ORIGINAL ARTICLE

https://doi.org/10.1590/1806-9282.20221052

CHAMPS score in predicting mortality of patients with acute nonvariceal upper gastrointestinal bleeding

Hakan Aydin[1*], Göksu Bozdereli Berikol[1], Mehmet Ozgur Erdogan[1], Eyüp Gemici[2], Halil Doğan[1]

SUMMARY

OBJECTIVE: The aim of this study was to evaluate the performance of the Charlson Comorbidity Index≥2, in-hospital onset, albumin <2.5 g/dL, altered mental status, Eastern Cooperative Oncology Group performance status≥2, steroid use score in predicting mortality in patients with nonvariceal upper gastrointestinal bleeding and compare it with the Glasgow-Blatchford score; the albumin, international normalized ratio; alteration in mental status, systolic blood pressure, and age 65 score; the age, blood tests, and comorbidities score; and Complete Rockall score.

METHODS: The data of patients with acute upper gastrointestinal bleeding who visited the emergency department during the study period were obtained from the hospital automation system by using the classification of disease codes and analyzed in this retrospective study. Adult patients with endoscopically confirmed nonvariceal upper gastrointestinal bleeding were included in the study. Patients with bleeding from the tumor, bleeding after endoscopic resection, or missing data were excluded. The prediction accuracy of the Charlson Comorbidity Index≥2, in-hospital onset, albumin < 2.5 g/dL, altered mental status, Eastern Cooperative Oncology Group performance status≥2, steroid use score was calculated using the area under the receiver operating characteristic curve and compared with that of Glasgow-Blatchford score, the albumin, international normalized ratio; alteration in mental status, systolic blood pressure, and age 65 score, the age, blood tests, and comorbidities score, and Complete Rockall score.

RESULTS: A total of 805 patients were included in the study, and the in-hospital mortality rate was 6.6%. The performance of the Charlson Comorbidity Index≥2, in-hospital onset, albumin < 2.5 g/dL, altered mental status, Eastern Cooperative Oncology Group performance status≥2, steroid use score (area under the receiver operating characteristic curve 0.812, 95%CI 0.783–0.839) was better than Glasgow-Blatchford score (area under the receiver operating characteristic curve 0.683, 95%CI 0.650–0.713, p=0.008), and similar to the the age, blood tests, and comorbidities score (area under the receiver operating characteristic curve 0.829, 95%CI 0.801–0.854, p=0.563), the albumin, international normalized ratio; alteration in mental status, systolic blood pressure, and age 65 score (area under the receiver operating characteristic curve 0.794, 95%CI 0.764–0.821, p=0.672), and Complete Rockall score (area under the receiver operating characteristic curve 0.761, 95%CI 0.730–0.790, p=0.106).

CONCLUSION: The performance of the Charlson Comorbidity Index≥2, in-hospital onset, albumin < 2.5 g/dL, altered mental status, Eastern Cooperative Oncology Group performance status≥2, steroid use score in predicting in-hospital mortality for our study population is better than Glasgow-Blatchford score and similar to the the age, blood tests, and comorbidities score, the albumin, international normalized ratio; alteration in mental status, systolic blood pressure, and age 65 score, and Complete Rockall score.

KEYWORDS: Peptic ulcer hemorrhage. Upper gastrointestinal tract. Critical care. Gastrointestinal hemorrhage. Melena.

INTRODUCTION

Acute upper gastrointestinal bleeding (UGIB) is an important emergency with high mortality and morbidity rates[1,2]. Despite the improvements in pharmacological and endoscopic treatments, the mortality rate in UGIB cases is estimated to be 2–10%[3,4].

An important issue for emergency department (ED) physicians is to determine hospitalization and intervention needs when an acute UGIB patient visits the ED. Nonvariceal UGIB guidelines recommend using risk scores to aid clinical decision-making[5,6]. Conventional scoring systems for assessing the prognosis of patients with nonvariceal UGIB mainly include the Rockall score (RS); Glasgow-Blatchford score (GBS); the albumin, INR, alteration in mental status, systolic blood pressure, and age 65 (AIMS65) score; and age, blood tests, and comorbidities (ABC) score[7-10].

In 2021, Matsuhashi et al. developed a new score called Charlson Comorbidity Index≥2, in-hospital onset, albumin <2.5 g/dL, altered mental status, Eastern Cooperative Oncology Group performance status≥2, steroid use (CHAMPS) to predict mortality in nonvariceal UGIB patients[11]. In that study, the CHAMPS score had a significantly higher discriminating ability from GBS, AIMS65, ABC score, and pre-endoscopic RS in predicting low-risk patients in nonvariceal UGIB patients[11]. For this reason, they reported that it could

[1]University of Health Sciences, Bakırköy Dr. Sadi Konuk Training and Research Hospital, Department of Emergency Medicine – Istanbul, Turkey.
[2]University of Health Sciences, Bakırköy Dr. Sadi Konuk Training and Research Hospital, Department of General Surgery – Istanbul, Turkey.
*Corresponding author: drhakanaydin054@gmail.com
Conflicts of interest: the authors declare there is no conflicts of interest. Funding: none.
Received on January 09, 2023. Accepted on January 10, 2023.

be a more effective score in terms of safe discharge. However, a study on the effectiveness of the new CHAMPS score in risk stratification or predicting mortality in different populations has not yet been presented.

The aim of this study was to evaluate the performance of the CHAMPS score in predicting in-hospital mortality in patients who visited the ED with nonvariceal UGIB and compare it with that of GBS, AIMS65, ABC score, and complete RS (CRS).

METHODS

This study was approved by the ethics committee of the research institution (date: 07.03.2022, protocol number: 2022/80). It was made in accordance with the principles of the Declaration of Helsinki. Due to the retrospective nature of the study, the requirement for informed consent was waived; however, informed consent about the risks of UGIB and all treatment modalities was obtained from all patients at their first visit. In addition, all individual information was securely protected and made available to researchers only. In addition, all data were analyzed anonymously. Finally, our report was organized by using the components of the STROBE checklist[12].

Study design

This single-center retrospective observational study was conducted involving patients diagnosed with nonvariceal UGIB in the ED of a tertiary training and research hospital. The hospital where the study was conducted is a center located in a region with a population of approximately 5 million, where endoscopy is performed on a 24-h basis and patients with suspected UGIB from other health centers in the region are referred.

Study participants

This study was carried out with adult patients diagnosed with nonvariceal UGIB who visited the ED of Bakırköy Dr. Sadi Konuk Training and Research Hospital between January 1, 2017, and March 1, 2022. Nonvariceal UGIB was defined as a disease confirmed by endoscopy with one of the following findings: vomiting of fresh blood, melena, or a decrease in hemoglobin levels of ≥2 g/dL from a prior examination. Exclusion criteria were as follows: (1) bleeding from the tumor, (2) bleeding after endoscopic resection, and (3) patients whose data were missing to calculate the relevant risk classification scores (Figure 1).

Data collection and definitions

All patients between the study dates were scanned from the electronic medical record system. The medical records of all patients diagnosed with nonvariceal UGIB were reviewed, and

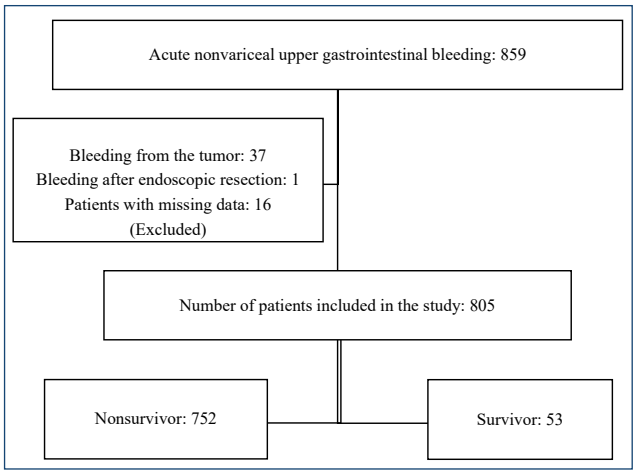

Figure 1. Flowchart of the study.

data were recorded in the predesigned study form. Data collection in the form was as follows: patient demographics (age, gender, and comorbidity), symptoms of visiting ED (hematemesis, melena, syncope, and change in mentality), in-hospital/out-of-hospital onset, cause of bleeding (gastric ulcer, duodenal ulcer, and others), vital symptoms (systolic blood pressure and pulse), blood test (hemoglobin, albumin, creatinine, blood urea nitrogen, international normalized ratio [INR]), drugs used (anticoagulants, antiplatelet agents, nonsteroidal anti-inflammatory drugs, steroids, and antisecretory agents), physical condition (Eastern Cooperative Oncology Group Performance Status [ECOG-PS]), comorbid conditions (Charlson Comorbidity Index [CCI]), and American Society of Anesthesiologists (ASA) score. Rebleeding was defined as vomiting of fresh blood at 7 days, bleeding with melena or hemodynamic instability, and was confirmed by endoscopy as recurrent episodes of bleeding from the same source. The primary outcome of this study was all-cause in-hospital mortality. The points of the predictive scores for each patient were calculated by two investigators blinded to the outcome.

CHAMPS score

The CHAMPS score is a simple equal-weight score, determined based on six variables (CCI ≥2, in-hospital onset, albumin <2.5 g/dL, altered mental status, ECOG-PS ≥2, steroid use); the maximum score is six points[11].

Statistical analyzes

Data were analyzed by using SPSS Statistics for Windows (version 23.0, SPSS Inc., Chicago, IL, USA) and MedCalc program (version 16.8.4; MedCalc Software, Mariakerke, Belgium). Whether the continuous variables were normally distributed

or not was calculated by using the Kolmogorov-Smirnov test and histograms. Descriptive statistics were expressed as mean±standard deviation or median plus interquartile range (IQR), while categorical variables were expressed as numbers and percentages (%). Normally distributed data were compared with the Student's t-test, and non-normally distributed data were compared using the Mann-Whitney U test. The Pearson's chi-square test was used to compare categorical results (Table 1). The performance of the scoring systems for predicting outcomes was assessed by a receiver operating characteristic (ROC) curve analysis. The area under the ROC curve (AUC) was calculated, and the CHAMPS score was compared with those of four existing scores (GBS, CRS, AIMS65 score, and ABC score) using the DeLong test. According to the previous studies, the thresholds for low-risk patients were determined as 0, ≤1, ≤1, ≤3, and 0 in the CHAMPS, GBS, AIMS65, ABC score, and CRS, and those for high-risk patients were determined as ≥3, ≥5, ≥2, ≥8, and ≥5 in the five scores, respectively[7-11]. The performance of the prediction scores was assessed to predict the low- and high-risk patients according to the specificities, sensitivities, negative predictive values (NPVs), positive predictive values (PPVs), and weighted accuracies (Table 2). $p<0.05$ was taken as the statistical significance level.

RESULTS

This study included 805 consecutive adult patients who met the eligibility criteria (Figure 1). The median age of the patients was 66 years (IQR: 51–80), and the female rate was 32.9% (n=265). The rebleeding rate was 9.1% (n=73), and the in-hospital mortality rate was 6.6% (n=53). The nonsurvivor group had a higher median age (76 years [IQR: 70–85] vs. 66 years [IQR: 50–80], $p<0.001$) and a higher rate of female patients (47.2 vs. 31.9%, $p=0.022$) than survivors. The characteristic features of the study population are shown in Table 1.

The CHAMPS, AIMS65, ABC score, GBS, and CRS classified patients as low risk at 26, 65.6, 59.3, 3.6, and 10.2%, respectively. In-hospital mortality rates in groups classified as low risk were calculated as 0, 20.8, 16.9, 0, and 0%, respectively. The CHAMPS, AIMS65, ABC, GBS, and CRS scores classified patients as high risk at 8.9, 34.4, 13.0, 89.1, and 49.2%, respectively. In-hospital mortality rates in groups classified as high risk were calculated as 30.6, 15.2, 22.9, 7.0, and 11.1%, respectively. The sensitivity, specificity, PPV, and NPV of the scoring system in predicting in-hospital mortality are shown in Table 2.

The CHAMPS score showed good performance in the prediction of in-hospital mortality in nonvariceal UGIB patients with an AUC (95%CI) of 0.812 (0.783–0.839). The performance of the CHAMPS score was significantly superior to the GBS (AUC 0.683, 95%CI 0.650–0.713, $p=0.008$) and similar to the AIMS65 score (AUC 0.794, 95%CI 0.764–0.821, $p=672$), ABC score (AUC 0.829, 95%CI 0.801–0.854, $p=0.563$), and CRS (AUC 0.761, 95%CI 0.730–0.790, $p=0.106$).

DISCUSSION

The CHAMPS score has not been tested in UGIB patients except in Matsuhashi et al., and since our study is the first in this regard, it can be considered an external validation study in a sense[11]. In our study, the CHAMPS score had a significantly better discriminating ability than GBS in predicting in-hospital mortality; however, there was no significant difference compared to the AIMS65 score, ABC score, and CRS. This new score, called CHAMPS, also outperformed other scores in identifying low-risk patients in the study population.

In our study, the percentage of patients in the low-risk group according to the CHAMPS score was lower than that in the study by Matsuhashi et al.[11]. However, no mortality was observed in the patient group classified as low risk according to the CHAMPS score. The International Consensus Group suggests using a GBS of ≤1 to identify patients who are at very low risk of mortality and who can be considered for outpatient treatment[6]. In our study, no death was observed in patients classified as low risk according to GBS and CRS scores as well as CHAMPS score. However, a very small proportion of patients were classified as low risk by GBS and CRS. A higher proportion of patients were classified in the low-risk group of AIMS65 and ABC scores; however, the in-hospital mortality rate was higher in these groups when compared to other scores. For our study population, the low-risk classification of AIMS65 and ABC scores is not sufficient for safe discharge[10,13]. Identifying low-risk patients with high accuracy is important for early discharge. This enables the physician to make a safe discharge decision, thereby reducing the burden on the emergency services and the health system[14]. For our study population, the CHAMPS score appears to be beneficial for safe discharge.

On the contrary, early recognition of high-risk patients requiring urgent hospitalization and intervention prevents delays in treatment, thus reducing morbidity and mortality[15]. In the high-risk patient group of the ABC score, which has the highest AUC value in this study, the in-hospital mortality rate was 22.9%, which is consistent with the literature[10,16]. In our

Table 1. Descriptive statistics of study population in terms of in-hospital mortality.

	All patients	Survivor	Nonsurvivor	p-value
Demographic data				
Age (years), median (IQR)	66 (51–80)	66 (50–80)	76 (70–85)	<0.001
Sex: Female, n (%)	265 (32.9)	240 (31.9)	25 (47.2)	0.022
Cause of nonvariceal UGIB, n (%)				
Gastric ulcer	395 (49.1)	367 (48.8)	28 (52.8)	0.031
Duodenal ulcer	306 (38.0)	293 (39.0)	13 (24.5)	
Others	104 (12.9)	92 (12.2)	12 (22.6)	
Vital signs, mean±SD				
Systolic blood pressure (mmHg)	121.6±18.0	122.7±17.1	104.6±22.0	<0.001
Pulse (bpm)	98.2±14.5	97.7±14.3	104.4±15.3	0.001
Blood test, median (IQR)				
Hemoglobin (g/dL)	9.0 (6.9–11.0)	9.0 (7.0–11.0)	8.4 (6.3–10.2)	<0.001
Albumin (g/dL)	3.5 (3.0–3.9)	3.5 (3.1–4.0)	2.8 (2.3–3.4)	<0.001
Creatinine (mg/dL)	0.9 (0.7–1.2)	0.9 (0.7–1.2)	1.2 (0.8–2.1)	<0.001
INR	1.0 (0.9–1.2)	1. 0 (0.9–1.2)	1.4 (1.2–1.8)	<0.001
Symptoms and signs				
Melena	686 (85.2)	647 (86.0)	39 (73.6)	0.014
Vomiting of fresh blood	226 (28.1)	202 (26.9)	24 (45.3)	0.004
Syncope	27 (3.4)	21 (2.8)	6 (11.3)	0.001
Altered mental status, n (%)	30 (3.7)	13 (1.7)	17 (32.1)	<0.001
Medication, n (%)				
Anticoagulants	121 (15.0)	109 (14.5)	12 (22.6)	0.109
Antiplatelet agents	118 (14.7)	107 (14.2)	11 (20.8)	0.194
NSAIDs	225 (28.0)	210 (27.9)	15 (28.3)	0.953
Steroids	29 (3.6)	24 (3.2)	5 (9.4)	0.018
Antisecretory agents	271 (33.7)	214 (32.0)	30 (56.6)	<0.001
Scoring system, median (IQR)				
ASA, median (IQR)	1 (0–3)	0 (0–3)	3 (2–4)	<0.001
ECOG-PS, median (IQR)	0 (0–1)	0 (0–1)	2 (1–2)	<0.001
CCI, median (IQR)	4 (1–5)	3 (1–5)	6 (5–9)	<0.001
CHAMPS score	1 (0–2)	1 (0–2)	2 (2–3)	<0.001
Glasgow-Blatchford score	10 (7–12)	10 (7–12)	12 (9–15)	<0.001
AIMS65 score	1 (0–2)	1 (0–2)	2 (2–3)	<0.001
ABC score	3 (0–5)	2 (0–5)	7 (5–10)	<0.001
Complete Rockall score	4 (3–6)	4 (2–6)	6 (5–8)	<0.001
Rebleeding, n (%)	73 (9.1)	66 (8.8)	7 (13.2)	0.278
Hospital stay (day), median (IQR)	5 (5–6)	5 (5–6)	5 (5–7)	0.116

ABC: age, blood tests, and comorbidities; AIMS65: albumin level <30 g/L (A), international normalized ratio >1.5 (I), altered mental status (M), systolic blood pressure ≤90 mmHg (S), and age >65 years (65); ASA: American Society of Anesthesiologists. CHAMPS: CCI ≥2, in-hospital onset, albumin <2.5 g/dL, altered mental status, ECOG-PS ≥2, steroids; CCI: Charlson Comorbidity Index; ECOG-PS: Eastern Cooperative Oncology Group Performance Status; INR: international normalized ratio; IQR: interquartile range; NSAIDs: nonsteroidal anti-inflammatory drugs, SD: standard deviation.

Table 2. Predictive performance of scoring systems for in-hospital mortality.

	Cutoff value	Patients, n (%)	Mortality, n (%)	Sens. %	Spec. %	PPV, %	NPV, %	Weighted accuracy, %
Low risk								
CHAMPS	0	209 (26.0)	0	100	27.8	8.9	100.0	32.5
AIMS65	≤1	528 (65.6)	11 (2.1)	79.3	68.8	15.2	97.9	69.4
ABC score	≤3	477 (59.3)	9 (1.8)	83.0	62.2	13.4	98.1	63.6
GBS	≤1	29 (3.6)	0	100.0	5.7	7.0	100.0	11.9
CRS	≤1	82 (10.2)	0	100.0	10.9	7.3	100.0	16.8
High risk								
CHAMPS	≥3	72 (8.9)	22 (30.6)	41.5	93.4	30.6	95.8	89.9
AIMS65	≥2	277 (34.4)	42 (15.2)	79.3	68.8	15.7	97.9	69.4
ABC score	≥8	105 (13.0)	24 (22.9)	45.3	89.2	22.9	95.9	86.3
GBS	≥5	717 (89.1)	50 (7.0)	94.3	11.3	6.9	96.6	16.8
CRS	≥5	396 (49.2)	44 (11.1)	83.0	53.2	11.1	97.8	55.2

ABC: age, blood tests, and comorbidities; CRS: Complete Rockall score; GBS: Glasgow-Blatchford score; NPV: negative predictive value; PPV: positive predictive value; Sens: sensitivity; Spec: specificity.

study, GBS had the highest sensitivity in the high-risk group. Sensitivity for detecting high-risk patients is a critical outcome because it is important to avoid misclassifying high risk as low risk when making decisions about early discharge. However, it should be noted that a very high proportion of patients in this study were classified in the high-risk group of GBS. Another remarkable piece of data regarding the CHAMPS score in our study was the patients in the intermediate risk group with a rate of 65.1%. In this intermediate-risk group, which included the highest number of patients, the mortality rate was 0.6%. The article of Matsuhashi et al. does not offer any recommendations for the management of patients classified as intermediate risk based on the CHAMPS score. This uncertainty in the management of patients in the intermediate-risk group may be an important aspect that needs improvement for the CHAMPS score.

In our study, the CHAMPS score had a significantly better discriminating ability than GBS score, consistent with the study by Matsuhashi et al. GBS score showed lower performance in terms of AUC compared to all other scores. In a study by Ak and Hökenek, GBS showed poor performance in predicting mortality in patients with acute UGIB who visited the ED[17]. However, the GBS score is a score used to determine the need for treatment and was evaluated in our study in terms of mortality estimation due to its relatively poor performance. However, new scores are being developed to predict mortality in UGIB patients. Recently, Bai et al. in a study of patients with cirrhosis and acute gastrointestinal bleeding showed that the cirrhosis acute gastrointestinal bleeding score (CAGIB) outperformed the Child-Pugh, model for end-stage liver disease, and neutrophil-lymphocyte ratio[18]. The performance of the CAGIB score, which consists of comorbidity and laboratory data, can be tested or revised for patients with nonvariceal UGIB.

Our study has several limitations. It was a retrospective, single-center study, which may limit the generalizability of the results and lead to selection bias. We tried to minimize errors by collecting all medical records for nonvariceal UGIB patients. In the tertiary hospital where the study was conducted, although hospitalization and patient management are carried out according to the current American College of Gastroenterology Clinical Guideline: Upper Gastrointestinal and Ulcer Bleeding[6], the patient management of clinicians may contain subjective decisions. Different treatment modalities may have affected the in-hospital mortality of the patients and thus the findings.

CONCLUSION

The CHAMPS score, which does not require endoscopy data, is a suitable classification score for use in the ED for risk stratification of nonvariceal UGIB patients. In our study population, it performed relatively well in identifying low-risk patients. It may facilitate the clinician in the management of

low-risk patients in terms of early discharge. The performance of the CHAMPS score in predicting in-hospital mortality for our study population is better than GBS and similar to ABC, AIMS65, and CRS scores. There is a need to confirm the performance of the CHAMPS score in clinical practice with prospective studies in larger populations.

COMPLIANCE WITH ETHICAL STANDARDS

Health Sciences University Bakırköy Dr. Sadi Konuk Training and Research Hospital Ethics Committee approved for the study (Date: 07.03.2022, protocol number: 2022/80). This article has not been previously presented at any event (congress, symposium, etc.).

HUMAN RIGHTS

The principles set out in the Declaration of Helsinki were followed. The need for informed consent was waived due to the retrospective nature of the study.

AUTHORS' CONTRIBUTIONS

HA: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Validation, Writing – review & editing. **GBB:** Conceptualization, Data curation, Supervision, Validation, Writing – review & editing. **MOE:** Methodology, Supervision, Validation, Writing – review & editing. **EG**: Data curation, Formal Analysis, Investigation, Writing – review & editing. **HD:** Investigation, Methodology, Supervision, Writing – review & editing.

REFERENCES

1. Wuerth BA, Rockey DC. Changing epidemiology of upper gastrointestinal hemorrhage in the last decade: a nationwide analysis. Dig Dis Sci. 2018;63(5):1286-93. https://doi.org/10.1007/s10620-017-4882-6
2. Laine L, Yang H, Chang SC, Datto C. Trends for incidence of hospitalization and death due to GI complications in the United States from 2001 to 2009. Am J Gastroenterol. 2012;107(8):1190-5. https://doi.org/10.1038/ajg.2012.168
3. Lee PL, Yang KS, Tsai HW, Hou SK, Kang YN, Chang CC. Tranexamic acid for gastrointestinal bleeding: a systematic review with meta-analysis of randomized clinical trials. Am J Emerg Med. 2021;45:269-79. https://doi.org/10.1016/j.ajem.2020.08.062
4. 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):1327-35. https://doi.org/10.1136/gut.2010.228437
5. Thiebaud PC, Yordanov Y. European guidelines on the management of upper gastrointestinal bleeding: where are emergency physicians? Eur J Emerg Med. 2022;29(1):7-8. https://doi.org/10.1097/MEJ.0000000000000896
6. Laine L, Barkun AN, Saltzman JR, Martel M, Leontiadis GI. ACG clinical guideline: upper gastrointestinal and ulcer bleeding. Am J Gastroenterol. 2021;116(5):899-917. https://doi.org/10.14309/ajg.0000000000001245
7. Rockall TA, Logan RF, Devlin HB, Northfield TC. Risk assessment after acute upper gastrointestinal haemorrhage. Gut. 1996;38(3):316-21. https://doi.org/10.1136/gut.38.3.316
8. Blatchford O, Murray WR, Blatchford M. A risk score to predict need for treatment for upper-gastrointestinal haemorrhage. Lancet. 2000;356(9238):1318-21. https://doi.org/10.1016/S0140-6736(00)02816-6
9. Saltzman JR, Tabak YP, Hyett BH, Sun X, Travis AC, Johannes RS. A simple risk score accurately predicts in-hospital mortality, length of stay, and cost in acute upper GI bleeding. Gastrointest Endosc. 2011;74(6):1215-24. https://doi.org/10.1016/j.gie.2011.06.024
10. Laursen SB, Oakland K, Laine L, Bieber V, Marmo R, Redondo-Cerezo E, et al. ABC score: a new risk score that accurately predicts mortality in acute upper and lower gastrointestinal bleeding: an international multicentre study. Gut. 2021;70(4):707-16. https://doi.org/10.1136/gutjnl-2019-320002
11. Matsuhashi T, Hatta W, Hikichi T, Fukuda S, Mikami T, Tatsuta T, et al. A simple prediction score for in-hospital mortality in patients with nonvariceal upper gastrointestinal bleeding. J Gastroenterol. 2021;56(8):758-68. https://doi.org/10.1007/s00535-021-01797-w
12. Dicu D, Pop F, Ionescu D, Dicu T. Comparison of risk scoring systems in predicting clinical outcome at upper gastrointestinal bleeding patients in an emergency unit. Am J Emerg Med. 2013;31(1):94-9. https://doi.org/10.1016/j.ajem.2012.06.009
13. Kim MS, Choi J, Shin WC. AIMS65 scoring system is comparable to Glasgow-Blatchford score or Rockall score for prediction of clinical outcomes for non-variceal upper gastrointestinal bleeding. BMC Gastroenterol. 2019;19(1):136. https://doi.org/10.1186/s12876-019-1051-8
14. Rout G, Sharma S, Gunjan D, Kedia S, Nayak B, Shalimar. Comparison of various prognostic scores in variceal and non-variceal upper gastrointestinal bleeding: a prospective cohort study. Indian J Gastroenterol. 2019;38(2):158-66. https://doi.org/10.1007/s12664-018-0928-8
15. Tham J, Stanley A. Clinical utility of pre-endoscopy risk scores in upper gastrointestinal bleeding. Expert Rev Gastroenterol Hepatol. 2019;13(12):1161-7. https://doi.org/10.1080/17474124.2019.1698292
16. Saade MC, Kerbage A, Jabak S, Makki M, Barada K, Shaib Y. Validation of the new ABC score for predicting 30-day mortality in gastrointestinal bleeding. BMC Gastroenterol. 2022;22(1):301. https://doi.org/10.1186/s12876-022-02374-y
17. Ak R, Hökenek NM. Comparison of AIMS65 and Glasgow Blatchford scores in predicting mortality in patients with upper gastrointestinal bleeding. Rev Assoc Med Bras (1992). 2021;67(5):766-70. https://doi.org/10.1590/1806-9282.20210580
18. Bai Z, Li B, Lin S, Liu B, Li Y, Zhu Q, et al. Development and validation of CAGIB score for evaluating the prognosis of cirrhosis with acute gastrointestinal bleeding: a retrospective multicenter study. Adv Ther. 2019;36(11):3211-20. https://doi.org/10.1007/s12325-019-01083-5