PNI values in patients with acute pancreatitis were distributed in two extremes: While PNI was within normal limits in patients with mild pancreatitis, the mean PNI was as low as 34 in patients with necrotizing pancreatitis. In patients with severe pancreatitis, albumin levels may decrease rapidly due to systemic inflammation and hypermetabolism, and lymphopenia may develop [30]. Efgan et al. reported that PNI $\leq$ 34 in patients with acute pancreatitis predicted the development of necrosis, and mortality increased significantly in these patients [31]. Our data also support this, with a difference in PNI between mild and severe pancreatitis. In a recent study on patients with cirrhosis, PNI was strongly associated with disease severity and prognosis [29]. Our findings are consistent with those of similar studies in the current literature. In this study, which analyzed 513 patients with decompensated cirrhosis, disease severity increased as the PNI value decreased, and the group with a low PNI was exposed to significantly more complications. In cirrhotic patients with PNI $\leq$ 41.75, the incidence of major complications, such as gastrointestinal bleeding, hepatic encephalopathy, and infection, was found to be significantly higher [29]. These data suggest that a low PNI predicts mortality and morbidity in patients with cirrhosis.

Patients presenting with signs of GI bleeding should be treated separately. In our study, patients presenting with upper GI bleeding symptoms, such as melena and hematemesis, constituted 14% of all admissions. The significant effect of the PNI value on the clinical course in patients presenting to the emergency department with gastrointestinal emergencies has been demonstrated [32]. In particular, the need for intensive care and serious diagnoses (e.g., upper gastrointestinal bleeding, decompensated cirrhosis, and acute pancreatitis) was significantly higher in patients with PNI < 38, whereas milder clinical pictures and more favorable outcomes were observed in patients with PNI $\geq$ 38. This finding is consistent with the literature, indicating that a PNI below 38 indicates at least moderate malnutrition [10]. This suggests that PNI can predict the severity of the underlying diagnosis in patients with gastrointestinal emergencies. Although the differences in PNI between diagnoses were not statistically significant for all groups (especially benign causes had similar PNI values among themselves), there was a significant difference between the "malignancy/advanced chronic disease" group and the "acute benign disease" groups. This suggests that PNI may be particularly useful for identifying patients with severe comorbidities. In clinical practice, routine assessment of nutritional status in the emergency department is not common; however, our findings suggest that even a simple index such as the PNI can provide important clues to the general condition of the patient, especially in GI emergencies with hemorrhage or chronic disease.

Although mortality was not directly analyzed in our study, patients admitted to the intensive care unit were mostly found to have a low PNI, which is similarly predictive of poor short-term prognosis. Our results suggest that PNI, an objective indicator of nutritional status, may significantly impact clinical outcomes. In the emergency department, patients with good nutritional status (high PNI) were mostly discharged as outpatients, whereas those with poor nutritional status (low PNI) more frequently required hospitalization and intensive care. The literature also supports this result. For example, Zhang and Pan (2022) evaluated PNI as a prognostic marker in patients with sepsis in the emergency department and found that low PNI significantly increased the 30-day mortality risk [33]. In our study, the fact that the non-intensive care patient outcome was close to PNI levels was primarily because clinically severe diseases were admitted to our hospital, the criteria for hospitalization for diagnosis and treatment were kept wide, and the patients were usually hospitalized.

A significant proportion of patients with gastrointestinal emergencies require hospitalization, a significant proportion require intensive care level support, and mortality

is significant, especially in severe cases. This highlights the importance of risk markers such as PNI. PNI also remained an independent predictor of intensive care admission (the likelihood of intensive care was significant for those with PNI < 40 compared to those with PNI ≥ 40). This finding is extremely valuable because it shows that nutritional status can influence clinical outcomes, independent of factors such as age or disease severity score. Indeed, in a study conducted in patients with sepsis, PNI remained independently predictive of mortality when PNI was added to the model in addition to APACHE-II and SOFA scores [34]. Patients with low PNI require closer follow-up, and if they are to be discharged, they should be followed up in outpatient clinics. Nutritional support should be planned if possible. Especially in elderly and comorbid patients, PNI calculation at the time of emergency admission may detect "hidden malnutrition" cases that may require intervention. For example, Griffin et al. (2020) reported that malnutrition or risk was detected in one-third of elderly patients evaluated in the emergency department, but most of them did not receive specific nutritional interventions [35]. However, malnutrition prolongs hospital stays and increases mortality in frail older adults.

A large study evaluating data from 4120 elderly patients who underwent emergency gastrointestinal surgery showed that PNI was significant in predicting 90-day mortality. In this study, PNI, together with other nutrition-based scores, was among the reliable parameters predicting short-term survival after major surgery; as a result, it was emphasized that immune-nutritional indicators are important prognostic markers in elderly patients undergoing emergency gastrointestinal surgery [36]. This finding supports the notion that the PNI may contribute to clinical risk stratification in emergency situations, which is consistent with our data.

In conclusion, when all the findings of our study are evaluated together, it is understood that the PNI is closely related to the clinical course in patients with gastrointestinal emergencies. The PNI is lower in elderly or chronically ill patients with GI emergencies, indicating that these patients present with more severe symptoms and require more intensive care. The correlation of PNI with both admission findings and final diagnoses is valuable in terms of reflecting the systemic effects of the underlying pathology.

The fact that the PNI can be calculated using only routine blood tests provides wide applicability to clinical practice. This index, which has been previously used in oncological and cardiovascular diseases, seems to be useful for decision support in emergency medicine, especially in gastrointestinal emergencies. Early recognition of patients with low PNI may allow the management of this high-risk group with interventions such as intensive care follow-up and aggressive fluid and nutritional support.

In the future, it would be appropriate to test the value of PNI as a decision support tool in large-scale, prospectively designed studies. It may also be clinically useful to investigate whether nutritional interventions to improve PNI (e.g., early nutritional support and albumin replacement) impact outcomes in the acute phase. However, recent studies have shown that the use of albumin is controversial due to complications caused by volume overload [37].

This study has several limitations. First, the exclusion of patients with gynecological and trauma-related abdominal pathology, although methodologically justified, may have caused a degree of selection bias, particularly by excluding older female patients with comorbid GI conditions. Since our study has a retrospective and single-center design, it is not easy to clarify the causal relationship, and further multicenter studies are required to generalize the results. In addition, future research should include direct comparisons between PNI and established scoring systems such as MELD (for cirrhosis) and APACHE-II, in order to better understand the unique predictive value of PNI in gastrointestinal emergencies.

5. Conclusions

The PNI is a valuable biomarker for predicting disease severity and short-term prognosis in patients presenting to the emergency department for gastrointestinal emergencies. A low PNI defines a subgroup with a high risk of intensive care need and mortality in this patient group. The inclusion of PNI in routine emergency assessment may help in the early recognition of individuals who may be critically ill. In this way, the management of high-risk patients can be improved with proactive approaches, such as intensive care follow-up and aggressive fluid and nutritional support. In conclusion, PNI is a practical and cost-effective score based on simple parameters that provides important support to clinicians in the risk stratification of patients with GI emergencies.

Author Contributions: Conceptualization, R.K. and B.C.; methodology, R.K.; software, R.K.; validation, R.K. and B.C.; formal analysis, R.K.; investigation, B.C.; resources, R.K.; data curation, B.C.; writing—original draft preparation, R.K.; writing—review and editing, B.C.; visualization, R.K.; supervision, B.C.; project administration, R.K.; funding acquisition, R.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was planned in accordance with the principles of the Declaration of Helsinki, as this was a retrospective observational study. Approval was obtained from the local ethics committee (Balıkesir University Health Sciences Non-Interventional Research Ethics Committee; Decision No: 2024/244; Date: 17 December 2024).

Informed Consent Statement: Patient consent was waived because this was a retrospective medical record review.

Data Availability Statement: The original contributions presented in this study are included in this article. Further inquiries should be directed to the corresponding author.

Acknowledgments: The authors thank Ozkan ISIK for the statistical analysis of the study. The authors have reviewed and edited the output and take full responsibility for the content of this manuscript.

Conflicts of Interest: The authors declare no conflicts of interest.

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