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ACİL SERVİS BAŞVURULARINDA ALT GASTROİNTESTİNAL KANAMA: HASTA PROFİLLERİ VE KLİNİK SONUÇLAR – RETROSPEKTİF BİR ÇALIŞMA

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Öz

Alt gastrointestinal (Gİ) kanama, özellikle ileri yaş grubunda acil servis (AS) başvurularının ve hastaneye yatışların önemli nedenlerinden biridir. Çoğu olgu kendiliğinden sonlansa da bazı hastalarda yoğun izlem, girişimsel tedavi ve uzamış hastanede yatış süresi gerekmektedir. Bu retrospektif çalışmada, Şubat 2023 ile Şubat 2025 tarihleri arasında üçüncü basamak bir hastanenin acil servisine akut alt Gİ kanama nedeniyle başvuran 319 hasta incelenmiştir. Hastalar, DSÖ/BM uyumlu yaş gruplarına (18–24, 25–44, 45–59, 60–74, 75–89 ve ≥90 yıl) göre sınıflandırılmıştır. Demografik özellikler, başvuru semptomları, laboratuvar bulguları, hastanede yatış süresi (HYS) ve hastane içi mortalite değerlendirilmiştir. Bulgulara göre, ortanca yaş 61 yıl (IQR 49–74) olup hastaların %56,4'ü erkekti. Tüm yaş gruplarında en sık başvuru semptomu hematokezya idi. HYS yaşla birlikte anlamlı olarak artış göstermiş (Kruskal–Wallis H=44,27, sd=5, p<0,0001; Spearman ρ=0,30, p<0,0001), ancak cinsiyet açısından anlamlı fark bulunmamıştır (Mann–Whitney p=0,73). Yaş grupları içinde erkek-kadın karşılaştırmaları Holm düzeltmesi sonrası istatistiksel anlamlılığa ulaşmamıştır. Hastane içi mortalite %1,6 (n=5) oranında saptanmış olup tüm olgular ≥60 yaş grubunda idi. Sonuç olarak, alt Gİ kanamanın özellikle orta ve ileri yaş yetişkinlerde sık görüldüğü, hastanede yatış süresinin yaşla güçlü şekilde ilişkili olduğu, ancak cinsiyetle ilişkili olmadığı belirlenmiştir. Bu bulgular, acil serviste alt Gİ kanama başvurularında yaşa özgü risk değerlendirmesi ve yönetim stratejilerinin önemini vurgulamaktadır.

Anahtar Kelimeler: Alt Gastrointestinal Kanama, Acil Servis, Klinik Özellikler, Hastanede Kalış Süresi, Mortalite

PATIENT PROFILES AND CLINICAL OUTCOMES IN EMERGENCY DEPARTMENT PRESENTATIONS OF LOWER GASTROINTESTINAL HEMORRHAGE: A RETROSPECTIVE STUDY

Abstract

Lower gastrointestinal (GI) bleeding is a significant cause of emergency department (ED) visits and hospital admissions, particularly among older adults. While most cases resolve spontaneously, a subset of patients requires intensive monitoring, interventional treatment, and prolonged hospitalization. This retrospective study analyzed 319 patients presenting with acute lower GI bleeding to the ED of a tertiary care hospital between February 2023 and February 2025. Patients were stratified into WHO/UN-aligned age groups (18–24, 25–44, 45–59, 60–74, 75–89, and ≥90 years). Demographics, presenting symptoms, laboratory findings, length of hospital stay (LOS), and in-hospital mortality were evaluated. Results showed a median age of 61 years (IQR 49–74), with 56.4% being male. Hematochezia was the most frequent presenting symptom across all age groups. LOS significantly increased with advancing age (Kruskal–Wallis H=44.27, df=5, p<0.0001; Spearman ρ=0.30, p<0.0001), but no significant sex-related differences were observed (Mann–Whitney p=0.73). Male–female comparisons within age groups did not reach significance after Holm correction. In-hospital mortality occurred in 1.6% of patients (n=5), all aged ≥60 years. In conclusion, lower GI bleeding was most prevalent in middle-aged and older adults, with hospital LOS strongly associated with age but not with sex. These findings highlight the importance of age-specific risk assessment and tailored management strategies for ED presentations of lower GI bleeding.

Keywords: Lower Gastrointestinal Bleeding, Emergency Department, Clinical Characteristics, Length of Stay, Mortality

1. INTRODUCTION

Lower gastrointestinal (GI) bleeding is a common clinical condition and accounts for a considerable proportion of emergency department (ED) visits and hospital admissions (1). It originates from the GI tract distal to the ligament of Treitz and most often presents as hematochezia. Etiologies range from benign anorectal disorders to life-threatening colonic or vascular diseases. Management depends on bleeding severity, underlying cause, and patient comorbidities, requiring an individualized approach to diagnosis and treatment (2).

Although many cases resolve spontaneously, some patients develop hemodynamic instability requiring aggressive resuscitation, endoscopic therapy, or surgery. Older adults and those with comorbidities face a higher risk of complications and mortality (3).

It encompasses bleeding from the GI tract distal to the ligament of Treitz, often presenting as hematochezia, with causes ranging from benign anorectal conditions to life-threatening colonic or vascular pathologies. The management of lower GI bleeding varies based on severity, underlying etiology, and patient comorbidities, necessitating a tailored approach to diagnosis and treatment (4-5).

Although the majority of lower GI bleeding cases are self-limiting, a subset of patients experiences hemodynamic instability, requiring aggressive resuscitation, endoscopic interventions, or even surgical management. Older adults and individuals with significant comorbidities are particularly vulnerable to prolonged hospital stays and adverse outcomes (6-8). Given the variability in clinical presentations and the deficiency of standardized risk stratification tools, further investigation into the demographics, laboratory parameters, and hospitalization trends of affected patients is essential for optimizing clinical decision-making (9-10).

Despite notably essential advances in diagnostic techniques such as colonoscopy, angiography, and capsule endoscopy, significant challenges persist in predicting hospitalization outcomes, transfusion needs, and long-term prognosis in patients with lower gastrointestinal bleeding (10-12). A clearer understanding of age- and gender-specific hospitalization patterns, together with the clinical and laboratory factors that predict prolonged stays, is in fact essential for refining triage protocols, optimizing resource allocation, and improving patient-centered care (13-14).

The objective of this study is to describe the demographic and clinical characteristics of patients presenting to the ED with lower GI bleeding and to analyze factors such as length of hospital stay. Examining the data of patients with a history of lower gastrointestinal bleeding is valuable for facilitating the early diagnosis of new cases and for preventing potential complications.

2. MATERIALS AND METHODS

Study Design and Setting

This study was designed as a retrospective cohort study, conducted at a tertiary-level education and research hospital. The study period covered the dates between February 2023 and February 2025. The research protocol was approved by the Ethics Committee of the same hospital (Approval Date: 07.02.2025, Approval Number: 331). The study included all patients, regardless of age, who presented to the emergency department (ED) with a diagnosis of lower gastrointestinal (GI) bleeding. Only patients with confirmed lower GI bleeding based on clinical and radiological findings were included in the study.

Study Population and Data Collection

Inclusion criteria: Patients aged 18 years and older who were admitted to the emergency department between February 2023 and February 30, 2025, with complaints of lower gastrointestinal bleeding.

Exclusion criteria: Patients younger than 18 years and those with incomplete demographic information (age or sex) were excluded from the study.

Age was analyzed both as a continuous variable and as a categorical measure, with stratification into life-stage groups of epidemiological relevance: 0–1 years (infancy), 2–4 years (early childhood), 5–14 years (childhood), 15–24 years (youth), 25–44 years (young adulthood), 45–59 years (middle age), 60–74 years (older adulthood), 75–89 years (late older adulthood), and ≥90 years (advanced older adulthood). These groupings align with international demographic frameworks established by the World Health Organization (15-17) and the United Nations, which, for example, define youth as 15–24 years and older persons as ≥60 years. Since patients under 18 years of age were excluded from the study, age groups were created by categorizing patients over 18 years of age according to the WHO age scale. These groupings align with international demographic frameworks established by the World Health Organization and the United Nations, which, for example, define youth as 15–24 years and older persons as ≥60 years. They are also consistent with commonly used population health surveillance and age-standardization protocols (18-19). This stratification facilitates consideration of known differences in disease exposure, health-seeking behavior, and clinical outcomes across developmental and aging stages, while enabling comparability with global epidemiological research, including recent studies on gastrointestinal bleeding and injury epidemiology (20-21).

Data Processing and Analysis

All data preprocessing, analysis, and visualization were conducted using Python (version 3.12.7). Data manipulation was performed with pandas, while visualizations were generated with Matplotlib and Seaborn.

Data Preprocessing

To ensure consistency and reliability, several steps were undertaken:

Language standardization: Turkish column names and categorical variables were translated into English for clarity and comparability.

Handling missing data: Missing values were identified and imputed with appropriate statistical measures.

Categorical encoding: Gender and other categorical variables were converted into numerical form for statistical analysis.

Exploratory and Statistical Analysis

Descriptive and inferential statistics were applied to evaluate demographic, clinical, and laboratory characteristics of patients with lower gastrointestinal bleeding. Correlation heatmaps were generated to assess relationships between hospitalization duration, age, and laboratory values, highlighting clinically relevant patterns.

Comparative analyses were conducted to examine differences in hospital stay duration by sex. Independent-samples t-tests were used for normally distributed data, while Mann–Whitney U tests were applied for non-normal distributions. Associations between categorical variables—such as age group, sex, and mortality—were analyzed using chi-square tests, with results reported as χ^2 values, degrees of freedom, and p-values. Fisher's exact tests were additionally performed when expected cell counts were small.

Statistical significance was defined as $p < 0.05$. This integrated analytic approach—combining preprocessing, visualization, and inferential testing—enabled a comprehensive assessment of patient characteristics and hospitalization outcomes, supporting clinically meaningful interpretation.

3. RESULTS

Lower gastrointestinal (GI) bleeding presents with diverse clinical manifestations, varying in etiology, severity, and underlying risk factors. Understanding the distribution of these cases is essential for optimizing patient management, improving diagnostic approaches, and guiding preventive strategies. This section provides a comprehensive analysis of lower GI bleeding patterns, focusing on the most common causes, their distribution across different age and gender groups, hospitalization trends, and their association with clinical outcomes and healthcare resource utilization. Additionally, these findings offer valuable insights into the impact of demographic and external factors on patient admissions and the epidemiology of lower GI bleeding.

A total of 319 patients met the inclusion criteria, comprising 139 females (43.6%) and 180 males (56.4%). Analysis of life-stage distributions revealed that lower gastrointestinal (GI) bleeding was most frequent in the 60–74 years (older adulthood) group, which accounted for 88 cases (27.6%). This was followed by the 45–59 years (middle age) group with 61 cases (19.1%) and the 75–89 years (late older adulthood) group with 65 cases (20.4%). Patients aged 45 years and older accounted for 224 cases (70.2%), confirming the disproportionate burden of lower gastrointestinal bleeding among middle-aged and older adults. Younger adults (<45 years) represented 93 cases (29.2%), and no pediatric patients (<15 years) were identified.

Across most age groups, men predominated, particularly in the 25–44, 45–59, and 60–74 year categories. In contrast, a slight female predominance was observed in the 75–89 year group (n = 36, 55.4% vs. n = 29, 44.6%).

Mortality was confined to patients over 60 years of age: one death occurred in the 60–74 group (20% of total deaths), three in the 75–89 group (60%), and one in the ≥90 group (20%).

Overall, the findings indicate that lower gastrointestinal bleeding primarily affects older adults, with a male predominance between 25 and 74 years, and a higher representation of women in the late-elderly category (75–89 years). The absence of pediatric cases affects the age-related nature of the condition (Table 1).

Table 1. Age Groups with Deaths and Percentages

Age Group	Female	Female %	Male	Male %	Deaths	Deaths %	Total	Total %
18–24 (Youth)*	8	5.8	11	6.1	0	0	19	6
24–44 (Young Adulthood)	33	23.7	41	22.8	0	0	74	23.2
45–59 (Middle Age)	26	18.7	35	19.4	0	0	61	19.1
60–74 (Older Adulthood)	32	23	56	31.1	1	20	88	27.6
75–89 (Late Older Adulthood)	36	25.9	29	16.1	3	60	65	20.4
90+ (Very Old Age)	4	2.9	8	4.4	1	20	12	3.8
Total	139	100	180	100	5	100	319	100

Note: Statistical analyses were performed to evaluate associations between age groups, sex, and mortality.

Age group × Death: $\chi^2(5) = 10.03$, $p = 0.074$, Cramér's $V = 0.18$ (small).

Sex × Death: $\chi^2(1) = 2.33$, $p = 0.127$, Cramér's $V = 0.09$ (very small); Fisher's exact $p = 0.071$.

Collapsed Age (<60 vs ≥60) × Death: $\chi^2(1) = 2.98$, $p = 0.084$, Cramér's V = 0.10; Fisher's exact $p = 0.061$.

These results indicate no statistically significant associations (all $p > 0.05$), with small effect sizes. A total of 319 patients were included in the analysis, with a mean age of 57.76 ±20.81 years (range: 19–101 years). The distribution of hematological and biochemical parameters is summarized in Table 2.

The hematological profile of the cohort demonstrated reduced hemoglobin (HGB) concentrations, with a mean value of 11.99 ±3.03 g/dL and a median of 12.4 g/dL, spanning a wide distribution from 2.7 to 17.5 g/dL. Hematocrit (HCT) levels followed a similar pattern, averaging 36.31 ±8.49% with a median of 37% and values ranging between 9.5% and 55%. Red blood cell indices further indicated relative heterogeneity, as reflected by the mean corpuscular volume (MCV), which averaged 84.49 ±7.31 fL across a distribution of 52.7–105 fL.

Platelet (PLT) counts displayed substantial variability, with a mean of 261.8 ±107.79 $\times 10^3/\mu L$, an interquartile range (IQR) of 199–313 $\times 10^3/\mu L$, and extremes ranging from 20 to 677 $\times 10^3/\mu L$. White blood cell (WBC) counts likewise revealed marked interindividual differences, with an overall mean of 8,867 ±4,015/μL, a median of 8,340/μL, and a notably broad range from 1,059 to 40,300/μL.

Biochemical indices further reflected variability within the study population. Mean glucose concentration was 122.5 ±51.68 mg/dL, with a median of 107 mg/dL and values ranging from 74 to 409 mg/dL, suggesting that a subset of patients presented with significant hyperglycemia. Blood urea nitrogen (BUN) levels averaged 23.13 ±22.54 mg/dL, with an IQR of 12–24.5 mg/dL and a range of 5–223 mg/dL, indicating the presence of both standard and markedly elevated values within the cohort.

Taken together, these findings demonstrate a broad distribution of hematological and biochemical parameters among patients presenting with lower gastrointestinal bleeding, reflecting the heterogeneous clinical profiles and comorbid conditions characteristic of this population.

Liver function tests revealed that aspartate aminotransferase (AST) had a mean of 32.84 ± 78.26 U/L, with a median of 22 U/L (range: 8–1336 U/L), while alanine aminotransferase (ALT) levels averaged 27.85 ±64.19 U/L, with a median of 19 U/L (range: 2–981 U/L).

Table 2. Patient Characteristics and Laboratory Findings

Feature	Count	Mean	Standard Deviation	Min	25th Percentile (Q1)	Median (Q2)	75th Percentile (Q3)	Max
AGE	319	57.76	20.8135	19	40.5	61	74	101
HGB	319	11.99	3.02867	2.7	10.1	12.4	14.2	17.5
HCT	319	36.31	8.48890	9.5	31	37	43	55
MCV	319	84.49	7.30946	52.7	80	86	89	105
PLT	319	261.8	107.792	20	199	243	313	677
WBC	319	8867	4015.93	1059	6440	8340	10750	40300
GLUCOSE	319	122.5	51.6812	74	95	107	129	409
BUN	319	23.13	22.5433	5	12	16	24.5	223
AST	319	32.84	78.2556	8	16	22	30.5	1336
ALT	319	27.85	64.1919	2	12	19	25.5	981

Note: Abbreviations of laboratory parameters: AGE: Age.HGB (Hemoglobin): Hemoglobin level in the blood (g/dL).HCT (Hematocrit): The percentage of red blood cells in the blood volume (%).MCV (Mean Corpuscular Volume): The average volume of red blood cells (fL).PLT (Platelet): Thrombocyte count (10^3/µL).WBC (White Blood Cell): Leukocyte count (10^3/µL).GLUCOSE: Blood sugar level (mg/dL).BUN (Blood Urea Nitrogen): Urea nitrogen level in the blood (mg/dL).AST (Aspartate Aminotransferase): Liver enzyme, elevated in liver and muscle damage (U/L).ALT (Alanine Aminotransferase): Liver enzyme, particularly elevated in liver damage (U/L)

The distribution of presenting symptoms among patients with lower gastrointestinal (GI) bleeding is summarized in Table 3. The predominant presenting symptom was hematochezia, observed in both sexes, with slightly higher numbers in males (n = 165) compared to females (n = 124). Less common symptoms included syncope (n = 5) and other gastrointestinal complaints (n = 17). This distribution highlights the central clinical role of hematochezia as the predominant symptom of lower GI bleeding.

Table 3. The Distribution of Presenting Symptoms Among Patients With Lower Gastrointestinal (GI) Bleeding

Age Group	Hematochezia- female	Hematochezia - Male	Syncope-Female	Syncope-Male	Other-Female	Other-Male	Total-Female	Total-Male	Total
18-24 (Youth)*	8	11	0	0	0	0	8	11	19
24–44 (Young Adulthood)	31	39	1	0	1	2	33	41	74
45–59 (Middle Age)	24	35	1	0	1	0	26	35	61
60–74 (Older Adulthood)	29	47	1	5	2	4	32	56	88
75–89 (Late Older Adulthood)	29	26	2	1	5	2	36	29	65
90+ (Very Old Age)	3	7	0	1	1	0	4	8	12
Total	124	165	5	7	10	8	139	180	319

When stratified by age group, hematochezia remained the most frequent presentation across all life stages, with the highest prevalence in older adulthood (60–74 years, n = 76), followed by young adulthood (24–44 years, n = 70) and middle age (45–59 years, n = 59). Syncope was almost exclusively reported among older adults, particularly those aged 60–74 years (n = 6) and 75–89 years (n = 4), consistent with increased hemodynamic instability in the elderly population. “Other” symptoms were reported sporadically across adult groups without a distinct concentration.

Statistical analysis showed no significant association between presenting symptoms and sex across age groups or in the total cohort (all $p > 0.05$). Detailed chi-square analyses yielded the following results:

18–24 years (Youth): Counts too sparse for a reliable chi-square due to multiple zero cells.

24–44 years (Young Adulthood): $\chi^2(2) = 1.399$, $p = 0.497$, Cramér’s V = 0.138 (n = 74).

45–59 years (Middle Age): $\chi^2(2) = 2.784$, $p = 0.249$, Cramér’s V = 0.214 (n = 61).

60–74 years (Older Adulthood): $\chi^2(2) = 1.135$, $p = 0.567$, Cramér’s V = 0.114 (n = 88).

75–89 years (Late Older Adulthood): $\chi^2(2) = 1.041$, $p = 0.594$, Cramér’s V = 0.127 (n = 65).

90+ years (Very Old Age): $\chi^2(2) = 2.550$, $p = 0.279$, Cramér’s V = 0.461 (n = 12).

Overall (all ages combined): $\chi^2(2) = 1.121$, $p = 0.571$, Cramér’s V = 0.059 (n = 319).

Although none of the comparisons reached statistical significance, effect size estimates (Cramér's V) suggested small associations in some subgroups, particularly in the 45–59 and 90+ year categories. The validity of several chi-square tests was, however, limited by small expected cell counts (<5). In summary, hematochezia was the dominant presenting symptom across all ages and both sexes, while syncope and other complaints were predominantly seen in older patients. This pattern reflects the centrality of visible rectal bleeding in clinical recognition of lower GI hemorrhage, with additional symptoms becoming more relevant in advanced age due to increased disease severity and comorbidities.

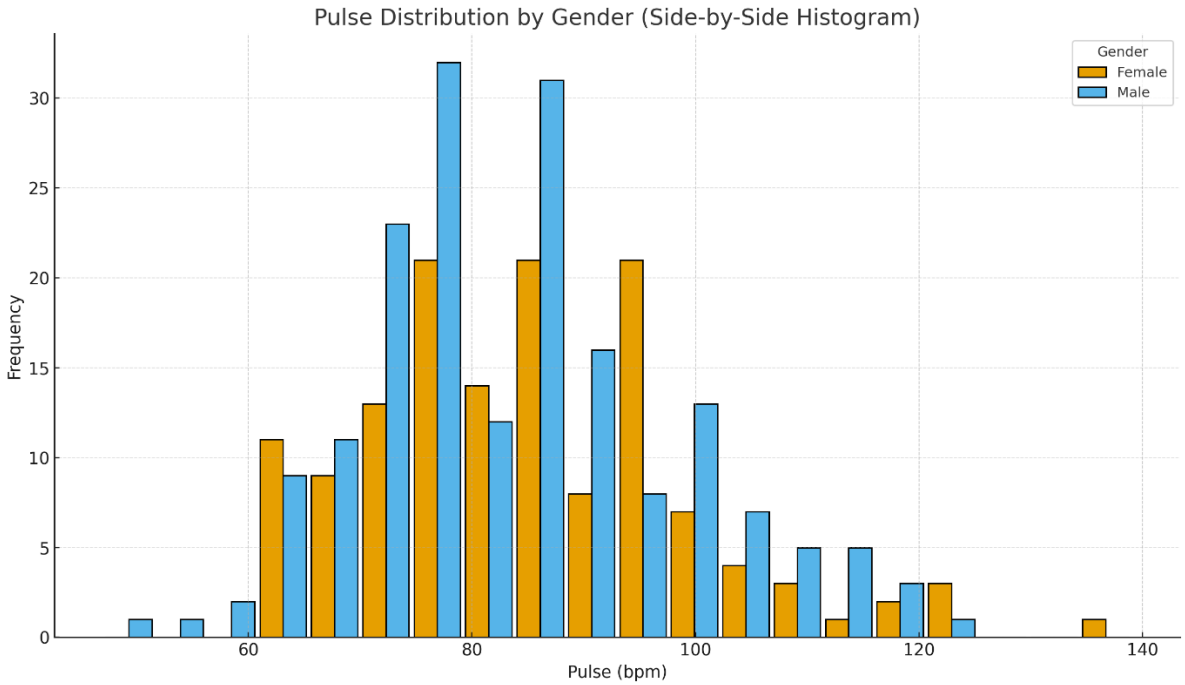

Figure 1. Pulse Rate Distribution by Gender

Pulse distributions did not differ significantly between male and female patients (p = 0.62). The distribution of pulse rates (bpm) among patients with lower gastrointestinal (GI) bleeding, stratified by gender, is presented in Figure 1. The data approximate a slightly right-skewed distribution, with the majority of patients—both male and female—exhibiting pulse rates between 60 and 100 bpm. The modal values clustered around 75–85 bpm, consistent with normal to mildly elevated heart rates at presentation.

A subset of patients demonstrated tachycardia (>100 bpm), more apparent among males, reflecting possible hemodynamic compromise or ongoing hemorrhage. Conversely, a smaller number of patients had bradycardia (<60 bpm), observed in both genders but slightly more frequent in males, which may be attributable to pharmacologic effects, autonomic dysfunction, or compensatory physiological mechanisms.

While the median pulse values were comparable between males and females, the distribution of pulse values among males demonstrated greater variability, extending toward both lower and higher extremes. Outliers with markedly elevated rates (>120 bpm) were recorded in both sexes, underscoring the clinical relevance of tachycardia as an indicator of instability.

Taken together, these findings confirm that pulse rate distributions are broadly similar across genders, but variability and extreme values appear more pronounced among male patients. This

highlights the need for individualized hemodynamic monitoring in the acute management of lower GI bleeding.

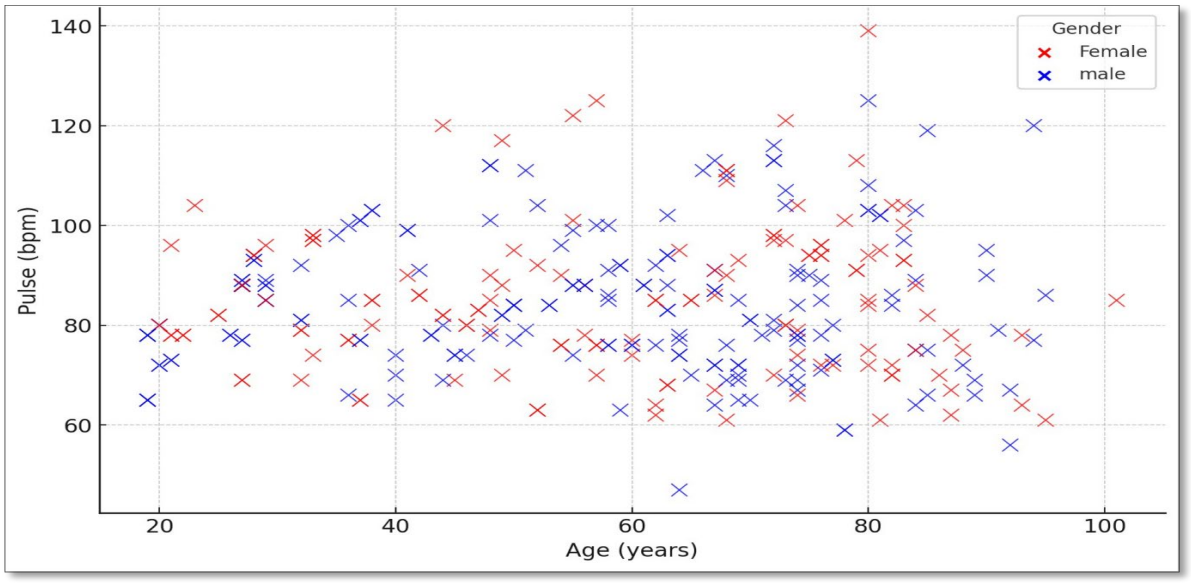

Figure 2. Relationship Between Age and Pulse Rate

The scatter plot in Figure 2 illustrates the relationship between age and pulse rate, with data points categorized by gender. The distribution of pulse values shows considerable variation across all age groups, with no clear linear trend between age and heart rate.

Younger patients, particularly those under 40 years, demonstrated a wider range of pulse values, including some elevated pulse rates exceeding 120 bpm, potentially indicative of hemodynamic instability or compensatory tachycardia. In contrast, older patients (>70 years) exhibited more moderate pulse rates, with fewer cases of extreme tachycardia.

Although pulse rates were similar between genders, a wider distribution—especially at higher pulse rates—was observed in males. This indicates that age alone is not the sole determinant of pulse variability and that clinical factors should be considered.

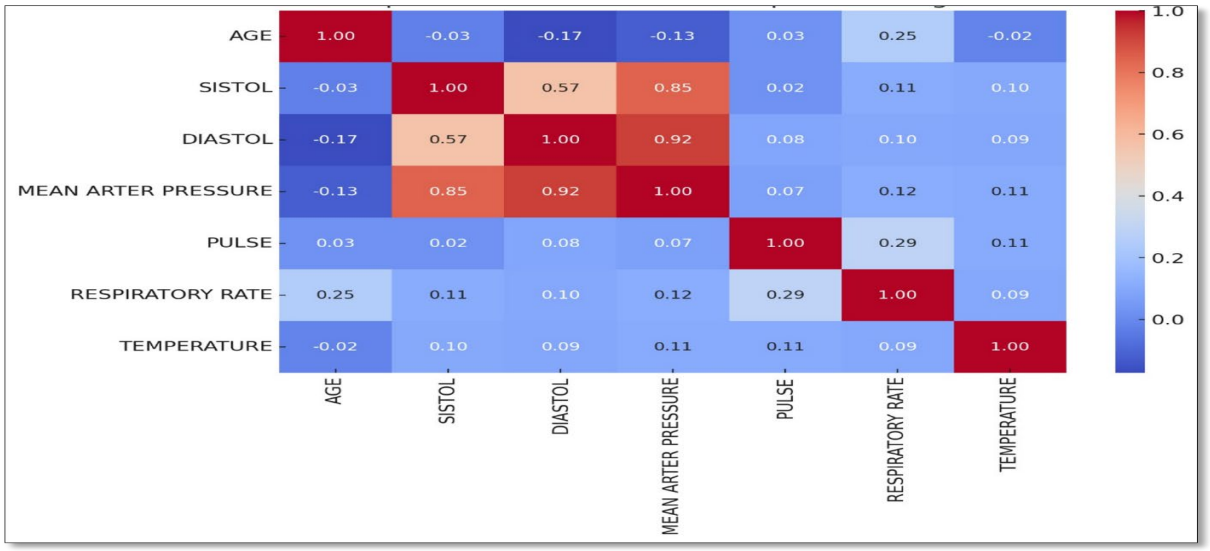

Figure 3. Heatmap of Correlations Among Age and Vital Parameters (Blood Pressure, Pulse, Respiratory Rate, Temperature)

Values represent Pearson correlation coefficients (r). Statistical significance was evaluated using two-tailed tests, with correlations at $p < 0.05$ considered statistically significant.

The correlation heatmap in Figure 3 displays the relationships between key vital signs, including blood pressure, pulse, respiratory rate, and temperature.

Systolic and Diastolic Blood Pressure showed a strong positive correlation ($r = 0.57$), as expected.

Mean Arterial Pressure (MAP) exhibited a high correlation with both systolic ($r = 0.85$) and diastolic blood pressure ($r = 0.92$), reinforcing its role as a derived measure of overall blood pressure stability.

Pulse and Respiratory Rate were moderately correlated ($r = 0.29$), suggesting a link between heart rate and respiratory function, potentially influenced by hemodynamic status.

Age did not show significant correlations with most vital parameters, except for a weak positive correlation with respiratory rate ($r = 0.25$).

These findings indicate that while blood pressure components are closely related, other vital signs such as pulse, temperature, and respiratory rate exhibit weaker associations, suggesting a more complex interplay of physiological responses in patients with lower GI bleeding.

The distribution of hemoglobin (HGB) levels across age groups and by gender is illustrated in Figure 4. The violin plots demonstrate apparent variability in HGB concentrations, with differences observed both between age categories and between sexes.

Younger patients (≤24 and 25–44 years) exhibited relatively higher hemoglobin levels with narrower distributions, suggesting more stable hematological status in these groups. In contrast, middle-aged and older patients (45 years and above) showed broader distributions and lower median values, reflecting the increased likelihood of anemia and comorbid conditions with advancing age.

Gender-based differences were also evident: while both sexes demonstrated decreasing hemoglobin levels with age, male patients showed wider variability, particularly in the 60–74 and ≥75 age groups. This suggests that older male patients may present with more heterogeneous clinical profiles, ranging from near-normal hemoglobin levels to marked anemia.

Overall, these findings underscore that hemoglobin levels in lower gastrointestinal bleeding are strongly influenced by both age and sex. The observed heterogeneity highlights the clinical importance of stratifying patients by demographic factors to guide transfusion thresholds and management strategies more effectively.

The scatter plot illustrates the relationship between age and hemoglobin (HGB) levels in patients presenting with lower gastrointestinal bleeding, stratified by sex. A negative correlation was observed between age and hemoglobin for both sexes, indicating that hemoglobin levels tend to decrease with advancing age. This trend was more pronounced among male patients, who generally exhibited higher baseline HGB values in younger age groups but a steeper decline across the lifespan. Female patients, while showing lower baseline hemoglobin levels, demonstrated a more gradual decline with age.

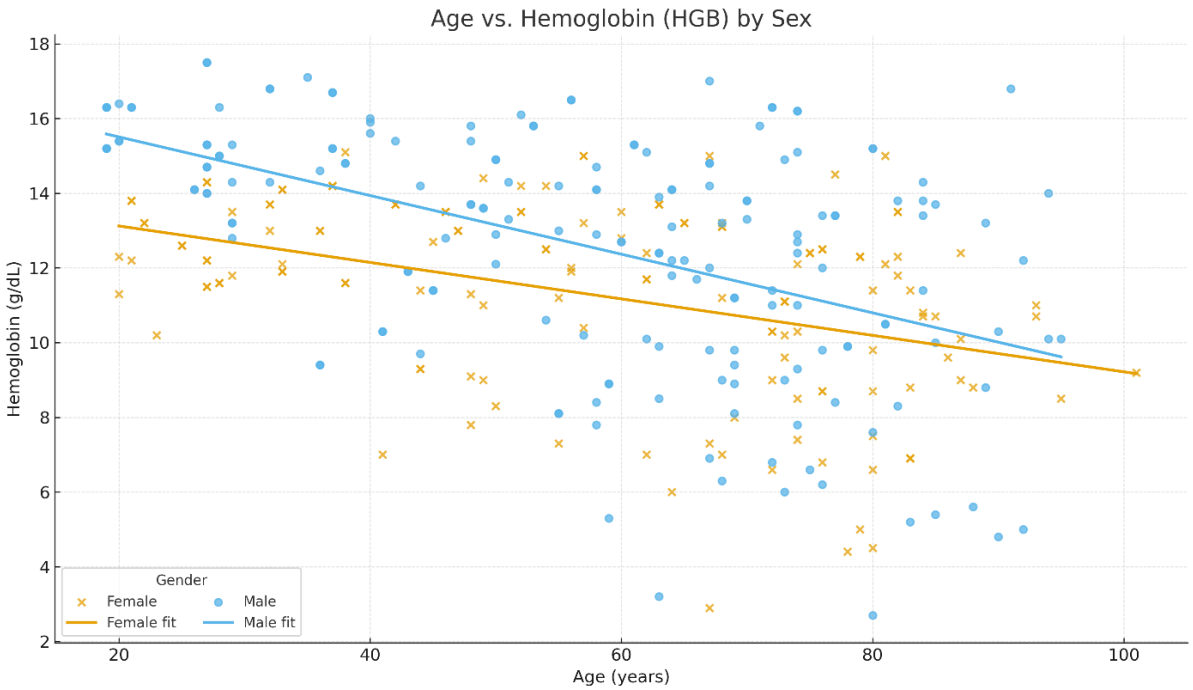

Figure 4. Relationship between Age and Hemoglobin (HGB) Levels Stratified by Sex

Linear regression analyses demonstrated a negative correlation between age and hemoglobin levels in both sexes. The associations were evaluated using two-tailed tests, with $p < 0.05$ considered statistically significant.

Regression lines highlight these patterns, showing a consistent downward trajectory in both groups. These findings underscore the combined impact of age and sex on hematological status in gastrointestinal bleeding, suggesting that older individuals—particularly males—may present with more severe anemia at the time of admission. This has clinical relevance for early risk stratification and transfusion decision-making.

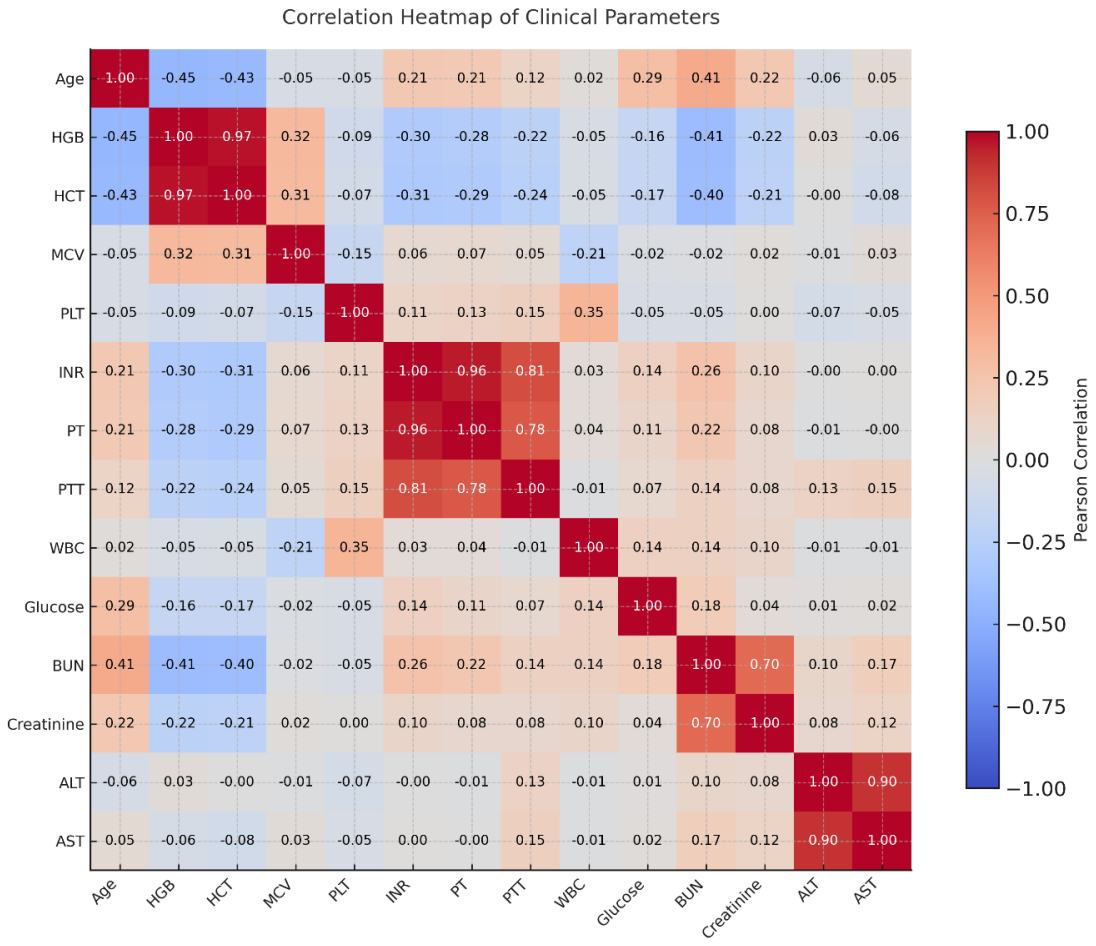

Figure 5. Correlation Analysis of Blood Parameters

Values represent Pearson correlation coefficients (r). Although only correlation coefficients are displayed, statistical significance was evaluated using two-tailed tests ($p < 0.05$ considered significant).

The correlation heatmap in Figure 6 presents the relationships between key hematological and biochemical parameters in patients with lower gastrointestinal (GI) bleeding.

Hemoglobin (HGB) and Hematocrit (HCT) demonstrated a strong positive correlation ($r = 0.97$), reflecting their physiological relationship in oxygen transport and blood volume.

Blood Urea Nitrogen (BUN) exhibited a moderate positive correlation with age ($r = 0.41$), indicating that renal function declines with age, which may be relevant in patients with comorbidities affecting kidney function.

Platelet (PLT) count and White Blood Cell (WBC) count were moderately correlated ($r = 0.35$), suggesting a possible association between inflammatory responses and platelet activation.

Aspartate Aminotransferase (AST) and Alanine Aminotransferase (ALT) were highly correlated ($r = 0.90$), reflecting their shared role in liver function and injury markers.

These findings highlight the interrelationships between hematological and biochemical parameters, emphasizing the importance of monitoring renal function, inflammatory markers, and liver enzymes in the clinical assessment of patients with lower GI bleeding.

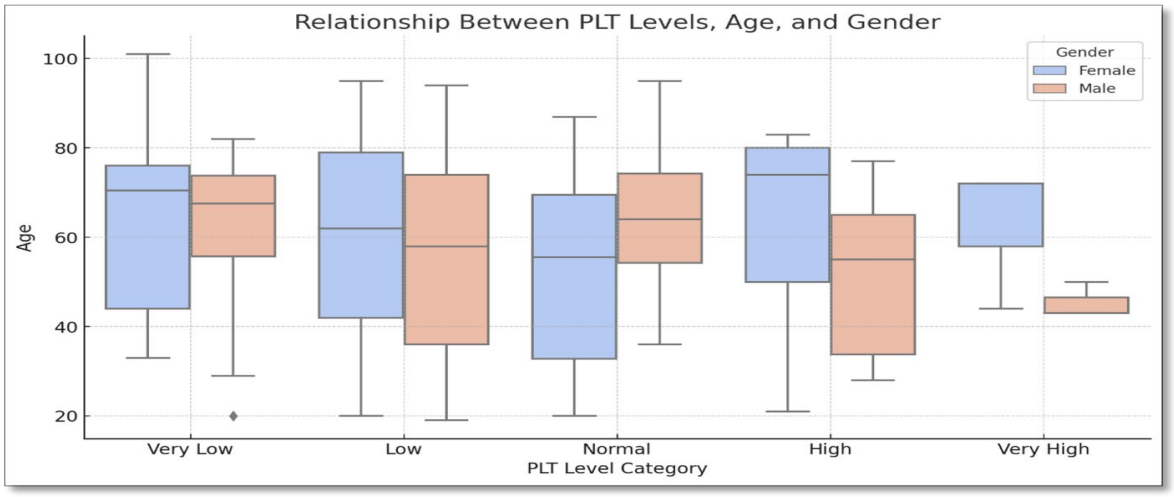

Figure 6. Relationship Between Platelet (PLT) Levels, Age, and Gender

Comparisons of age distributions across PLT level categories and between genders were evaluated using appropriate statistical tests. Differences with $p < 0.05$ were considered statistically significant.

The boxplot in Figure 7 illustrates the distribution of platelet (PLT) levels across different age groups, stratified by gender.

Patients with very low PLT levels were predominantly older (median age ~65 years), with some cases extending beyond 80 years.

Standard and low PLT levels were observed across a wide age range, indicating a balanced distribution among younger and older adults.

High and very high PLT levels were more frequent in younger patients, particularly in females, suggesting potential reactive thrombocytosis or hematologic variations.

Gender distribution was pretty consistent across all PLT categories, with females exhibiting slightly higher median ages in the "Very Low" and "High" PLT groups. These findings suggest that PLT levels may be influenced by both age-related physiological changes and underlying clinical conditions in patients with lower GI bleeding.

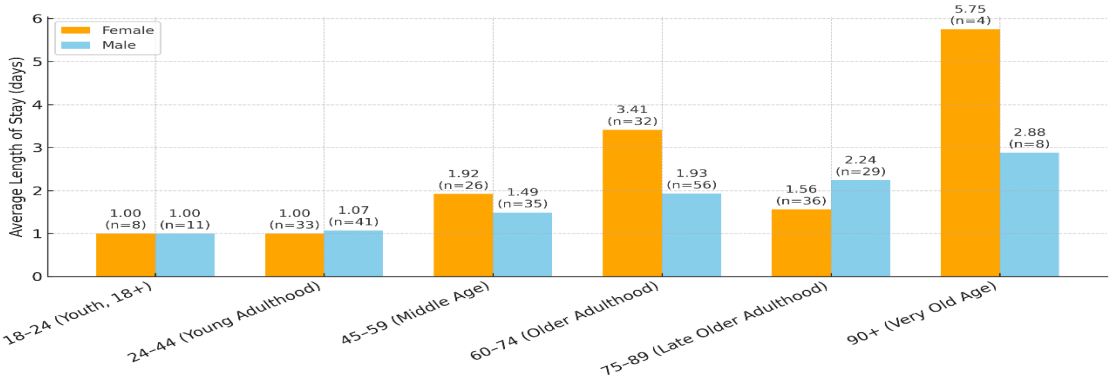

Figure 7. Average length of hospital stay (LOS, days) stratified by age group and sex.

LOS increased progressively with advancing age (Kruskal–Wallis H=44.27, df=5, p<0.0001; Spearman ρ=0.30, p<0.0001 for trend). No significant overall sex difference was observed (Mann–Whitney p=0.73). Within individual age groups, sex-specific comparisons did not reach statistical significance after Holm adjustment (all p>0.05).

The grouped bar chart (Figure 8) demonstrates that hospitalization duration progressively increases with age. Patients in the 0–44 years age group had relatively short hospital stays, whereas a marked increase was observed among older adults, particularly those aged 60 years and above. The longest average LOS was recorded in patients aged 75 years and older, reflecting the impact of advanced age, frailty, and comorbidities. When stratified by sex, male patients tended to remain hospitalized slightly longer than females in most age groups, although the difference did not reach statistical significance. This trend is consistent with prior studies suggesting that older age and male sex may predispose to more complicated clinical courses in gastrointestinal bleeding.

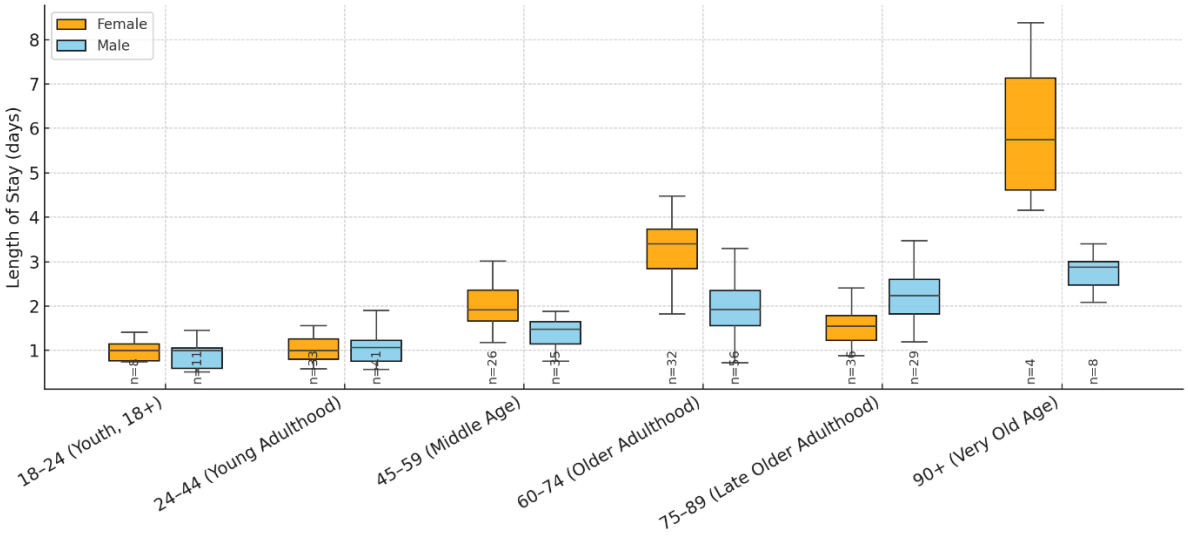

Figure 8. Distribution of hospital stay (LOS, days) by age group and sex (boxplots).

LOS increased significantly with advancing age (Kruskal–Wallis H=44.27, df=5, p<0.0001; Spearman ρ=0.30, p<0.0001 for trend). Median LOS remained 1 day in most groups, but the interquartile range widened in patients ≥45 years, with several prolonged stays observed among the elderly. No significant overall sex difference was detected (Mann–Whitney p=0.73). Within-group male–female comparisons were not statistically significant after Holm adjustment (all p>0.05).

The boxplots (Figure 9) provide additional detail regarding the variability of hospitalization. While younger patients (<45 years) showed shorter and more homogeneous LOS, older patients, especially those over 60 years, demonstrated a wider spread of hospital stay durations. Several outliers with prolonged LOS were noted among elderly patients, which likely represent cases with severe bleeding, delayed recovery, or multiple comorbidities requiring extended care. The interquartile range (IQR) widened considerably in older groups, further underlining the heterogeneity of outcomes in this population.

Overall, these findings highlight that age is a key determinant of hospitalization duration in lower gastrointestinal bleeding, while sex differences are less pronounced. The increasing LOS observed in elderly patients emphasizes the need for age-tailored management strategies and efficient resource allocation in emergency and inpatient care.

4. DISCUSSION

Elde edilen bulgular, tez türleri arasında yüksek lisans tezlerinin baskın olduğunu, doktora tezlerin Lower gastrointestinal (GI) bleeding is a prevalent clinical condition that presents with diverse etiologies, varying severities, and significant implications for patient management and hospitalization. Our study provides a detailed analysis of the clinical characteristics, hospitalization trends, and laboratory findings of patients presenting with lower GI bleeding in an emergency department setting. This discussion integrates our findings with previous research to contextualize the epidemiological, diagnostic, and therapeutic aspects of lower GI bleeding while highlighting the implications for patient outcomes.

Comparison of Demographics and Epidemiology

Our study found that lower GI bleeding was more common in older adults (61–80 years, 34.5%), with a predominance in male patients (56.4%). These findings align with previous studies, such as Alruzug et al. (22), which reported a male-to-female ratio of 1.5:1 in a Saudi population, and Niikura et al. (23), who found that older age and male gender were significant risk factors for in-hospital mortality. The median age of our study cohort (57.76 years) is comparable to the median age of 51.9 years reported in the Saudi population and 54 years in the study by Cerruti et al. (24). These consistent findings across different populations suggest that lower GI bleeding is more prevalent in middle-aged and older men, likely due to higher rates of comorbid conditions, medication use (such as NSAIDs and anticoagulants), and age- related vascular changes.

The study by Bai et al. (25) in China also demonstrated regional variations in the etiology of lower GI bleeding, with inflammatory bowel disease (30.2%) and colorectal cancer (10.7%) being the most common causes. In contrast, diverticular disease—a leading cause in Western populations—was rare. This contrasts with our findings and those of Gayer et al. (26), where diverticulosis and hemorrhoids were among the most common causes of lower GI bleeding. Our study did not specifically analyze the causes of bleeding. Still, given the demographic distribution, it is likely that diverticular disease and anorectal disorders (e.g., hemorrhoids and rectal ulcers) are predominant in our cohort, similar to the Western populations described in Schmulewitz et al. (27) and Brackman et al. (28).

Hospitalization Trends and Length of Stay

The mean hospital stay in our study was shorter than the 6.7 days reported in Schmulewitz et al. (20), where early colonoscopy was associated with a shorter hospitalization duration (5.4 vs. 7.2 days, $p<0.008$). Our data suggest that the majority of patients (90%) were discharged within 0-3 days, with a small proportion requiring prolonged hospitalization (4+ days). This discrepancy may be attributed to differences in patient triage, severity of cases, and the timing of diagnostic procedures.

Our study reinforces the role of early endoscopic evaluation in predicting hospital length of stay. The findings from Schmulewitz et al. (27) demonstrated that patients who underwent early colonoscopy had shorter hospital stays, supporting the hypothesis that timely diagnosis and intervention can expedite management and discharge. Similarly, Gayer et al. (26) reported that colonoscopy enabled diagnosis in most patients, reducing the need for surgical interventions. While our study did not specifically analyze the impact of colonoscopy timing, the observed short hospital stays suggest that early diagnosis and conservative management were likely effective in most cases.

Hemodynamic Stability, Laboratory Findings, and Risk Stratification

Hemodynamic instability is a key determinant of clinical outcomes in lower GI bleeding. Our study found that tachycardia (>100 bpm) was common in anemic patients (HGB <10 g/dL), emphasizing the need for hemodynamic monitoring in high-risk patients. Similar findings were reported by Cerruti et al. (24), where hypotension, antiplatelet/anticoagulant use, and hemoglobin <10.5 g/dL were associated with increased need for hospital-based intervention and higher mortality.

The SHA2PE score, tested by Cerruti et al. (24), was designed to predict the need for hospital-based intervention in lower GI bleeding. Although our study did not apply this scoring system, our findings support its key predictive variables, including age, hemoglobin levels, and hemodynamic instability. Additionally, Niikura et al. (23) found that older age, male gender, comorbidities (e.g., heart failure, renal disease, and liver disease), and blood transfusion requirements were significant predictors of in-hospital mortality. Our study complements these findings by demonstrating that older patients required more extended hospital stays, likely due to comorbid conditions and increased bleeding severity.

Correlation analysis in our study revealed strong associations between hemoglobin and hematocrit levels, as well as moderate correlations between platelet count and inflammatory markers. These findings align with the data from Niikura et al. (23), which identified low BMI, NSAID use, and transfusion requirements as significant factors associated with in-hospital mortality. These results suggest that a combination of clinical, laboratory, and hemodynamic parameters should be used to stratify patients and guide early intervention strategies.

Interventions and Clinical Outcomes

Our study showed that hematochezia was the predominant symptom in both males and females, consistent with previous reports (26, 28). The management of lower GI bleeding varies widely, with options including endoscopic hemostasis, angiographic embolization, and surgery in severe cases. Gayer et al. (26) reported that spontaneous cessation of bleeding occurred in 77.6% of cases, with only 4.8% requiring emergency surgery. Similarly, Cerruti et al. (24) found that 65% of patients who required intervention received blood transfusions, while 47% underwent endoscopic hemostasis. These findings highlight the increasing reliance on conservative and minimally invasive techniques in modern clinical practice.

While our study did not assess the rate of rebleeding or the effectiveness of different therapeutic approaches, our results suggest that most patients were managed conservatively with short hospital stays. Future research should focus on identifying predictors of rebleeding and assessing the effectiveness of various treatment modalities.

Clinical Implications and Future Directions

The findings from our study and previous research underscore several important clinical implications:

Early endoscopic evaluation should be prioritized to reduce hospital length of stay and facilitate early discharge.

Hemodynamic status, laboratory markers (HGB, HCT, MCV, PLT, INR, PT, PTT), and age should be integrated into risk stratification models to identify high-risk patients who may require prolonged hospitalization or invasive interventions.

Gender-based differences in hospitalization trends suggest that male patients may require closer monitoring, as they were more frequently affected and had more extended hospital stays.

Standardized risk scores such as SHA2PE should be further validated in larger populations to guide triage decisions and improve resource utilization.

Future studies should explore prospective validation of risk scores, the impact of early colonoscopy on long-term outcomes, and the role of non-invasive diagnostic tools such as capsule endoscopy and CT angiography in the management of lower GI bleeding.

Our study contributes to the growing body of evidence on the clinical characteristics, hospitalization trends, and outcomes of lower GI bleeding. By integrating findings from multiple studies, we reaffirm the importance of early diagnosis, risk stratification, and individualized

management strategies. Further research is warranted to refine predictive models and optimize intervention strategies, ultimately improving patient outcomes and reducing healthcare burden in lower GI bleeding cases.

5. CONCLUSION

This study provides a comprehensive evaluation of the clinical characteristics, hospitalization trends, and laboratory findings of patients presenting with lower gastrointestinal (GI) bleeding in an emergency department setting. Our findings contribute to the growing body of evidence regarding risk stratification, hospitalization outcomes, and predictive factors for disease severity, reinforcing the importance of an integrated clinical approach in the management of lower GI bleeding.

Lower GI bleeding predominantly affected middle-aged and older adults, with the highest prevalence observed in the 60–74 years group (27.6%), followed by the 45–59 years group (19.1%) and the 75–89 years group (20.4%). The male predominance (56.4%), particularly in the 25–74 years range, aligns with previous studies highlighting gender-based differences in bleeding risk and disease burden. Notably, in the late older adulthood group (75–89 years), females slightly outnumbered males, and among patients aged ≥90 years, the sex distribution was again balanced. These findings suggest that age-related factors may supersede sex-related risk differentials in the very elderly population. Hematochezia remained the most common presenting symptom across all groups, consistent with existing literature emphasizing its clinical relevance in early detection and triage.

Our laboratory analysis revealed a wide variability in hemoglobin levels, with a significant proportion of patients presenting with anemia (HGB <10 g/dL), indicating substantial blood loss and the potential need for transfusion therapy. Elevated white blood cell (WBC) counts in many patients suggest an associated inflammatory response or underlying infection, findings that align with previous research identifying WBC count as a marker of disease severity and hemodynamic instability. The presence of tachycardia in patients with lower hemoglobin levels further emphasizes the need for vigilant hemodynamic monitoring and early intervention in high-risk individuals.

Hospitalization analysis demonstrated that the majority of patients (90%) were discharged within 0–3 days, with only a small subset requiring prolonged hospitalization (≥4 days). Older patients (>51 years) had significantly more extended hospital stays, likely due to comorbidities and increased disease severity, a pattern well-documented in previous studies. Male patients were more frequently affected by extended hospital stays, reinforcing the need for gender-specific risk assessment and management strategies. The findings from our research, in conjunction with previous literature, support the growing consensus that timely endoscopic evaluation and risk stratification tools play a crucial role in determining hospitalization duration and clinical outcomes.

The correlation analysis of blood parameters revealed strong associations between hemoglobin and hematocrit levels, as well as moderate correlations between platelet count and inflammatory markers, suggesting that hematological and biochemical markers can serve as valuable indicators of disease severity and prognosis in lower GI bleeding cases. These findings align with studies highlighting the predictive value of laboratory parameters in guiding transfusion decisions, risk stratification, and treatment escalation.

Clinical Implications and Future Directions

The integration of clinical, laboratory, and hemodynamic parameters can significantly enhance early identification, triage, and management strategies for lower GI bleeding. Given the increasing reliance on minimally invasive diagnostic and therapeutic interventions, our findings support the need for:

Prioritizing early risk stratification using clinical and laboratory markers to identify patients at high risk of prolonged hospitalization and hemodynamic instability.

Enhancing the role of early colonoscopy can reduce hospital stay and improve diagnostic accuracy, as demonstrated in previous studies that show an association with earlier discharge.

Developing standardized predictive models incorporating vital signs, laboratory markers, and comorbid conditions to optimize triage decisions and intervention planning.

Expanding research on gender-based differences in lower GI bleeding to improve personalized treatment approaches and resource allocation.

In summary, this study underscores the critical importance of early diagnosis, risk stratification, and targeted management strategies in patients presenting with lower GI bleeding. Older age, esp. male gender, anemia, tachycardia, and prolonged hospitalization emerged as key clinical factors influencing patient outcomes. The integration of clinical, laboratory, and hemodynamic parameters will be essential in optimizing patient management, reducing unnecessary hospitalizations, and improving overall prognosis. Future research should focus on validating risk prediction models and investigating novel diagnostic tools to further enhance evidence-based strategies for managing lower GI bleeding in emergency settings.

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Competing Interests: The authors declare no conflicts of interest.

Author Contributions:

Dr. Ayhan Tabur conceived and designed the study; planned the materials and methods; supervised data acquisition; interpreted the findings; and drafted the manuscript. He also served as the corresponding author. Dr. Emre Bülbül developed the literature/search strategy; curated the dataset; performed the statistical analyses and prepared tables/figures; and critically revised the manuscript for important intellectual content. Both authors approved the final version and agree to be accountable for all aspects of the work.

Ethics Statement

Research and Ethics Statement for the Article "Patient Profiles and Clinical Outcomes in Emergency Department Presentations of Lower Gastrointestinal Hemorrhage: A Retrospective Study"	
This study was conducted in accordance with the principles of "Research and Publication Ethics" and was checked using a plagiarism detection program. All responsibility for the content of the study rests with the author(s).	
Compliance with Research and Publication Ethics	The data used in this study were obtained from hospital records of the Emergency Department at a tertiary care institution. The study included patients aged 18 years and older admitted with a diagnosis of acute lower gastrointestinal bleeding between February 2023 and February 2025. The research protocol was reviewed and approved by the Ethics Committee of SBÜ Diyarbakır Gazi Yaşargil Training and Research Hospital (Approval Date: 07.02.2025, Approval Number: 331).
Conflict of Interest Statement	The authors declare that they have no conflicts of interest regarding this article.
Financial Support	-
Author Contribution Statement	Both authors contributed equally to the study design, data collection, statistical analysis, interpretation of findings, and manuscript preparation.
Acknowledgments	-
Ethics Committee Approval	The study was approved by the Ethics Committee of SBÜ Diyarbakır Gazi Yaşargil Training and Research Hospital (Approval Date: 07.02.2025, Approval Number: 331).
Permission for Use of Scales/Measurements	-

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