

# Investigation of the Relationship between ROCKALL, AIMS-65, and GLASGOW BLATCFORD Scores and Active Bleeding in Patients Presenting to the Emergency Department with Upper Gastrointestinal Bleeding

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Submitted: 28.06.2022

Revised: 07.07.2022

Accepted: 18.07.2022

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**Keywords:** AIMS-65; emergency department; Glasgow blatchford; Rockall; upper gastrointestinal bleeding.



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## ABSTRACT

**Objective:** This study aims to examine the association between the Rockall, AIMS-65, and Glasgow Blatchford (GBS) scores to the presence of active bleeding during the endoscopy in patients who are admitted to the emergency department (ED) and suspected of upper gastrointestinal (GI) bleeding.

**Methods:** The data of 337 patients who visited to the ED due to upper GI bleeding during the period determined for the study were included in the study and analyzed retrospectively. In this context, age, gender, comorbid disease, GIS bleeding scores results (GBS, Rockall and AIMS65, and endoscopy) of the patients were evaluated.

**Results:** Active bleeding has detected in 21.3% of the patients. The GBS and Rockall scores of the patients with active bleeding have found to be high ( $p<0.05$ ), and there was not an association found between the AIM65 score and the presence of active bleeding ( $p>0.05$ ). The cutoff value for GBS has determined as 11.5. While the sensitivity at this value was 68.1%, the specificity was 63%. For the Rockall score, the cutoff value has found to be 3.5. While the sensitivity at this value was 50%, the specificity was 79.6%. The cutoff value for the AIMS65 score has found to be 1.5. While the sensitivity at this value was 36.1%, the specificity was 74%.

**Conclusion:** The finding that most has been indicated the presence of active bleeding is GBS, followed by the Rockall score. AIMS65 score has been found insufficient for indicating active bleeding. New prospective studies are needed to confirm the usability of these scores in determining the presence of active bleeding.

## INTRODUCTION

Gastrointestinal system (GIS) bleeding is one of the common reasons for admission to emergency department (EDs). The most specific known cause of gastrointestinal

(GI) bleeding is the upper GI bleeding, which is named according to its localization. This localization is proximal to the ligament of Treitz.<sup>[1]</sup> In addition, upper GI bleeding is a severe impact for mortality and morbidity. Its incidence varies between 39 and 172/100,000 annual hospital admis-

sions.<sup>[2,3]</sup> It is still a significant health issue with a mortality rate of around 10%, regardless of improvement in intensive care treatment and present procedures in diagnostic and therapeutic.<sup>[3]</sup>

The most known causes of upper GI bleeding are peptic ulcer, erosive gastritis, and esophageal varices.<sup>[4]</sup> These bleedings stop spontaneously and only require a supportive treatment in general.<sup>[4,5]</sup> The most significant point in the approach to upper GI bleeding is to evaluate the hemodynamic status at the time of admission, to take frequent vital follow-ups and to ensure hemodynamic stability. Another important point is to determine the cause of bleeding and to prevent re-bleeding by applying the necessary treatment approaches.<sup>[4]</sup>

Risk scoring systems will help the physician to make an accurate and quick decision, since the patient population in question requires that to determine the diagnosis and treatment.<sup>[6,7]</sup> Therefore, there are various risk scoring systems developed using clinical, laboratory, and endoscopic findings.<sup>[8]</sup> Risk scoring in GI bleeding is generally based on treatment requirements, while some evaluate mortality and the possibility of re-bleeding.<sup>[9]</sup> Some of the scorings used in GIS bleeding are Apache, Rockall, SAPS (Simplified Acute Physiology Score), Forrest, Glasgow-Blatchford Score (GBS), Child Pugh, Model for End-Stage Liver Disease, and AIMS-65.<sup>[9]</sup> In various studies, it has been stated that patients in the low-risk group could be safely discharged early or could be followed up with outpatient treatment.<sup>[8]</sup> Among the scores derived from the results of patients with acute upper GI bleeding, GBS and Rockall are the most widely used and most widely adopted.<sup>[8]</sup>

In this study, the relationship between the Rockall, GBS, and AIMS-65 scores will be examined against to the presence of active bleeding during the endoscopy in patients who were admitted to the ED.

## MATERIALS AND METHODS

This study has been carried out in accordance with the latest version of the "Helsinki Declaration" and the "Good Clinical Practices Directive," following the approval of the Ankara Training and Research Hospital EML board, with the decision numbered 5063 at the committee numbered July 15, 2015-601, retrospectively.

Patients over the age of 18 were included in the study. Age, gender, comorbid disease, GIS bleeding scores (GBS, Rockall, and AIMS65), and endoscopy results of the patients were evaluated. Patients with a diagnosis other than GI bleeding, patients transferred from another hospital, and patients whose GI bleeding scores could not be measured were not included in the study.

### Statistical analysis

Data were analyzed in SPSS Windows version 18. The distribution of the variables has been ensured by the

"Kolmogorov-Smirnov" test. Regarding to determine the data, mean and standard deviation are presentation in the expression of quantitative parametric data, and median and interquartile range (IQR) values are used in the expression of quantitative non-parametric data. The number of patients (n) and frequency (%) values are used in the presentation of qualitative data. Student-t test is used in the analysis of quantitative parametric data, Mann-Whitney U-test is used in the analysis of quantitative non-parametric data, Spearman's correlation is used in the analysis of quantitative data, and the Chi-square test is used in the analysis of qualitative data. p-value of <0.05 has been considered statistically significant except it stated otherwise.

## RESULTS

The median age of the patients has been detected as 63 (IQR: 31.5), of which 211 (62.6%) were male and 126 (37.4%) were female. In 72 (21.4%) of 337, total patients included in the study, bleeding has been determined. The rate of the findings of the patients as following: 102 (30.3%) diabetes mellitus (DM), 76 (22.6%) hypertension (HT), 40 (11.9%) chronic renal failure (CRF), 31 (9.2%) heart failure, 25 (7.4%) atrial fibrillation (AF), 22 (6.5%) coronary artery disease (CAD), 19 (5.6%) peptic ulcer, 19 (5.6%) liver pathology, 10 (3.0%) cerebrovascular disease (CVA), 8 (2.4%) malignancy, and 5 (1.5%) heart valve disease.

It has been found that the presence of active bleeding has not been differ in terms of CVA, HT, DM, heart valve disease, CAD, AF, peptic ulcer, liver pathology, and heart failure compared to those without bleeding ( $p>0.05$ ). The frequency of CRF and malignancy was significantly higher in patients with active bleeding ( $p<0.05$ ) (Table 1).

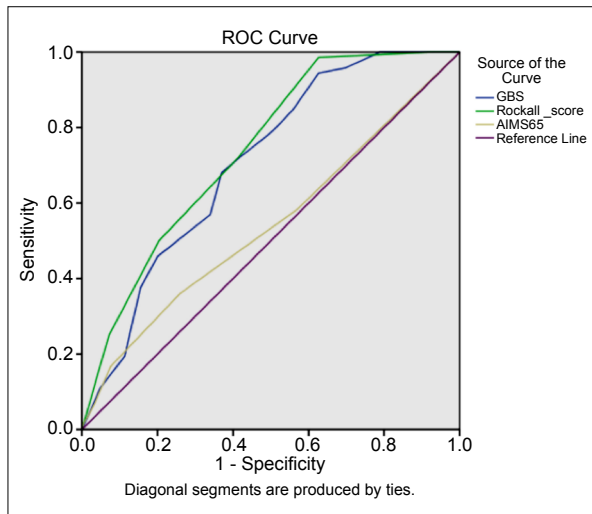
**Table 1.** Presence of bleeding and with association of comorbid disease

	Yes/No n	Bleeding during the endoscopy	
		Yes (n=72) n (%)	No (n=265) n (%)
DM	102/235	23 (31.9)	79 (29.8)
HT	76/261	18 (25.0)	58 (21.9)
CRF	40/297	14 (19.4)	26 (9.8)
Heart failure	31/306	5 (6.9)	26 (9.8)
AF	25/312	4 (5.6)	21 (7.9)
CAD	22/315	4 (5.6)	18 (6.8)
Peptik ulcer	19/318	1 (1.4)	18 (6.8)
Liver Pathology	19/318	7 (9.7)	12 (4.5)
CVA	10/327	1 (1.4)	9 (3.4)
Malignity	8/329	4 (5.6)	4 (1.5)
Heart valve disease	5/332	1 (1.4)	4 (1.5)

\*Chi-square test. DM: Diabetes mellitus; HT: Hypertension; CRF: Chronic renal failure; AF: Atrial fibrillation; CAD: Coronary artery disease; CVA: Cerebrovascular accident.

**Table 2.** Scores of AUC, confidence intervals, sensitivity, and specificity, for the presence of bleeding

	AUC	95% Confidence interval		Cut-off	Sensitivity
		Lower limit	Upper limit		
Glasgow-blatchford score	0.706	0.646	0.766	11.5	68.1%
Rockall score	0.740	0.682	0.797	3.5	50%
AIMS65	0.542	0.462	0.621	1.5	36.1%

**Figure 1.** Scores of the ROC curve for the presence of bleeding.

In our study, it was conducted that the area under the curve (AUC) for GBS is 0.706 (CI: 0.646–0.766). The effective cutoff value is 11.5 and the sensitivity at this value is 68.1% and the specificity is 63%. The AUC for the Rockall score is 0.740 (CI: 0.682–0.797). The effective cutoff value is 3.5 and the sensitivity at this value is 50% and the specificity is 79.6%. The AUC for the AIMS65 score is 0.542 (CI: 0.462–0.621). The effective cutoff value is 1.5 and sensitivity at this value is 36.1% and specificity is 74% (Table 2 and Fig. 1).

## DISCUSSION

GI bleeding has a major place among ED admissions and is the most common GI type of emergency.<sup>[10]</sup> Since acute upper GI bleeding is among the significant causes of mortality and morbidity, these patients require timely examination and emergency interventions. It has been shown that the identification and classification of upper GI bleedings at the time of admission affects the course of the disease.<sup>[11]</sup> Proper evaluation of the patient in upper GI bleeding will determine the time of endoscopy, the risk of re-bleeding and similar factors, thus facilitating patient management and reducing the mortality rate.<sup>[10]</sup>

It has been found that early endoscopy is beneficial in many ways in both high-risk and low-risk patients.<sup>[12,13]</sup> However, since emergency endoscopy maintains with on duty watch system in most of the hospitals, it is of great importance for the emergency physician to identify low-risk patients

and patients who require endoscopic intervention in upper GI bleeding on time.<sup>[14–16]</sup> Therefore, the International consensus statements and the American college of gastroenterology practice guidelines advise using scores.<sup>[10]</sup>

In our study, it was detected that the median GBS value of the patients is 10, the median value of the Rockall score is 2, and the median value of the AIM65 score is 1. While GBS and Rockall scores of patients with active bleeding have been found as high, AIM65 score has not been found as associated with the presence of active bleeding. Braynt et al.,<sup>[17]</sup> in their study, stated that GBS and Rockall scores increased as the patient's clinics worsened. In another study conducted by Önalın,<sup>[18]</sup> it has been reported that the patients had an average Rockall score of 2.5 and a mean GBS of 7. In patients with high scores, the estimated possibilities were higher than the observed re-bleeding rate. In addition, the estimated possibilities for patients with low scores were lower than the observed re-bleeding rate.<sup>[19]</sup> Martínez-Cara et al.,<sup>[20]</sup> in their study, stated that the mean scores of all scores were highest in patients with short-term mortality (AIMS65:2.4, GBS: 13.7, and Rockall score: 7.1) and lowest in those who have not been required transfusion (AIMS65: 0.97, GBS: 6.5, and Rockall score: 3.8). The scores, in our study, are similar to the literature. However, GBS and Rockall score results increase with clinical worsening, similar to the literature, but do not change, unlike the AIMS65 literature. We attribute this to our low average age and low INR value.

When the AUC levels of the patients have been examined, it was understood that the GBS was 0.706 (CI: 0.646–0.766), Rockall score was 0.740 (CI: 0.682–0.797), AIMS65 was 0.542 (CI: 0.462–0.621). GBS and Rockall scores have been evaluated in many studies, and it has been revealed that GBS is superior in practical use.<sup>[21]</sup> Yaka et al.,<sup>[22]</sup> in their study, reported that the GBS was superior in distinguishing high-risk patients: They found 0.771 AIMS65 and 0.896 GBS, for AUC (95). In Blatchford et al. study, the AUC for GBS in mortality was 0.92; he found the AUC for the Rockall score to be 0.71. Martínez-Cara et al.,<sup>[20]</sup> found an AIMS65 AUC of 0.56 for re-bleeding, 0.70 for GBS, and 0.71 for Rockall. In this study, the AUC values in mortality, endoscopy intervention, ES transfusion, and hospitalization were found to be higher for all three scoring systems. Since our study is the first study to determine active bleeding, it does not have specific AUC values. However, the results in identifying high-risk patients and patients at risk of re-bleeding have been found similar and it is not as successful as

showing the mortality rate. In the light of available data, the most convenient scoring for re-bleeding is the Rockall score, then followed by the GBS score. In addition, it was not as successful as showing the mortality rate. Thus, the most appropriate scoring for re-bleeding has been found as the Rockall score, then followed by the GBS score.

In our study, the suitable cutoff value for GBS has been accepted to be 11.5. The sensitivity at this value is 68.1% and the specificity is 63%. The appropriate cutoff value for the Rockall score has been accepted to be 3.5. At this value, the sensitivity is 50% and the specificity is 79.6%. The appropriate cutoff value for the AIMS65 score has been determined as 1.5. The sensitivity at this value is 36.1% and the specificity is 74%. The cutoff value has not been defined for scoring systems. Yaka et al.,<sup>[22]</sup> in their study of GBS, stated that if the score is higher, the sensitivity is lower and the specificity is higher. In addition, when the GBS score has taken as a cutoff value of 2, they stated that the sensitivity was 97% and the specificity was 43%. In the same study, when the AIMS65 score cutoff value is 1, sensitivity is 45%, and specificity is 93%. They stated that GBS was superior in identifying high risks in ROC analysis. Martínez-Cara et al.,<sup>[20]</sup> when evaluating the sensitivity and specificity of mortality, endoscopic intervention, transfusion requirement, and outcome, he found the following: Sensitivity for AIMS65 cutoff 1 value was between 87 and 100% and specificity was between 24 and 37%. The sensitivity for various cutoff values for GBS is between 65 and 91% and the specificity is between 44 and 68%. At various cutoff values for the Rockall score, the sensitivity is between 69 and 90% and the specificity is between 51 and 60%. Since our study showed isolated active bleeding, it may be considered natural that it differs from other sensitivity and specificity values.

## CONCLUSION

In this study conducted that while GBS and Rockall scores were high in patients with active bleeding, the AIMS65 score was not found to be associated with the presence of active bleeding. New prospective studies are required to confirm the usability of these scores in examining the presence of active bleeding.

### Ethics Committee Approval

This study approved by the Ankara Training and Research Hospital Clinical Research Ethics Committee (Date: 15.07.2015, Decision No: 601/5063).

### Informed Consent

Retrospective study.

### Peer-review

Externally peer-reviewed.

### Authorship Contributions

Concept: N.B., N.Y.Ş., Y.K.; Design: N.B., N.Y.Ş., Y.K.; Supervision: .K., M.K.; Fundings: M.K.; Materials: N.B., M.K.; Data: N.B., M.K.; Analysis: Y.K., N.B., Ö.K.; Literature

search: N.B., Ö.K.; Writing: N.B., N.Y.Ş., Ö.K.; Critical revision: N.B., N.Y.Ş., M.K., Ö.K.

### Conflict of Interest

None declared.

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## Acil Servise Üst Gastrointestinal Sistem Kanaması ile Başvuran Hastalarda ROCKALL, AIMS-65 ve GLASGOW BLATCFORD Skorları ile Aktif Kanama Arasındaki İlişkinin İncelenmesi

**Amaç:** Bu çalışmada, acil departmanına (AD) üst GİS kanaması şüphesiyle başvurup endoskopi yapılan hastalarda, Rockall, AIMS-65 ve Glasgow Blatchford (GBS) skorları ve endoskopide aktif kanama varlığı arasındaki ilişki incelenecektir.

**Gereç ve Yöntem:** Çalışma için belirlenen period içerisinde acil servise üst GİS kanama sebebiyle başvuran ve çalışmaya dahil edilen 337 hastanın verileri retrospektif olarak incelendi. Hastaların yaş, cinsiyet, komorbid hastalık, GİS kanama skorları (GBS, Rockall ve AIMS65, endoskopi sonuçları değerlendirildi.

**Bulgular:** Hastaların %21.3'ünde aktif kanama vardı. Aktif kanaması olan hastaların GBS ve Rockall skoru yüksek iken ( $p<0.05$ ), AIM65 skorunun aktif kanama varlığı ile ilişkisi saptanmadı ( $p>0.05$ ). GBS için cut-off değeri 11.5, bu değerdeki sensitivite %68.1 spesifite ise %63; Rockall skoru için, cut-off değeri 3.5, bu değerdeki sensitivite %50 spesifite ise %79.6; AIMS65 skoru için cut-off değeri 1.5, sensitivite %36.1 spesifite %74 olarak saptandı.

**Sonuç:** Aktif kanama varlığını GBS en iyi gösterirken, bunu Rockall skoru takip etmektedir. AIMS65 skoru aktif kanamayı göstermekte yetersizdir. Aktif kanama varlığını gösterme de bu skorların kullanılabilirliğini doğrulamak için yeni prospektif çalışmalara ihtiyaç vardır.

**Anahtar Sözcükler:** Acil departmanı; AIMS-65, Glasgow Blatchford; Rockall; üst gastrointestinal sistem kanaması.