Rzeszów University Press 2025
ISSN 2544-1361 (online)
doi: 10.15584/ejcem.2025.3.2

http://www.ejcem.ur.edu.pl
European Journal of Clinical and Experimental Medicine
Eur J Clin Exp Med 2025; 23 (3): 548–554

ORIGINAL PAPER

Evaluation of the Glasgow-Blatchford score in predicting clinical outcomes in upper gastrointestinal bleeding

Fidan İnciler [1], Tolga Düzenli [2], Hüseyin Köseoğlu [2], Mesut Sezikli [2]

[1] Department of Internal Medicine, Hitit University Faculty of Medicine, Corum, Türkiye
[2] Department of Gastroenterology, Hitit University Faculty of Medicine, Corum, Türkiye

ABSTRACT

Introduction and aim. Acute upper gastrointestinal bleeding is a common cause of emergency admissions with potentially serious outcomes. Early evaluation of patients is crucial to predict morbidity, recurrence of bleeding, and mortality. The Glasgow Blatchford score (GBS) is a validated scoring system used to predict the need for medical interventions such as blood transfusion, endoscopy, and surgery. This study aimed to explore the correlation of GBS with prognostic markers in patients with upper gastrointestinal bleeding.

Material and methods. This retrospective study included patients >18 years old admitted to Hitit University Corum Erol Olcok Training and Research Hospital due to upper gastrointestinal bleeding between December 2022 and May 2023. Exclusion criteria were insufficient endoscopy or data or pregnancy. GBS scores were calculated at the initial presentation for each patient and their association with prognostic markers and mortality was analyzed. Comparison of numerical measurements between independent groups was evaluated using the Mann-Whitney U test and categorical variables were evaluated using the Chi-square test. Spearman coefficients were used for correlations. ROC analysis was used to determine the sensitivity and specificity of GBS to predict endpoints. The predictive factors for the endpoints were investigated using logistic regression analysis.

Results. A total of 140 patients were enrolled in the study. GBS was significant in predicting the need for blood transfusion (OR: 1.493, 95% CI: 1.297–1.719, p<0.001), need for endoscopic intervention (OR: 1.248, 95% CI: 1.089–1.430, p=0.001), and preference for ward/intensive care unit (OR: 0.869, 95% CI: 0.790–0.953, p=0.003). For predicting mortality, Charlson Comorbidity Index (OR: 1.023, CI=1.008–1.437, p=0.046) was significant. GBS was not significant for predicting mortality (p=0.582).

The area under the curve (AUC) of GBS with a cut-off of 9.5 for mortality was 0.64 (95% CI 0.513–0.775, p=0.032) with a sensitivity of 68.2% and specificity of 52.5%, AUC 0.752 (95% CI 0.653–0.851, p<0.001) for the need for endoscopic intervention with a sensitivity of 90% and specificity of 50.8%, AUC 0.729 (95% CI 0.646–0.812, p<0.001) for admission to intensive care with a sensitivity of 70.1% and specificity of 58.9% and AUC 0.853 (95% CI 0.782–0.924, p<0.001) for the need for blood transfusion with a cut-off of 8.5 with a sensitivity of 84.9% and specificity of 75.5% for the selected.

Conclusion. The GBS did not predict mortality, but effectively predicted the need for blood transfusion, endoscopic intervention, and intensive care unit admission. The Charlson comorbidity index was predictive for mortality in this study group.

Keywords. Glasgow-Blatchford score, prognosis, upper gastrointestinal bleeding

Corresponding author: Tolga Düzenli, e-mail: tolgaduzenli@yahoo.com

Received: 2.12.2024 / Revised: 3.03.2025 / Accepted: 9.03.2025 / Published: 30.09.2025

İnciler F, Düzenli T, Köseoğlu H, Sezikli M. Evaluation of the Glasgow-Blatchford score in predicting clinical outcomes in upper gastrointestinal bleeding. *Eur J Clin Exp Med.* 2025;23(3):548–554. doi: 10.15584/ejcem.2025.3.2.

Introduction

Upper gastrointestinal system (GIS) bleeding refers to bleeding anywhere in the gastrointestinal system proximal to the Treitz ligament. It is one of the leading causes of hospital admissions and is associated with significant morbidity and mortality. The key priorities in managing GIS bleeding include rapid patient evaluation, stabilization, identifying the site of bleeding, and preventing recurrent bleeding, which notably increases mortality.[1]

Various risk scoring systems have been developed to assess prognostic factors such as mortality, the need for early intervention, the risk of rebleeding, and length of hospital stay.[2] Recently, there has been considerable interest in pre-endoscopy risk scores for upper GIS bleeding that can be calculated after hospital admission. One of the most commonly used scores is the Glasgow Blatchford score (GBS).[3] These scoring systems use clinical, hemodynamic, and laboratory variables and can also identify low-risk patients who could be managed as outpatients.[4] Additionally, it has been suggested that these scores can identify higher-risk patients who may require urgent endoscopy or intensive care.[3,4]

The GBS indicates the need for intervention to control bleeding. It incorporates variables such as hemoglobin (g/dL), systolic blood pressure (mmHg), presence of syncope, melena, and history of heart or liver failure, adjusted by age.[4] However, additional prognostic markers have been explored to further refine risk stratification in patients with bleeding from the upper GIS. One such marker is the Charlson Comorbidity Index (CCI), which is a widely used tool to quantify comorbid conditions and predict long-term mortality.[5] The CCI assigns weighted scores to various chronic diseases, providing an overall comorbidity burden score. In the context of upper GIS bleeding, higher CCI scores may have been associated with increased mortality and worse clinical outcomes. Despite its established prognostic value in other medical conditions, its role in upper GIS bleeding risk assessment has not been fully elucidated.

Aim

The aim of this study was to investigate the relationship between the Glasgow Blatchford Score and prognostic markers, including the Charlson Comorbidity Index, in patients with upper GIS bleeding. By assessing the prognostic value of these markers, we aim to enhance the risk stratification process and improve clinical decision-making in this patient population.

Material and methods

Study group

Data related to the study were collected from hospital records of patients admitted to Hitit Training and Research Hospital between December 2022 and May 2023 with upper GIS bleeding.

Inclusion criteria for the study were patients 18 years and older who were admitted to our hospital due to upper GIS bleeding. Exclusion criteria included patients with insufficient endoscopy or data, and pregnant patients. The diagnoses were made after an endoscopy, and all subgroups of upper gastrointestinal bleeding (UGIB), including esophageal variceal bleeding, were included.

Demographic data such as age, sex, presenting complaints, chronic illnesses, medications, surgical history, smoking and alcohol history, and previous episodes of gastrointestinal bleeding were retrospectively evaluated from discharge summaries. Data on intensive care and ward admission status, intubation status, initial vital signs at emergency department admission, rectal examination findings of bleeding, syncope status, need for blood transfusion, time of endoscopic intervention, presence of active bleeding during endoscopy, method of intervention if performed, need for surgery, occurrence of rebleeding, discharge or exitus outcomes, reasons for exitus if occurred, and length of hospital stay were recorded. Charlson CCI and GBS were calculated. The CCI evaluates 22 comorbid conditions to predict the risk of mortality at one year. Each condition is scored from 1 to 6 based on its associated risk level. GBS is calculated using parameters that include blood urea level (mmol/L), hemoglobin level (g/dL), systolic blood pressure (mmHg) and other markers (pulse rate above 100, melena, syncope, presence of liver disease, and heart failure).

The patients were categorized according to hospitalization outcomes ending in mortality, and prognostic indicators of mortality were determined. The relationship between GBS and prognosis/mortality was statistically evaluated.

Statistical methods

All statistical analyzes were performed using IBM SPSS Statistics for Windows software (version 26; IBM Corp., Armonk, NY, USA). Descriptive statistics were reported as number and percentage for categorical variables, mean for numerical variables. The relationships between variables were explored using the Spearman correlation test. Comparison of numerical measurements between independent groups according to research groups was assessed using the Mann-Whitney U test. Comparison of rates between research groups for categorical variables was evaluated using the Chi-square test. ROC analysis was used to determine the sensitivity and specificity of GBS to predict endpoints. The Youden index was used to determine cutoff points. The predictive factors for the endpoints were investigated using logistic regression analysis. Statistical significance was established at $p<0.05$.

Ethical aspect of the study

The approval for the study was obtained from the Ethics Committee for Clinical Research of the Faculty of Medicine on September 13, 2023, under decision number 2023-120. The study was carried out according to the Helsinki Declaration and good clinical practices.

Table 1. Clinical characteristics of the study group*

Clinical charesteristics	n (%)
Age, mean	69.7±18
Sex, female	58 (41.4)
DOAC use	19 (13.6)
NSAID use	43 (30.7)
Kvit antagonist use	29 (20.7)
LMWH use	5 (3.6)
CCI, mean	5.5±3.5
Hospital admission	
ICU	67 (47.9)
Clinic	73 (52.1)
Melena	89 (63.6)
Syncope	12 (8.6)
Need for transfusion	86 (61.4)
Endoscopic intervention	20 (14.3)
Rebleeding	5 (3.6)
Exitus	21 (15.7)
Length of stay, days	5.1±6.3
GBS	9.5± 4.9

* DOAC – direct oral anticoagulant, ICU – intensive care unit, LMWH – low-molecular-weight heparin, NSAID – non-steroidal anti-inflammatory drugs

Results

Among 388 patients, 248 were excluded due to missing data, leaving a total of 140 patients included in the study. The mean age of the patients was 69.7±18 years. Of the patients, 41.4% (n=58) were women and 58.6% (n=82) were male. Demographic and clinical data of the patients are presented in Table 1.

Table 2. Etiologies of patients with upper gastrointestinal bleeding

Etiology	n=140	%
Peptic ulcer		
Bulbus	24	17.1%
Gastric	17	12.1%
Erosive gastritis	2	1.4%
Esophageal ulcer	2	1.4%
Mallory Weiss syndrome	7	5%
Esophagitis	21	15%
Premalign lesions	5	3.6%
Gastric cancer	11	7.9%
Esophageal varices	13	9.3%
Other	14	10%

Among the patients included in the study based on the etiology of GIS bleeding, 29.2% (n=41) had peptic ulcer disease. Bulbar ulcer was detected in 17.1% (n=24) of patients diagnosed with peptic ulcer. The distribution of patients according to the etiology of GIS bleeding is shown in Table 2.

Comparisons of patient groups based on mortality, need for blood transfusion, need for endoscopic intervention, and admission to wards or intensive care units are presented in Table 3.

The results of the correlation analyzes between continuous variables age, CCI, length of hospital stay, and GBS examined in the study group are shown in Table 4. There is a moderate positive correlation between age, CCI, length of hospital stay, and GBS.

Table 3. Comparisons of patient groups according to clinical outcomes*

	Exitus			Need for blood tranfusion			Need for intervention			Need for ICU		
	Yes (n=22)	No (n=118)	p	Yes (n=86)	No (n=54)	p	Yes (n=20)	No (n=120)	p	Clinic (n=73)	ICU (n=67)	p
Age (mean)	78.4	68	0.013	73	64.4	0.005	70.6	69.5	0.804	64.1	75.7	<0.001
Sex (male)	11	47	0.374	47	38	0.238	9	49	0.726	32	26	0.546
DOAC use	4	15	0.172	13	6	0.187	3	16	0.865	10	9	0.565
NSAID use	8	38	0.532	30	13	0.177	6	37	0.94	17	26	0.047
Kvit antagonist use	0	11	0.143	8	3	0.429	2	9	0.658	3	8	0.085
Antipletelet use	4	28	0.78	20	9	0.344	4	28	0.932	11	18	0.085
LMWH use	3	2	0.006	5	0	0.071	1	4	0.71	1	4	0.143
CCI (mean)	7.8	5.0	0.001	6.2	4.3	0.001	5.5	5.4	0.906	4.3	6.8	<0.001
Admission to clinic	2	71	<0.001	38	38	0.001	6	67	0.032			
Need for intervention	3	17	0.924	19	1	0.001				6	14	0.032
Need for transfusion	18	68	0.032				19	67	0.001	35	51	0.001
Exitus				18	4	0.032	3	19	0.928	2	20	<0.001
Rebleeding	1	4	0.789	5	0	0.071	2	3	0.094	2	3	0.58
Length of stay (days)	9.6	4.3	<0.001	6.3	3.2	0.005	5.7	5	0.626	3.6	6.7	0.003
GBS (mean)	11.9	9.1	0.015	11.9	5.7	<0.001	13	8.9	0.001	7.6	11.6	<0.001

* DOAC – direct oral anticoagulant, ICU – intensive care unit, LMWH – low-molecular-weight heparin, NSAID – non-steroidal anti-inflammatory drugs

Table 4. Correlations between Glasgow Blatchford score and continuous variables

	GBS (n=140)	
	r	p
Age	0.47	<0.001
CCI	0.518	<0.001
Length of stay	0.272	0.001

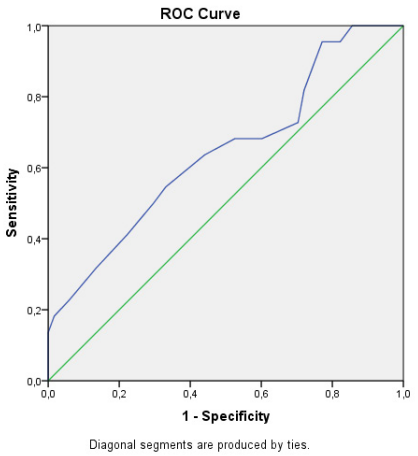
Logistic regression analyzes performed to predict mortality, need for blood transfusion, the need for endoscopic intervention, and admission to the wards or intensive care units are provided in Table 5. The parameters showing the differences between groups in the comparison table were included in the regression analysis.

Table 5. Logistic regression analysis to predict mortality and the need for blood transfusion, intervention, and intensive care unit

	OR	%95 CI	p
Mortality			
GBS	1.036	0.913-1.176	0.582
Age	1.02	0.976-1.066	0.389
LMWH use	0.145	0.020-1.027	0.053
CCI	1.203	1.008-1.437	0.046
Need for blood transfusion			
GBS	1.493	1.297-1.719	<0.001
Age	0.985	0.944-1.021	0.394
CCI	0.995	0.830-1.193	0.958
Need for intervention			
GBS	1.248	1.089-1.430	0.001
Need for ICU			
GBS	1.153	1.049-1.266	0.003
Age	0.956	0.956-1.016	0.354
NSAID use	1.636	0.733-3.653	0.239
CCI	0.909	0.782-1.056	0.212

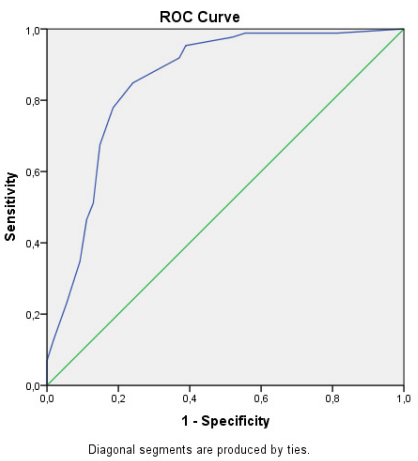
* CI – confidence interval, DOAC – direct oral anticoagulants, ICU – intensive care unit, LMWH – low molecular weight heparin, NSAID – non-steroidal anti-inflammatory drugs, OR – odds ratio

ROC curves for GBS predicting mortality, need for blood transfusion, need for endoscopic intervention, and admission to intensive care are presented in Figures 1–4, respectively. The area under the curve (AUC) for mortality was 0.64 (95% CI 0.513–0.775, p=0.032) with a sensitivity of 68.2% and specificity of 52.5% for the selected GBS threshold of 9.5. For the need for blood transfusion, the AUC was 0.853 (95% CI 0.782-0.924, p<0.001) with a sensitivity of 84.9% and a specificity of 75.5% for the selected GBS threshold of 8.5. For the need for endoscopic intervention, the AUC was 0.752 (95% CI 0.653-0.851, p<0.001) with a sensitivity of 90% and a specificity of 50.8% for the selected GBS threshold of 9.5. For admission to intensive care, the AUC was 0.729 (95% CI 0.646-0.812, p<0.001) with a sensitivity of 70.1% and specificity of 58.9% for the selected GBS threshold of 9.5.



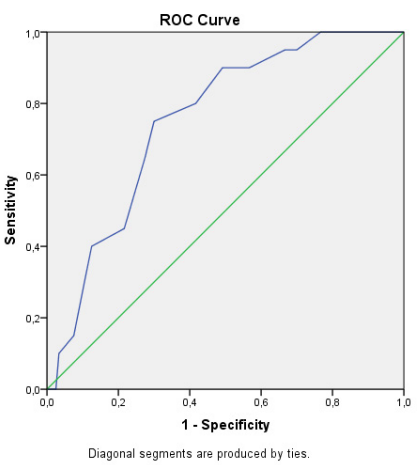
	AUC (%95)	Cut-off	p	Sensitivity (%)	Specificity (%)
GBS	0.644 (0.513–0.775)	9.5	0.032	68.2	52.5

Fig. 1. ROC curves for GBS predicting mortality



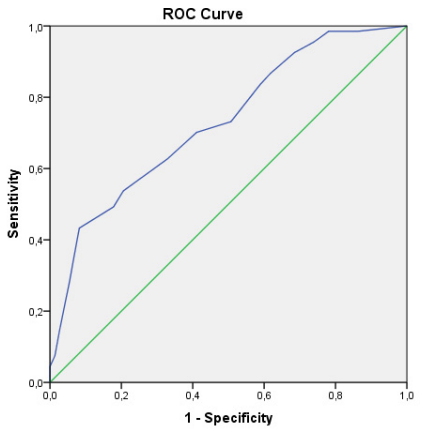
	AUC (%95)	Cut-off	p	Sensitivity (%)	Specificity (%)
GBS	0.853 (0.782–0.924)	8.5	<0.001	84.9	75.9

Fig. 2. ROC curves for the need for blood transfusion



	AUC (%95)	Cut-off	p	Sensitivity (%)	Specificity (%)
GBS	0.752 (0.653–0.851)	9.5	<0.001	90	50.8

Fig. 3. ROC curves for GBS need for endoscopic intervention



	AUC (%95)	Cut-off	p	Sensitivity (%)	Specificity (%)
GBS	0.729 (0.646–0.812)	9.5	<0.001	70.1	58.9

Fig. 4. ROC curves for GBS admission to intensive care

Discussion

Upper gastrointestinal bleeding (UGIB) represents a medical emergency with high hospitalization rates and a mortality risk of up to 10%.[6] Successful treatment of patients requires careful assessment of their risks. In this study, we investigated the performance of GBS in predicting mortality and clinical outcomes in patients with UGIB.

Firstly, in terms of patients, blood transfusion was performed in 86% of our patients, indicating a high rate of blood transfusion compared to the literature.[7-9] This high rate can be attributed to our hospital being a tertiary referral center, where complex cases are referred and patients presenting with severe comorbidities and more critical clinical conditions are admitted. In the literature, transfusions are reported in 33-53% of hospitalized patients due to UGIB internationally and as high as 75% in studies conducted in Turkey.[7-10] The latest recommendations from the European Society of Gastrointestinal Endoscopy (ESGE) and the International Consensus Group suggest targeting hemoglobin levels between 7 to 9 g/dL for transfusion, with higher targets considered for patients with significant comorbidities.[7] However, our study, like others, did not investigate the relationship between hemoglobin levels and the number of units transfused. Studies by Mokhtare et al. and Robertson et al. comparing GBS with other scoring systems found similar results.[8-9]

The second result was the rates of recurrent bleeding, whereas our study found a recurrence rate of 3.6%. Okutur et al. reported recurrent bleeding in 10% of cases, associated with higher average age, length of stay, and mortality rates.[10] Yavorsky et al. reported a recurrent bleeding rate of 7.1% in their retrospective study of 3294 patients.[11] Robertson et al.[9] also reported a recurrent bleeding rate of 9.7% in their study.

According to the Blatchford criteria, the mean GBS in our study was 9.5±4.9, which aligns with previous findings.[12,13] Advanced age and the presence of comorbid diseases increase mortality rates in GIB. Despite advances in diagnosis and treatment, a significant reduction in GIB mortality rates over the years has not been achieved.[12] Mortality rates vary depending on the cause, location, etiology of bleeding, and the presence of additional diseases. Mortality rates for GIB range from 8% to 20.3% in studies focusing on GIB and mortality.[12,13] In our study, the mortality rate was 15.7%, consistent with the literature.

As another outcome, the average length of hospital stay in our study was 5.1±6.3 days, which is similar to findings in other studies.[12-14] Uysal et al. reported endoscopic treatment in 38.1% of patients, 17.9% experiencing rebleeding.[14] Kim et al. reported re-bleeding in 12.7% and an endoscopic intervention need in 58.8% of their study population.[13] In our study, the rates of re-bleeding and endoscopic intervention were 20% each.

Endoscopy is crucial in identifying UGIB lesions due to its high sensitivity and specificity. Therapeutic endoscopy can achieve acute hemostasis and prevent rebleeding in most patients once a bleeding lesion is identified. In our study, 71.4% of the patients underwent endoscopy within the first 24 hours, consistent with the findings of the literature.[12-14]

With increasing age, the frequency of chronic diseases that predispose to bleeding and the use of medications that promote bleeding also increases. In our study, patients using low molecular weight heparin (LMWH) and direct oral anticoagulant (DOAC) had higher average GBS scores, which we attributed to accompanying comorbidities and age. We found that a higher GBS score predicts the need for transfusion and endoscopic intervention, but not mortality. Stanley et al. and Gökçek et al. reported that scoring systems predict mortality and the need for transfusions, while they do not have superiority over each other.[15,16]

In deceased patients, our study found higher ages, LMWH use, CCI, need for blood transfusion, length of stay, and GBS scores. Other studies have identified comorbid diseases as significant predictors of mortality in patients with nonvariceal upper gastrointestinal bleeding.[17,18] Kaplan et al. emphasized that advanced age and additional medical problems, even if asymptomatic, lead to worse outcomes and higher mortality rates.[18] A study in 3508 patients presenting to the emergency with UGIB reported a mortality rate, with more than half having one or more accompanying diseases at admission, and 83% of deaths being associated with one or more comorbid diseases.[19] Paksoy et al. found that 25.6% of patients had comorbid diseases, with 1.8% of deaths directly attributable to these conditions.[19]

Early and effective treatment aims to prevent patient mortality, accelerate recovery, and prevent compli-

cations. Identifying which patients require intervention (such as transfusion, endoscopic bleeding control) is crucial for prognosis. Patients at low risk for recurrent bleeding and death due to UGIB may still require transfusions. These patients should be hospitalized and not considered low-risk. In our study, we found that patients who underwent endoscopic intervention had a high need for blood transfusion and high GBS scores. In another study comparing risk scores, GBS was found to be the most successful score in predicting major transfusion needs and the need for endoscopic treatment.[18]

Various independent predictors have been identified in different studies that predict a poor prognosis and mortality in patients with GIB, including advanced age, male gender, presence of comorbidities, coagulopathy, replacement of blood products, redebleeding, high-risk lesions on endoscopy, and length of stay.[1,19] In our study, we focused on mortality, the need for blood transfusion, endoscopic intervention, and admission to the ICU as prognosis markers. We found a positive correlation between age, CCI, length of stay, and GBS.

Regression analyzes that evaluated parameters significantly associated with mortality among groups in our study found that each unit increase in CCI increased mortality by 1.2 times. Yurtsever et al. noted that high CCI affects mortality in logistic regression analysis.[20]

Most studies in the literature cover GBS and other scoring systems. Siebenhüer et al. found that GBS is the best system for predicting erythrocyte transfusion needs.[21] In our study, each increase in the GBS score was associated with a 1.4 times increase in the transfusion requirement.

In a study by Choi et al., it was observed that patients with a GBS of 10 or higher had a higher rate of admission to the emergency department ICU.[22] In a study by Taşldere et al, scores were compared, and a GBS of 11 or higher was found to predict admission to the ICU.[23] In our study, logistic regression analysis to predict admission to the ICU found GBS to be statistically significant.

This study had several limitations. First, this study was unicenter and retrospective. Second, the sample size was relatively small to obtain robust results. Third, our hospital is a tertiary referral center where complex cases are also referred, which may have introduced some bias in terms of patient selection.

Conclusion

This study has reaffirmed that GBS is a reliable predictive marker of the need for blood transfusion, endoscopic intervention, and intensive care management in upper gastrointestinal bleeding. Furthermore, CCI was identified as a significant predictor of mortality in this population of patients.

Declarations

Funding

This research did not receive external funding.

Author contributions

Conceptualization, F.İ. and T.D.; Methodology, H.K. and T.D.; Software, F.İ. and M.S.; Validation, T.D, H.K. and M.S.; Formal Analysis, T.D., H.K. and M.S.; Investigation, F.İ.; Resources, F.İ.; Data Curation, F.İ.; Writing – Original Draft Preparation, F.İ.and T.D.; Writing – Review & Editing, T.D., H.K. and M.S.; Visualization, T.D.; Supervision, T.D. and M.S.; Project Administration, T.D. and M.S.

Conflicts of interest

All authors declare that they have no conflicts of interest.

Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethics approval

The ethics committee approval for the study was obtained from Hitit University Faculty of Medicine Clinical Research Ethics Committee (Date: 13.09.2023, No: 120).

References

1. Kim JS, Kim BW, Kim DH, et al. Guidelines for Non-variceal Upper Gastrointestinal Bleeding. *J Gastroenterol*. 2020;75(6):322-332. doi: 10.4166/kjg.2020.75.6.322
2. Stanley AJ, Laine L, Dalton HR, et al. Comparison of risk scoring systems for patients presenting with upper gastrointestinal bleeding: international multicentre prospective study. *BMJ*. 2017;356:i6432. doi: 10.1136/bmj.i6432.
3. Rivieri S, Carron PN, Schoepfer A, Ageron FX. External validation and comparison of the Glasgow-Blatchford score, modified Glasgow-Blatchford score, Rockall score and AIMS65 score in patients with upper gastrointestinal bleeding: a cross-sectional observational study in Western Switzerland. *Eur J Emerg Med*. 2023;30(1):32-39. doi: 10.1097/MEJ.0000000000000983.
4. Wilkins T, Wheeler B, Carpenter M. Upper Gastrointestinal Bleeding in Adults: Evaluation and Management. *Am Fam Physician*. 2020;101(5):294-300.
5. Charlson ME, Carrozzino D, Guidi J, Patierno C. Charlson Comorbidity Index: A Critical Review of Clinimetric Properties. *Psychother Psychosom*. 2022;91(1):8-35. doi: 10.1159/000521288
6. Rockall TA, Logan RF, Devlin HB, Northfield TC. Incidence of and mortality from acute upper gastrointestinal haemorrhage in the United Kingdom Steering Committee and members of the National Audit of Acute Upper Gastrointestinal Haemorrhage. BMJ. 1995;311:222-226. doi: 10.1136/bmj.311.6999.222

7. Gralnek IM, Stanley AJ, Morris AJ, et al. Endoscopic diagnosis and management of nonvariceal upper gastrointestinal hemorrhage (NVUGIH): European Society of Gastrointestinal Endoscopy (ESGE) Guideline - Update 2021. *Endoscopy*. 2021;53(3):300-332. doi: 10.1055/a-1369-5274
8. Mokhtare M, Bozorgi V, Agah S, et al. Comparison of Glasgow-Blatchford score and full Rockall score systems to predict clinical outcomes in patients with upper gastrointestinal bleeding. *Clin Exp Gastroenterol*. 2016;9:337-343. doi: 10.2147/CEG.S114860
9. Robertson M, Majumdar A, Boyapati R, et al. Risk stratification in acute upper GI bleeding: comparison of the AIMS65 score with the Glasgow-Blatchford and Rockall scoring systems. *Gastrointest Endosc*. 2016;83(6):1151-1160. doi: 10.1016/j.gie.2015.10.021
10. Okutur SK, Alkım C, Bes C, et al. Acute upper gastrointestinal bleeding: Analysis of 230 cases. *The Turkish Journal of Academic Gastroenterology*. 2007;6:30-36.
11. Yavorsky RT, Wong RK, Maydonovitch C, et al. Analysis of 3,294 cases of upper gastrointestinal bleeding in military medical facilities. *Am J Gastroenterol*. 1995;90(4):568-573.
12. Hearnshaw SA, Logan RF, Lowe D, Travis SP, Murphy MF, Palmer KR. Acute upper gastrointestinal bleeding in the UK: patient characteristics, diagnoses and outcomes in the 2007 UK audit. *Gut*. 2011;60(10):1327-1335. doi: 10.1136/gut.2010.228437
13. Kim JJ, Sheibani S, Park S, Buxbaum J, Laine L. Causes of bleeding and outcomes in patients hospitalized with upper gastrointestinal bleeding. *J Clin Gastroenterol*. 2014;48(2):113-118. doi: 10.1097/MCG.0b013e318297fb40
14. Uysal Y, Babus SB, Kose A, et al. The prognostic significance of the risk scores at upper gastrointestinal bleeding. *Niger J Clin Pract*. 2019;22(8):1099-1108. doi: 10.4103/njcp.njcp_193_18
15. Stanley AJ, Dalton HR, Blatchford O, et al. Multicentre comparison of the Glasgow Blatchford and Rockall Scores in the prediction of clinical end-points after upper gastrointestinal haemorrhage. *Aliment Pharmacol Ther*. 2011;34:470-475. doi: 10.1111/j.1365-2036.2011.04747.x
16. Gökçek K, Ersel M, Altuncı YA, Karbek Akarca F, Kıyan S. Retrospective Analyses of the Utility of Glasgow-Blatchford and Rockall and Pre-Rockall Scoring Systems in Patients Admitted to the Emergency Department with Upper Gastrointestinal System Bleeding. *Forbes J Med*. 2022;3(3):314-320. doi: 10.4274/forbes.galenos.2022.36450
17. Custovic N, Husic-Selimovic A, Srsen N, Prohic D. Comparison of Glasgow-Blatchford Score and Rockall Score in Patients with Upper Gastrointestinal Bleeding. *Med Arch*. 2020;74(4):270-274. doi: 10.5455/medarh.2020.74.270-274
18. Kaplan RC, Heckbert SR, Psaty BM. Risk factors for hospitalized upper or lower gastrointestinal tract bleeding in treated hypertensives. *Prev Med*. 2002;34(4):455-462. doi: 10.1006/pmed.2002.1008
19. Tielleman T, Bujanda D, Cryer B. Epidemiology and Risk Factors for Upper Gastrointestinal Bleeding. *Gastrointest Endosc Clin N Am*. 2015;25(3):415-428. doi: 10.1016/j.giec.2015.02.010
20. Yurtsever G. Evaluation of endoscopy timing in patients with acute upper gastrointestinal bleeding in emergency department. *J Contemp Med*. 2023;13(5):959-965. doi: 10.16899/jcm.1341380
21. Siebenhüner K, Blaser J, Nowak A, et al. Comorbidities Associated with Worse Outcomes Among Inpatients Admitted for Acute Gastrointestinal Bleeding. *Dig Dis Sci*. 2022;67(8):3938-3947. doi: 10.1007/s10620-021-07197-7
22. Choi J, Lee JS, Lee S, Kim YW, Lee Y, Kim TY. International Normalized Ratio-to-Albumin Ratio as a Novel Marker of Upper Gastrointestinal Bleeding Severity. *Gastroenterol Res Pract*. 2022;2022:1172540. doi: 10.1155/2022/1172540
23. Bahadır T, Elmas BK, Serdar Ö, Ahmet A, Ertan S. Comparison of Glasgow Blatchford and New Risk Scores to Predict Outcomes in Patients with Acute Upper GI Bleeding. *Bezmialem Science*. 2023;11(1):100-107. doi: 10.14235/bas.galenos.2022.80299