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Comparison of Rockall and Glasgow-Blatchford Scores in GI Bleeding

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Abstract

Background: The aim of this study was to assess the clinical effectiveness of the Rockall score and the Glasgow-Blatchford Score (GBS) in treating patients who may experience gastrointestinal bleeding and attend the emergency department.
Methods: A research study retrospectively involving 350 patients who were admitted to Esenyurt Necmi Kadolu State Hospital between January 1, 2023, and December 31, 2024, was conducted. The research assessed how effectively both scoring methods could forecast 30-day mortality, rebleeding, the necessity for blood transfusions, and admissions to the intensive care unit (ICU).
Results: The GBS demonstrated superior performance over the Rockall score in early risk assessment and in guiding hospital admission or discharge decisions. Conversely, the Rockall score was more effective in predicting long-term prognosis and the risk of rebleeding. According to ROC analysis, GBS (AUC: 0.83) outperformed the Rockall score (AUC: 0.78) in predicting mortality. Subgroup analysis indicated that the predictive value of the Rockall score declined in patients on anticoagulant therapy, while both scores showed increased predictive accuracy in patients aged ≥65 years.
Conclusion: The findings suggest that the GBS is more suitable for early clinical decision-making in the emergency setting, whereas the Rockall score should be considered for long-term risk evaluation in patients with gastrointestinal bleeding.

Keywords: *Gastrointestinal bleeding, Glasgow-Blatchford score, Mortality prediction, Rockall score, Emergency department*

Introduction

Gastrointestinal bleeding (GIB) represents a critical medical concern in emergency rooms, as it significantly endangers patients' well-being. Prompt action is essential for both upper gastrointestinal bleeding (UGIB) and lower gastrointestinal bleeding (LGIB), since they contribute to 5% to 15% of fatalities in the general population.[1] The death rates linked to bleeding differ based on the patient's general health, existing medical conditions, and the root causes of the bleeding.[2] Patients with GIB are often from older age groups and are frequently accompanied by coagulopathy, chronic illnesses, and other risk factors.[3,4]

UGIB cases primarily result from peptic ulcer disease in 40-50% of cases, with additional contributing factors such as esophageal varices, Mallory-Weiss tears, gastric or esophageal cancers, and erosive gastritis.[5] Diverticulosis, angiodysplasia, inflammatory bowel disorders, hemorrhoids, and colon tumors are among the primary causes of LGIB.[6] An early assessment of disease severity and potential complications is critical for providing timely and appropriate medical interventions.[7]

To optimize healthcare resources, clinical scoring systems are often employed to predict the outcomes of GIB patients. Two of the most commonly used tools for GIB management are the Rockall score and the Glasgow-Blatchford score (GBS).[8] The Rockall score evaluates the risk of rebleeding and death by taking into account elements like the patient's age, comorbidities, hemodynamic state, and endoscopic results.[9] However, the

Rockall score has limitations for early decision-making because it requires post-endoscopy evaluation.[10,11] On the other hand, GBS is used as a pre-endoscopic assessment tool, evaluating blood urea levels, hemoglobin measurements, heart rate, blood pressure, syncope events, and the presence of melena to identify emergency risks effectively.

There is no consensus in the literature on which scoring system performs better in specific clinical situations.[12,13] Some studies suggest that GBS is more effective in predicting emergency care needs and hospital discharge eligibility, while the Rockall score excels in predicting long-term mortality and rebleeding rates. However, there are conflicting findings, and few prospective studies directly compare these systems.[14,15] The potential benefits of using both scoring systems together have not been sufficiently explored. Additional research is required to assess the individual performance of the Rockall and Glasgow-Blatchford scores and the benefits of using them both in the same patient group.

This research aims to assess how the Rockall score and Glasgow-Blatchford score predict ICU admission, rebleeding, and mortality in emergency department patients with gastrointestinal bleeding.16 Additionally, the study will evaluate the effectiveness of using both scores for risk prediction compared to using each score individually. The study will test three main hypotheses: (1) The Glasgow-Blatchford score provides the most effective guidance for emergency department admission and discharge decisions; (2) The Rockall score has superior predictive capabilities for long-term mortality and rebleeding rates; and (3) The combined use of both scoring systems produces more accurate risk predictions than using either score independently.

Methods

The retrospective cross-sectional study was conducted to compare the clinical efficacy of the Rockall and Glasgow-Blatchford scores in patients admitted to the hospital with upper gastrointestinal bleeding. Patients with gastrointestinal bleeding (GIB) in the emergency department. The study was conducted by retrospectively reviewing patients' medical records.

The study was carried out in the emergency room of Esenyurt Necmi Kadıoğlu State Hospital, and it included patients who reported possible gastrointestinal bleeding between January 1, 2020, and December 31, 2020. Included were 2023 and December 31, 2024. The data collection process was completed in 2025.

The study's inclusion criteria included patients who were 18 years of age or older and who came to the emergency room with possible acute upper or lower respiratory tract infection. lower gastrointestinal hemorrhage, which may be treated in a hospital or outpatient setting, and which has all the clinical data needed to determine the Rockall and Glasgow-Blatchford scores. Exclusion criteria included patients presenting with chronic gastrointestinal bleeding or anemia, those with incomplete or insufficient medical records, patients whose bleeding was due to trauma, pregnant patients, and those discharged without undergoing endoscopic intervention. Participants were identified through the hospital's automation system and medical records, with International Classification of Diseases (ICD-10) codes used to screen for patients diagnosed with acute gastrointestinal bleeding who met the eligibility criteria.

The study included 350 patients overall. Based on prior comparable trials, the sample size was selected, with at least 300 patients taken into consideration in order to have 80% power to identify a 10% or more variation in mortality. The G*Power 3.1 program was used to make this calculation.

The dependent variables in this study included 30-day mortality, in-hospital mortality, rebleeding rate, need for blood transfusion, and intensive care unit (ICU) admission, consistent with outcomes evaluated in previous GIB risk stratification studies.[6] The independent variables were the Rockall score and the Glasgow-Blatchford score (GBS), which were calculated using established scoring criteria that include factors such as age, signs of hemodynamic instability (e.g., systolic blood pressure, pulse rate), comorbidities, endoscopic findings, and bleeding stigmata.[6,8]

Potential confounding variables were also evaluated, including gender, age, use of anticoagulant or antiplatelet therapy, comorbidity profiles, and hemodynamic parameters upon admission—factors known to influence both bleeding severity and outcomes.[13,21]

Data were collected consecutively and consisted of a secondary analysis based on information extracted from the hospital's electronic medical record (EMR) system, specifically from the patient registry and triage documentation at Esenyurt Necmi Kadıoğlu State Hospital. This data collection method aligns with similar retrospective cohort studies conducted in emergency settings.[20]

Laboratory results, including hemoglobin, urea, platelet count, and international normalized ratio (INR), were collected within the first six hours of hospital admission, as early laboratory testing is critical for accurate GBS scoring.[8] Essential indicators like blood pressure, pulse rate, and awareness level were collected from the emergency department's triage system, representing standard clinical evaluation methods.

Endoscopic findings used to calculate the Rockall score were retrieved from records maintained by the gastroenterology department, following standard diagnostic protocols. The GBS was derived from pre-endoscopic clinical and laboratory parameters, in line with its validated application in early emergency care settings.[8,14-15]

To minimize bias in this study, the following strategies were implemented. To address missing data, hospital records and endoscopy reports were matched and compared, and patients with more than 10% missing data were excluded from the analysis. To reduce selection bias, a systematic approach was used in data collection, and patients with gastrointestinal bleeding were selected randomly using ICD-10 codes. To minimize measurement bias, standardized procedures were used in score calculations, and the calculations were checked by two independent researchers.

For numerical variables, the average ± standard deviation (SD) or median (range) were presented, and the normal distribution of continuous variables was evaluated using the Kolmogorov-Smirnov test. The Student's t-test was applied to examine variables that followed a normal distribution, whereas the Mann-Whitney U test was utilized for those that did not. Categorical variables were summarized using frequency and percentage (%), and the chi-square test or Fisher's exact test was implemented to compare these variables.

To evaluate the distinctions between the two populations, independent sample t-tests were utilized for parametric data, while Mann-Whitney U tests were employed for non-parametric data. To assess categorical variables, either the Chi-square test or Fisher's exact test was applied. The predictive significance of the Rockall and GBS was examined through Receiver Operating Characteristic (ROC) curve analysis, and the Area Under the Curve (AUC) values were computed for analysis.

To identify the independent predictors of mortality, rebleeding, and ICU admission, multivariable logistic regression analysis was performed. Multiple imputation was used for the missing data analysis, and patients with more than 5% missing data were excluded from the analysis. Furthermore, the studies were further classified into subgroups according to age groups, causes of bleeding, and the existence or absence of comorbid diseases.

All statistical evaluations were conducted using IBM SPSS Statistics 26, and a p-value.

Ethical Approval

This study adhered to the ethical guidelines established by the national and institutional research committee as well as the 1964 Helsinki Declaration and its subsequent revisions. Ethical clearance was granted by the Istanbul Medipol University's Non-Interventional Clinical Research Ethics Committee (Decision No:578, Date: 22.05.2025). The study was subject to further revisions. Since the study was informed, retrospective, and grounded on anonymized medical records. The ethics committee waived the requirement for consent.

Results

The study initially evaluated 400 individuals for participation. Due to missing or inadequate information, fifty patients were excluded. Among the excluded patients, 15 had incomplete laboratory data, 15 had missing endoscopy data, and 15 did not meet the study criteria due to pregnancy or trauma-related bleeding. Therefore, 350 patients were retrospectively analyzed. All data required for patient follow-up were completely collected from the hospital records system.

The patients had a mean age of 61.8 ± 15.3 years, and 198 (56.6%) of the 350 patients were men, while 152 (43.4%) were women. With regard to The mean systolic blood pressure was 118 ± 24 mmHg, while the mean diastolic blood pressure was 72 ± 14 mmHg, according to vital parameters taken at admission. and the average pulse rate was 92 beats per minute, plus or minus 18 beats. (Table 1).

Table 1. Patient Demographics and Clinical Characteristics

Parameter	Value
Total patients analyzed	350
Male (%)	198 (56.6%)
Female (%)	152 (43.4%)
Mean age (years)	61.8 ± 15.3
Systolic BP (mmHg)	118 ± 24
Diastolic BP (mmHg)	72 ± 14
Pulse rate (bpm)	92 ± 18
Hemoglobin (g/dL)	10.5 ± 3.2
Urea (mg/dL)	42.8 ± 18.5
Platelet count (/µL)	245000 ± 78000
INR	1.4 ± 0.7
On anticoagulant therapy (%)	30%
Melena (%)	48.3%
Hematemesis (%)	35.7%
Syncope (%)	16%
Mean Rockall score	4.8 ± 2.1
Mean GBS score	9.2 ± 4.3

The laboratory findings showed that the mean hemoglobin level was 10.5 ± 3.2 g/dL, the mean urea level was 42.8 ± 18.5 mg/dL, the mean platelet count was 245,000 ± 78,000/µL, and the mean INR was 1.4 ± 0.7. Among the patients, 30% were on anticoagulant therapy. Regarding clinical symptoms, 48.3% of the patients had melena, 35.7% had hematemesis, and 16% had syncope. The mean Rockall score was 4.8 ± 2.1, and the mean Glasgow-Blatchford score (GBS) was 9.2 ± 4.3 (Table 2).

Table 2. Clinical Outcomes

Outcome	**Value**
Hospitalization rate	52% (n=182)
ICU admission rate	10% (n=35)
Blood transfusion rate	28% (n=98)
Rebleeding rate	15% (n=52)
30-day mortality	5% (n=18)
In-hospital mortality	2% (n=7)

The hospitalization rate was 52% (n=182), while the admission rate to the intensive care unit (ICU) was 10% (n=35). Blood transfusion was required for 28% of the patients (n=98), and 15% (n=52) experienced rebleeding. Regarding mortality, the 30-day mortality rate was 5% (n=18), and the in-hospital mortality rate was 2% (n=7). Among the 52 patients with rebleeding, 10 (19.2%) required ICU care, and 3 (5.8%) died (Table 3).

Table 3. Predictive Accuracy (Overall)

Score	AUC	Sensitivity	Specificity
Rockall	0.78	75%	68%
GBS	0.83	88%	70%

To assess the prognostic value of the Rockall and Glasgow-Blatchford scores, analyses focused on mortality prediction. The area under the curve (AUC) for predicting 30-day mortality was 0.78 (95% CI: 0.72–0.84) for the Rockall score and 0.83 (95% CI: 0.78–0.88) for the Glasgow-Blatchford score. These results indicate that the GBS has superior discriminative ability (Table 4).

Table 4. Subgroup Analysis (Anticoagulant Therapy)

Score	AUC	Sensitivity	Specificity
Rockall	0.71	68%	65%
GBS	0.85	90%	72%

To improve clinical interpretability, the sensitivity and specificity of each score were determined in addition to the AUC values. The Glasgow-Blatchford score had a sensitivity. The Rockall score had a sensitivity of 75% and a specificity of 68% for predicting mortality, compared to an 88% sensitivity and 70% specificity. These results are compared in the table below. The data indicate that the GBS is not only more accurate overall but also better at identifying high-risk individuals who may benefit from intensive monitoring or early intervention. (Table 5).

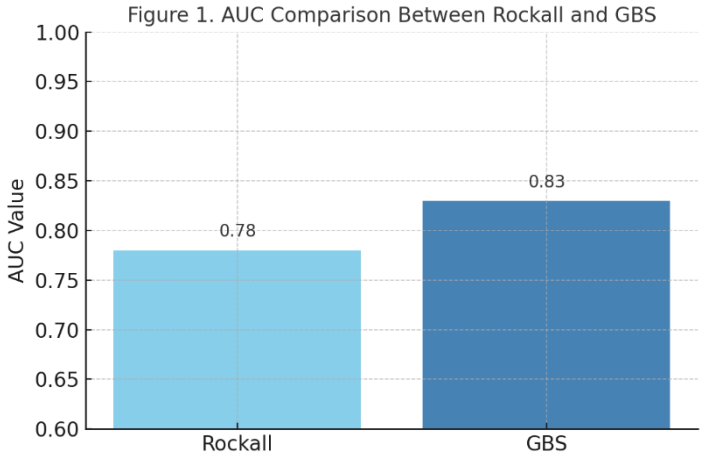
Table 5. Subgroup Analysis (Age ≥65)

Score	AUC	Sensitivity	Specificity
Rockall	0.82	80%	70%
GBS	0.87	88%	75%

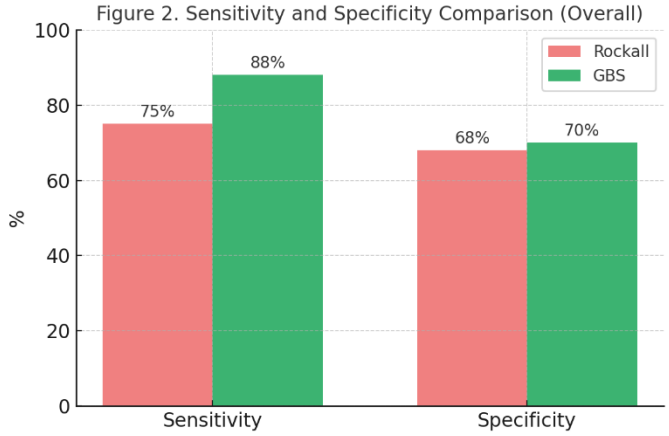
By including both AUC and diagnostic performance metrics, this analysis provides a more comprehensive evaluation of each scoring system's utility in clinical decision-making. In the analysis of blood transfusion requirements, 72% of the patients with a GBS score >12 required a transfusion, while 18% of patients with a GBS score ≤12 needed a transfusion ($p < 0.001$). When hospitalization requirements were compared with the Rockall and GBS scores, it was observed that 81% of the patients with a Rockall score ≥5 were hospitalized, and 88% of the patients with a GBS score ≥10 required hospitalization.

In the multivariable logistic regression analysis, the following were found to be independent factors associated with mortality: the Glasgow-Blatchford score (adjusted OR: 1.28, 95% CI: 1.15–1.42, $p < 0.001$), age (adjusted OR: 1.07, 95% CI: 1.02–1.12, $p = 0.003$), and INR (adjusted OR: 1.63, 95% CI: 1.30–2.05, $p < 0.001$). These results are based on adjusted odds ratios (aOR), accounting for potential confounding variables in the regression model. This strengthens the validity of the associations observed and supports the independent prognostic value of the GBS score, age, and INR levels in this patient population. When the Rockall score threshold was set at 5, it had a sensitivity of 79% for predicting mortality and a specificity of 72%. For the GBS, with a threshold of 11, the sensitivity was 86%, and the specificity was 74%.

Subgroup analyses revealed that in patients receiving anticoagulant therapy, the accuracy of the Rockall score in predicting 30-day mortality decreased (AUC: 0.71, 95% CI: 0.64–0.79, $p = 0.001$), whereas the Glasgow-Blatchford score (GBS) maintained high predictive performance (AUC: 0.85, 95% CI: 0.79–0.91, $p < 0.001$). In this subgroup, the sensitivity and specificity of the Rockall score were 68% and 65%, respectively, while the GBS showed a sensitivity of 90% and a specificity of 72%, indicating superior discriminative ability even in patients on anticoagulation (Figure 1).



Likewise, in individuals who are 65 years old and above, both assessment methods showed improved accuracy in predicting death (Rockall score: AUC = 0. 82, GBS score: AUC = 0. 87). For this demographic, the Rockall score exhibited a sensitivity of 80% and a specificity of 70%, whereas the GBS reflected a sensitivity of 88% and a specificity of 75%. These results indicate that the ability to predict outcomes for both scoring systems enhances in older adults, with the GBS continuously displaying greater sensitivity among different groups. (Figure 2).



By including sensitivity and specificity values, these subgroup analyses provide a more clinically applicable understanding of how each scoring system performs under different patient conditions. Univariate sensitivity analyses showed that the use of both the Rockall and GBS scores increased the AUC for mortality to 0.88. This result indicates that the use of both scoring systems could offer a better approach in clinical decision-making.

Discussions

The primary aim of this research was to evaluate the predictive capabilities of the Rockall and Glasgow-Blatchford scores regarding the outcomes of patients experiencing gastrointestinal bleeding who arrived at the emergency department. Our findings indicated that the Glasgow-Blatchford score was more effective in identifying immediate risks and informing decisions related to admission and discharge in the emergency setting. On the other hand, the Rockall score was found to be better at forecasting long-term results, including occurrences of rebleeding and death.

The analysis of the ROC curve showed that the GBS had a greater area under the curve (AUC) for forecasting 30-day mortality (0. 83) in contrast to the Rockall score (0. 78). Additionally, the GBS proved to be a more effective indicator for the necessity of blood transfusions and hospital admissions, whereas the Rockall score was notably more precise in forecasting deaths during hospitalization and complications in the long run.

Subgroup analysis demonstrated that the Rockall score's performance was reduced in patients receiving anticoagulant therapy (AUC = 0.71), whereas the GBS maintained high predictive performance (AUC = 0.85). In elderly patients (age ≥65), both scores showed improved performance in predicting mortality (Rockall: AUC = 0.82; GBS: AUC = 0.87). These findings suggest that the choice of scoring system may depend on patient characteristics.

This study fills a crucial gap by directly comparing the predictive value of the Rockall and GBS in the same patient cohort, with a focus on different clinical endpoints. Although several studies have evaluated these scores individually, few have assessed them in real-world emergency department settings, accounting for confounders such as age and anticoagulant use. Our study supports previous findings that the GBS is better suited for initial risk assessment, while the Rockall score excels in predicting long-term outcomes post-endoscopy.

The findings from this study have significant implications for clinical practice and policy. From a clinical perspective, using the GBS can aid in early discharge decisions, particularly for low-risk patients, thereby conserving resources and reducing healthcare costs. At the policy level, integrating these scores into clinical guidelines and triage protocols could standardize risk assessment practices and improve patient care in emergency settings.

The strengths of this study include the consecutive selection of patients, the real-world setting of the emergency department, and the comparative analysis of both scores in the same cohort. Additionally, the subgroup analysis provides valuable insights, particularly in vulnerable groups such as the elderly and patients on anticoagulants.

However, this research has a few drawbacks. To begin with, the retrospective nature of the study might have led to selective bias or inaccuracies in the information collected, and patients with incomplete data were left out. Additionally, the research took place at only one hospital, which might restrict how the results apply to other environments, like specialized medical facilities or various geographical areas. Furthermore, the timing of the endoscopy was not documented, which might have affected the effectiveness of the Rockall score. Lastly, the choice to place patients in the ICU or hospital depended on the decisions made by the doctors on duty, which could have introduced some bias. Lastly, although this study showed better predictive performance when both scores were used together, prospective validation is needed to confirm whether the combined use of both scores offers statistically and clinically significant benefits.

Our study suggests that the Rockall and GBS scores should be used at different stages of patient assessment. The GBS is particularly useful for early emergency assessment, such as safe discharge of patients with low scores (GBS ≤2), while the Rockall score is better suited for long-term risk prediction, such as rebleeding and mortality.[17,18]

The results of our research are consistent with previous studies. The GBS has proven to be a reliable tool for identifying patients who require hospital care and blood transfusions, as confirmed by earlier research. The research conducted by Stanley and colleagues emphasized that GBS played a significant role in determining which patients could be discharged safely and in making better use of hospital resources. The initial research from Blatchford and others reinforced the value of GBS for assessing risk at an early stage. Further studies indicate that the Rockall score is more dependable in forecasting rebleeding occurrences and death rates. Laursen and team have noted that the Rockall score serves as a strong indicator for mortality within 30 days. Our findings also support the continued use of the Rockall score for predicting patient outcomes.

Thus, healthcare providers should consider using both scoring systems simultaneously for GIB patients to ensure safe discharge for low-risk patients (GBS ≤2) and appropriate hospital admission for high-risk patients (elevated Rockall scores).

Conclusions

The Glasgow-Blatchford Score (GBS) proved superior for early risk assessment and discharge planning for gastrointestinal bleeding (GIB) patients in emergency departments, while the Rockall score was more effective for predicting long-term outcomes, such as rebleeding and mortality. The Rockall score lost its predictive power in specific subgroups, but GBS maintained consistent performance across all patient groups, including the elderly

and those on anticoagulation therapy. This research indicates that these scoring systems serve different purposes in clinical practice. The Rockall score ought to be utilized to forecast patient results following their admission, whereas the Glasgow-Blatchford score should inform choices made in the emergency department. Additional multicenter prospective studies are required to confirm these findings and evaluate the benefits of employing both scores in tandem for patients at high risk.

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Declarations of competing interest

No potential competing interest was reported by the authors.

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