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A comparative analysis of six prognostic systems for predicting 30-day in-hospital mortality in patients with acute upper gastrointestinal bleeding

***Corresponding Author:** Mamarajabov Sobirjon Ergashevich*

Email: m_sobirjon@yahoo.com

Ismati Amir Olimovich[1]; Mamarajabov Sobirjon Ergashevich[1]; Toru Aoyama[2]*; Junichi Sakamoto[3]; Anosov Victor Davidovich[4]; Nazarova Mamura Zaripovna[1]

[1]Samarkand State Medical University, Samarkand, Republic of Uzbekistan

[2]Department of Surgery, Yokohama City University, Yokohama, Japan.

[3]Tokai Central Hospital, Kakamigahara, Japan.

[4]City Clinical Hospital No. 15 named after O.M. Filatov, Russian Federation, Moscow, Russia.

Abstract

Background: Acute upper gastrointestinal bleeding (UGIB) is a serious problem with a high incidence and significant mortality. The reliability of the recently introduced international prognostic system, ABC, which was designed with the aim of predicting 30-day mortality, has been demonstrated. However, it remains one of the least studied prognostic systems at present.

Objective: Comparison of the performance of ABC with established prognostic systems, including the Rockall Score (RS), Glasgow-Blatchford Score (GBS), AIMS65, Cedars-Sinai Medical Center Predictive Index (CSMCPI), and Progetto Nazionale Emorragia Digestive Score (PNED) in the prediction of 30-day in-hospital mortality. Additionally, further study of the aforementioned systems was performed by comparing results of subgroups categorized by the etiology of UGIB in order to define the potential of prognostic systems in different groups of patients according to the etiology of UGIB.

Methods: This retrospective single-center study was conducted at City Clinical Hospital No. 15, named after O.M. Filatov in Moscow, Russian Federation. Data were collected over a period of 4 years, from 2020 to 2023. An area under the curve (AUROC) analysis was performed to compare the performance of these prognostic systems in predicting 30-day in-hospital mortality.

Results: The study included 1011 patients with UGIB who were diagnosed in the emergency department upon admission or during the inpatient treatment period. Mortality rates in the groups ranged from 30.7% to 31.9%. ABC was the most effective system for predicting 30-day in-hospital mortality (AUROC, 0.867; 95% CI 0.844-0.887; p <0.0001). In different subgroups with variceal, ulcer, and tumor bleeding, as well as Mallory-Weiss syndrome, ABC demonstrated superiority over other prognostic systems. Upon comparing the etiological subgroups, it was observed that ABC performed exceptionally well in subgroups with

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ulcer bleeding (AUROC 0.864; 95% CI 0.832-0.892; p <0.0001) and Mallory-Weiss syndrome (AUROC 0.867; 95% CI 0.771-0.933; p = 0.0001), while it was relatively less effective in the subgroup with variceal bleeding (AUROC 0.809; 95% CI 0.676-0.905; p <0.0001).

Introduction

Upper gastrointestinal bleeding (UGIB) remains one of the primary reasons for hospitalization and mortality in surgical departments [1, 2, 3]. In recent decades, substantial modifications have been made in the diagnosis and management of acute UGIB. Nevertheless, according to analytical reports [3, 4, 5], the comprehensive recommendations and revisions integrated into clinical protocols have not yielded a significant effect on the overall incidence and mortality rates among patients with UGIB. Consequently, one of the fundamental tasks of the present time includes not only diagnosing and treating patients, but also identifying patients who require prompt and intensified medical attention, for stratification into risk groups.

In the face of the enduring expansion of the world population and, consequently, the increased demand for emergency medical care, the relevance of patient triage according to risk groups should not be underestimated. For the purpose of categorizing patients into a low-risk group, for whom hospitalization may not be mandatory, and a high-risk group, who may be susceptible to unfavorable disease outcomes, there have been implementations of analytical and prognostic tools in clinical practice. Such instruments, in accordance with most modern international recommendations [6, 7, 8, 9, 10], are preferable in clinical practice due to their proven effectiveness. These include well-established scoring systems such as the Rockall Score (RS) [11], Glasgow-Blatchford Score (GBS) [12], Cedars-Sinai Medical Center Predictive Index (CSMCPI) [13], AIMS65 (Albumin, INR, Mental Status, Systolic blood pressure, age) [14], Progetto Nazionale Emorragia Digestive score (PNED) [15], and ABC (Age, Blood tests, Comorbidity) [16]. The aforementioned prognostic systems are among the most widely adopted, given the extensive validation of their effectiveness in clinical practice through research.

Prognostic systems for UGIB can be broadly classified into two groups: those that do not rely on the outcomes of an endoscopic examination, termed pre-endoscopic scoring systems, and those that require esophagogastroduodenoscopy (EGD) to calculate the total score, known as post-endoscopic scoring systems. Prognostic scoring systems typically define prognostic objectives declared during or after the development stage. For example, the GBS was developed to assess the need for further inpatient treatment, CSMCPI was released to predict the duration of a patient's hospitalization, AIMS65 was designed to predict the duration of hospitalization and the likelihood of a lethal outcome, PNED was tailored to predict mortality in patients with non-variceal bleeding, RS in its post-endoscopic (full) modification was formulated to determine the mortality risk in any type of UGIB, and ABC is officially designated as a system for predicting 30-day mortality in any type of gastrointestinal bleeding (GI), irrespective of the specific gastrointestinal tract section involved. The official assignment of prognostic objectives to each scoring system has never constrained its utilization. An example of this can be seen in the fact that for decades, researchers have consistently followed the tradition of validating these prognostic systems for the prediction of various outcomes, such as mortality, rebleeding, the need for hospitalization, the need for blood transfusion, and other prognostic objectives, even if a specific prognostic system's initial design did not encompass such purposes [17]. Among the established prognostic systems for GI bleeding, the relatively new ABC has been of particular interest in recent years. ABC is a pre-endoscopic prognostic system that utilizes laboratory data and anamnestic information to stratify patients into 3 risk groups. Owing to its novelty and appearance during the COVID-19 pandemic, it is one of the least studied and—at the same time—one of the most promising prognostic systems. This study aimed to conduct an extensive comparative analysis of 30-day in-hospital mortality predictions of the new ABC with the following five prognostic systems: PNED, CSMCPI, AIMS65, RS, and GBS. An additional objective was to establish the effectiveness of these prognostic systems in subgroups of patients depending on the etiological type of UGIB (i.e., ulcer, variceal, tumor bleeding, and Mallory-Weiss syndrome).

Materials and Methods

Study design

This study represents a single-center retrospective comparative analysis conducted at City Clinical Hospital No. 15, named after O.M. Filatov, affiliated with the Department of Healthcare of the City of Moscow, Russian Federation. The study database included patients with UGIB within a timeframe from 2020 to 2023. The inclusion criteria for patients in the study were as follows: age ≥18 years, symptoms of gastrointestinal bleeding reported by the patient upon admission to the hospital, signs of gastrointestinal bleeding that developed during hospitalization reported by the patient or medical staff, endoscopic evidence of active or recent UGIB in hospitalized patients, or upon admission to the emergency department. The exclusion criteria were as follows: the absence of an endoscopic examination, refusal to provide informed consent for inclusion in the study, and discharge from the hospital at the patient's request.

Aim of the study

The primary objective of this study was to assess the accuracy of predicting 30-day in-hospital mortality in patients with UGIB using six prognostic systems, with comparison of prediction results. The secondary objective was to split each of the six overall groups into subgroups depending on the etiology of UGIB, with further implementation of comparative analysis of the score's prognostic potential in the obtained subgroups within the original overall group and in subgroups within other overall groups.

The prognostic systems of interest in this study were as follows: ABC, PNED, CSMCPI, AIMS65, RS, and GBS. Subgroups were selected based on the following types of UGIB: ulcer, variceal, tumor bleeding, and patients with Mallory-Weiss syndrome.

Data collection

A database encompassing a comprehensive array of clinical and anamnestic data was constructed. This includes age, sex, height, weight, time since the onset of the disease was noted by the patient or medical personnel, comorbidities, harmful habits, information about medications taken, information about the performance of hemotransfusion, information about the state of hemodynamics, level of consciousness, initial signs of UGIB, body temperature, respiratory rate (RR), pain syndrome if present and its localization, daily diuresis, hospitalization outcome, laboratory data (complete blood count, biochemical blood test, procalcitonin levels, D-dimer, ferritin, analysis of blood gases and acid–base balance, and coagulation profile), results of endoscopic examination of the upper gastrointestinal tract, and data from other instrumental diagnostic methods (echocardiography, computed tomography).

The calculation of scoring systems, including the American Society of Anesthesiologists Classification (ASA) score, for each patient was automated by developing algorithms for components of each scoring system within the “Google Sheets” database environment.

The ASA score was calculated based on the patient's information in the database using machine algorithms in five stages. We compared and checked patient data with the factors presented in Table 1. This process involved the gradual exclusion of factors starting from ASA V and ending with ASA I in cases where no significant aggravating components were present.

The computation of prognostic scoring systems, namely ABC, PNED, CSMCPI, AIMS65, RS, and GBS, was automated by translating instructions from their original articles into algorithms integrated within the Google Sheets environment. Notably, for GBS all original components were considered with the exception of "syncope,” omission of which represents a limitation of this study.

Table 1: Factors determining the severity of a patient’s physical status.

Multiple organ dysfunction syndrome, sepsis with hemodynamic instability, hypothermia, intracranial hemorrhage	ASA V
Transient ischemic attack (TIA) during hospitalization, artificial ventilation of lungs, presence of unstable hemodynamics, liver disease in a decompensation stage, acutely developed elevation of blood urea level >24 mmol/L or creatinine level >500 µmol/L, platelet count <50×10^9/L, diagnosed sepsis or a procalcitonin level >2 ng/mL, Glasgow Coma Scale ≤9, cerebrovascular accident with hemiplegia or paraplegia in patient’s anamnestic data, chronic heart failure class III or IV according to NYHA classification, left ventricular ejection fraction <40%, myocardial infarction within the last 8 weeks	ASA IV
Alcoholism, body mass index of ≥40 kg/m², chronic obstructive pulmonary disease without significant functional limitations, uncontrolled arterial hypertension, implanted cardiac pacemaker, myocardial infarction more than 8 weeks previously, decompensated diabetes mellitus, liver disease in a compensation stage, chronic renal disease with a creatinine level >265 µmol/L, cerebrovascular accident with minimal residual effects (without hemiplegia or paraplegia) in patient’s anamnestic data, left ventricular ejection fraction of 40-50%, post-myocardial infarction fibrosis, coronary artery stenting in the patient's medical history	ASA III
Age ≥70 years, presence of chronic lung diseases, smoking, body mass index of ≥30 kg/m², controlled arterial hypertension, compensated diabetes mellitus	ASA II
Healthy patient	ASA I

Statistical analysis

MedCalc 20.1.4.0 was used to perform the statistical analyses. The outcome results were converted from categorical variables to binary variables for ease of calculation. For each prognostic system, an analysis of the area under the receiver operating characteristic curve (AUROC) was performed with a 95% confidence interval, and the optimal threshold value was determined for stratification into two risk groups. Additionally, four subgroups in each overall patient population were identified based on the source of bleeding (ulcer, varices, tumor, and Mallory-Weiss syndrome). Subsequently, an AUROC analysis with further comparison of results between subgroups with the same prognostic system’s overall group and against the results obtained from subgroups within other overall groups was conducted.

Results

Study population

The study initially included 1,011 patients. A total of 972 patients were included in the analysis, and 39 individuals were excluded from the study due to the absence of EDG. However, due to limitations associated with the lack of data within medical documentation, the computation of scores was feasible for all 972 patients when applying AIMS65 and GBS, for 970 patients when utilizing ABC, PNED, and RS, and for 700 patients when calculating CSMCPI. The sex distribution was similar across all six samples, with 59.87% ± 0.71% males and 40.13% ± 0.71% females. The average age of the participants was 63.2 ± 0.25 years.

In all six groups, approximately 12.5% ± 0.49% of the patients had no comorbidities. Among the comorbidities, diabetes mellitus was the most prevalent, while liver cirrhosis was less commonly observed. Approximately one quarter of the patients in the groups were infected with SARS-CoV-2, which may be easily explained by the period of the pandemic during data collection. The average hemoglobin level at the time of detection of UGIB was in the range of moderate anemia, and the levels of creatinine with urea were 1.5 and 2 times higher than the reference values, respectively.

The analysis of medication usage revealed that patients with upper gastrointestinal bleeding were more likely to have a history of using antiplatelet and anticoagulant drugs. The influence of glucocorticosteroids (GCs) and nonsteroidal anti-inflammatory drugs (NSAIDs) on the frequency of cases was relatively low. In 18% of cases, UGIB was first suspected when macroscopic signs of blood were initially identified in the stool, while in 29-31% of cases, blood was discerned in gastric contents (vomitus, material from the nasogastric tube). In 12% of cases, both symptoms were present, whereas in the remaining one-third, the diagnosis of upper gastrointestinal bleeding was established based on indirect signs. Approximately half of the patients required red blood cell transfusions, with slightly more than a quarter of them requiring plasma transfusions. Additionally, approximately 3.6-3.8% of patients received platelet transfusions.

Among the endoscopic findings, gastric and duodenal ulcers displaying signs of bleeding (active: FIa and FIb; recent: FIIa, FIIb, and FIIc) were the most common. The mean scores for the prognostic systems were as follows: 5.62 for ABC, 1.47 for AIMS65, 6.02 for CSMCPI, 8.62 for GBS, 4.08 for PNED, and 4.50 for RS. The average ASA score in the six groups corresponding

Table 2: Main characteristics of study groups

	ABC	AIMS65	CSMCPI	GBS	PNED	RS
Sample (amount of patients)	970	972	700	972	970	970
Age	63,44	63,45	62,95	63,45	63,44	63,43
Male	575	575	424	575	575	574
Female	395	397	276	397	395	396
BMI (kg/m^2)	27.59	27.59	27.33	27.59	27.59	27.59
Mean time since symptom onset (hours).	26.26	26.26	26.26	26.26	26.26	26.26
Significant comorbid conditions:						
Liver cirrhosis	93	94	66	94	93	94
Renal insufficiency	135	135	97	135	135	135
Malignant tumor	164	165	116	165	164	163
Heart failure	172	172	135	172	172	172
Diabetes mellitus	206	206	151	206	206	205
Chronic respiratory diseases	99	99	70	99	99	99
History of cerebrovascular accident	136	136	107	136	136	136
COVID-19	228	228	177	228	228	228
Absence of comorbidity	126	126	84	126	126	126
Medications intake:						
Antiplatelet agents (including aspirin)	117	117	91	117	117	117
Anticoagulants	128	128	103	128	128	126
NSAIDs	38	38	32	38	38	36
Proton pump inhibitors	110	110	89	110	110	109
Glucocorticosteroids	33	33	28	33	33	33
Harmful habits:						
Smoking habit	92	92	64	92	92	92
Alcoholic habit	131	131	97	131	131	131
Manifestation of symptoms:						
Melena	174	174	136	174	174	174
Hematemesis	284	285	214	285	284	285
Hematemesis + Melena	117	117	86	117	117	117
Mean laboratory values:						
Hemoglobin (g/L)	96.38	96.38	97.28	96.38	96.38	96.41
Albumin (g/L)	29.26	29.26	29.66	29.26	29.26	29.27
Urea (mmol/L)	17.52	17.52	17.56	17.52	17.52	17.49
Creatinine (µmol/L)	167.85	167.85	162.77	167.85	167.85	167.87
INR	1.65	1.65	1.67	1.65	1.65	1.65
ASA	3.07	3.07	3.10	3.07	3.07	3.07
Hemotransfusion (number of patients):						
Red blood cell transfusion	471	471	344	471	471	470
Plasma transfusion	252	252	190	252	252	251
Platelet transfusion	37	37	25	37	37	37
Primary source of bleeding according to esophagogastroduodenoscopic data:						
Gastric and duodenal ulcers	554	557	399	556	555	554
Esophageal varices	52	52	37	52	52	52
Malignant tumors	36	36	26	36	36	36
Mallory-Weiss syndrome	78	78	61	79	78	79
Others	250	249	177	249	249	249

Mean score of prognostic system	5.62	1.47	6.02	8.62	4.08	4.50
Rebleeding	140	140	107	140	140	140
Endovascular intervention	80	81	62	81	80	81
Surgical intervention	44	44	34	44	44	44
30-day mortality	309	309	215	309	309	308

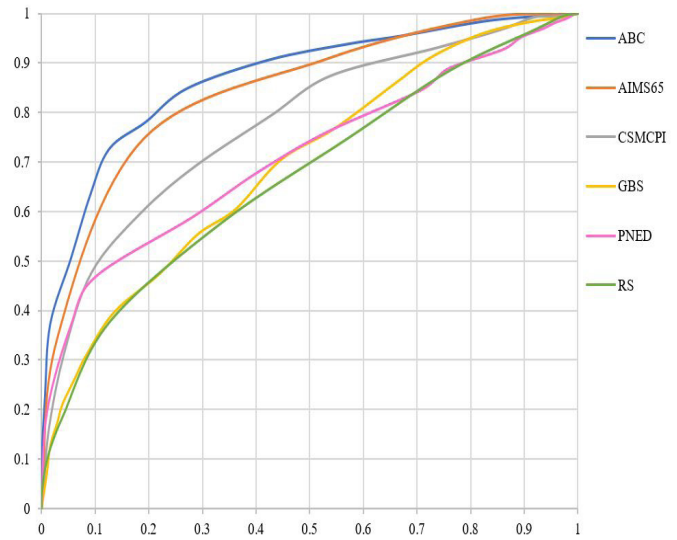

Figure 1: AUROC values of six prognostic systems in predicting 30-day in-hospital mortality.

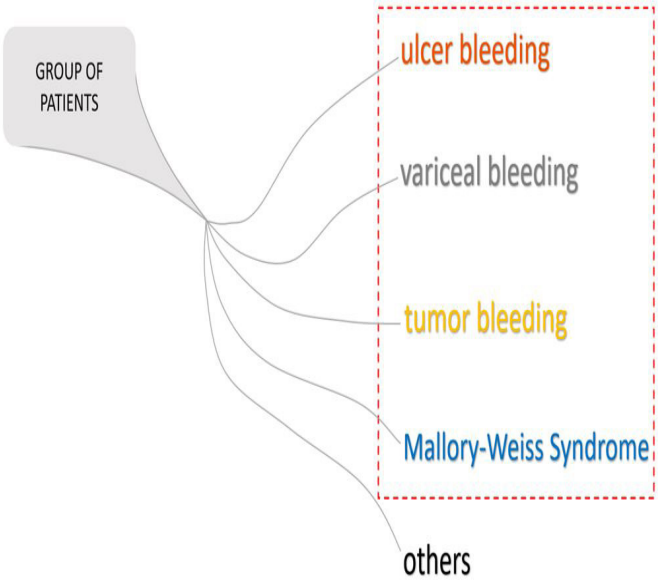

Figure 2: Delineation of subgroups from the overall group.

Table 3: Comparative analysis of six prognostic systems in predicting 30-day in-hospital mortality with determination of threshold values for stratifying patients into two risk groups.

Prognostic system	ABC	AIMS65	CSMCPI	GBS	PNED	RS
AUROC	0.867	0.829	0.774	0.693	0.711	0.666
Cut-off value	>5	>1	>5	>8	>2	>3
p-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Sensitivity (%)	87.38	80.91	81.4	70.87	89.97	87.34
Specificity (%)	72.62	74.81	59.79	55.35	46.75	37.61
PPV (%)	59.87	59.95	47.30	42.52	44.13	39.44
NPV (%)	92.49	89.37	87.88	80.31	90.88	86.46

to each of the prognostic systems was 3.08 ± 0.015. Mortality rates ranged from 30.7% to 31.9%.

Comparison between six main groups

Optimal threshold values were statistically established for each of the six aforementioned prognostic systems before performing a comparative assessment to predict 30-day in-hospital mortality. Notably, ABC was superior to the remaining five, yielding an AUROC value of 0.867 (95% CI 0.844-0.887; p <0.0001), with a designated cut-off value of >5 points.

The GBS and RS showed AUROC values below 0.7, namely 0.693 (95% CI 0.663-0.722; p <0.0001) and 0.693 (95% CI 0.635-0.696; p <0.0001), respectively, which suggests limited discriminative ability. Furthermore, it is noteworthy that the GBS had the lowest sensitivity among the investigated scoring systems, while the RS had the lowest specificity.

AIMS65, CSMCPI, and PNED showed satisfactory results according to the AUROC analysis, scoring 0.829 (95% CI 0.804-0.852; p <0.0001), 0.774 (95% CI 0.741-0.805; p <0.0001), and 0.711 (95% CI 0.681-0.739; p <0.0001), respectively. It is also worth noting that PNED showed the highest sensitivity among the six scoring systems, while AIMS65 showed the highest specificity.

All evaluated systems exhibited a high negative prognostic value (NPV), indicating their effectiveness in identifying patients with a high likelihood of survival. Regarding the assessment of positive prognostic value (PPV), ABC and AIMS65 achieved results close to 60%, whereas other prognostic systems showed unsatisfactory values in this criterion.

The secondary objective of the study was to divide each of the six overall groups into four subgroups based on endoscopic findings and subsequently assess their efficacy in predicting 30-day in-hospital mortality. In each of the six datasets, subgroups were established based on the following etiological types of bleeding: ulcer, variceal, and tumor bleeding, and a subgroup composed of patients with Mallory-Weiss syndrome.

The subgroups with ulcer bleeding were composed of patients with a primary source of UGIB as acute ulcers of the stomach

Table 4: The comparative analysis of the selected etiological subgroups

Prognostic system	Subgroup	AUROC	95% CI	Cut-off value	p-value	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
ABC	V	0.809	0.676-0.905	>7	<0.0001	88.5	61.5	69.7	84.2
ABC	U	0.864	0.832-0.892	>5	<0.0001	86.1	74.1	62.2	91.5
ABC	MW	0.867	0.771-0.933	>8	0.0001	71.4	95.8	62.5	97.1
ABC	T	0.848	0.690-0.946	>4	<0.0001	100.0	50.0	36.4	100.0
AIMS65	V	0.76	0.622-0.868	>1	<0.0001	84.6	53.9	64.7	77.8
AIMS65	U	0.831	0.798-0.862	>1	<0.0001	83.5	72.8	59.7	90.1
AIMS65	MW	0.782	0.674-0.867	>1	0.0324	71.4	90.1	41.7	97.0
AIMS65	T	0.688	0.512-0.831	>1	0.1159	62.5	67.9	35.7	86.4
CSMCPI	V	0.598	0.424-0.755	>8	0.2935	66.7	47.4	54.5	60.0
CSMCPI	U	0.769	0.725-0.810	>5	<0.0001	79.2	61.7	47.0	87.3
CSMCPI	MW	0.662	0.530-0.779	>3	0.2351	60.0	62.5	12.5	94.6
CSMCPI	T	0.621	0.411-0.802	>9	0.4512	50.0	75.0	37.5	83.3
GBS	V	0.747	0.607-0.857	>10	0.0003	80.8	57.7	65.6	75.0
GBS	U	0.674	0.633-0.713	>8	<0.0001	72.4	52.5	42.4	79.8
GBS	MW	0.735	0.624-0.828	>12	0.0306	42.9	95.8	50.0	94.5
GBS	T	0.618	0.442-0.775	>6	0.2322	87.5	39.3	29.2	91.7
PNED	V	0.553	0.408-0.691	>4	0.5125	96.2	19.2	54.3	83.3
PNED	U	0.703	0.663-0.740	>2	<0.0001	87.9	44.7	43.4	88.4
PNED	MW	0.78	0.672-0.866	>2	0.0031	71.4	76.1	22.7	96.4
PNED	T	0.578	0.403-0.740	>7	0.5571	50.0	78.6	40.0	84.6
RS	V	0.674	0.530-0.797	>3	0.017	73.1	57.7	63.3	68.2
RS	U	0.68	0.639-0.719	>4	<0.0001	80.0	46.3	41.7	82.8
RS	MW	0.798	0.692-0.880	>3	0.0005	57.1	84.7	26.7	95.3
RS	T	0.699	0.523-0.840	>6	0.1082	62.5	75.0	41.7	87.5

Abbreviations: V, subgroups including patients with variceal bleeding; U, subgroups consisting of patients with ulcer bleeding originating in either stomach or duodenum; MW, subgroups including patients with Mallory-Weiss syndrome; T, subgroups including patients with tumor bleeding. Within the subgroups of patients with variceal bleeding, ABC outperformed the other prognostic systems, achieving an AUROC value of 0.809 (95% CI 0.676-0.905; p <0.0001). In contrast, the results obtained from the RS, although statistically significant, fell below the threshold of 0.7. Indicators associated with CSMCPI and PNED were not statistically significant. There were 26–36 patients in subgroups involving patients with identified malignant tumors of the upper gastrointestinal tract (Table 2). All patients had confirmed histological evidence of the oncological process. Statistical significance was achieved using only ABC, with an AUROC of 0.848 (95% CI 0.690-0.946; p <0.0001). AIMS65 and RS demonstrated values that were close to statistical significance, whereas the predictive capacity of CSMCPI and PNED approached randomness. Regarding the prediction of 30-day mortality in patients with Mallory-Weiss syndrome, with the exception of CSMCPI, all prognostic systems yielded satisfactory results and ABC emerged as the most effective prognostic system, achieving an AUROC of 0.867 (95% CI 0.771-0.933; p = 0.0001).

and duodenum, coinciding with the Forrest classification of FIa, FIb, FIIa, FIIb, and FIIc. The subgroups related to tumor bleeding were composed of patients with UGIB exclusively from histologically confirmed malignant tumors located in the stomach or duodenum. Subgroups featuring variceal bleeding and Mallory-Weiss syndrome could potentially include patients with minor erosions and ulcers within the upper gastrointestinal tract. Optimal threshold values of prognostic systems were determined for each subgroup to stratify the patients into two risk groups.

In the subgroups with ulcer bleeding, all scoring systems exhibited statistically significant reliability in predicting 30-day in-hospital mortality. Notably, ABC and AIMS65 achieved the highest performance, yielding AUROC values of 0.864 (95% CI 0.832-0.892; p <0.0001) and 0.831 (95% CI 0.798-0.862; p <0.0001), respectively. Conversely, the RS and GBS had less satisfactory AUROC values of less than 0.7.

Discussion

The introduction of the novel ABC prognostic system for predicting mortality in patients with GI bleeding has attracted the attention of numerous researchers worldwide owing to its high effectiveness. Over the years, this system has accumulated a body of validation and comparative studies conducted in various regions worldwide. In 2017 and the few years that followed, this prognostic system was referenced in scientific literature as the International Bleeding Risk Scale (INBS) [18]. In 2020, the results of the first large-scale study on data from nearly 10 thousand patients were published, where ABC was validated and compared with other scoring systems [16]. A few months later, South Korean researchers published a validation study on a cohort of 905 patients, confirming the high effectiveness of ABC in predicting mortality when stratifying patients into two risk groups using a threshold score of >7 [19]. In 2021, New Zealand clinicians reported that ABC showed an AUROC of 0.85 in the prediction of 30-day in-hospital mortality [20]. In the same year, a comprehensive comparative study of ABC for predicting 90-day mortality, rebleeding and their combined assessment, coupled with patient follow-up after hospital discharge was conducted in China, but the results of this study did not demonstrate a significant difference in the prognostic potential of the two scoring systems: ABC could only slightly outperform pre-endoscopic RS [21]. A year later, another study's findings were published, illustrating the superiority of ABC over other established systems in assessing 30-day mortality based on a cohort of 1260 patients [22]. In 2023, an intriguing analysis incorporated data from patients without endoscopic examination, and the authors conducted a comprehensive comparative assessment of the prognostic capabilities of 13 scoring systems specifically designed to preoperatively assess the prognosis of patients with GI bleeding and to evaluate comorbidities in terms of potential mortality. They further concluded that ABC (INBS) demonstrated superiority over other systems. In Spain, the high effectiveness of ABC in predicting 30-day mortality was confirmed in 2023 [23]. However, the existing literature includes studies that contradict the statements mentioned above and refute the relative advantage of ABC over classical systems such as AIMS65, GBS, and RS [24, 25].

Given that it was introduced relatively recently during the pandemic, ABC has not received sufficient scientific research attention and thus requires further investigation. An important driver of the present study was to conduct an independent analysis to deepen the understanding of the prognostic potential of the new system in terms of 30-day in-hospital mortality. The distinctive features of this study in comparison to other scientific studies included the performance of upper gastrointestinal endoscopy in all cases, the incorporation of post-endoscopic prognostic systems into a comparative analysis, and the segregation of subgroups based on the etiological criteria of UGIB within six initial extensive cohorts to further compare the results of the selected scoring system, as well as with other prognostic systems. The primary prognostic endpoint for all six groups and 24 subgroups was 30-day in-hospital mortality. This study did not consider other endpoints. Data collection began during the COVID-19 pandemic, which may explain why all-cause mortality reached almost one-third of the initial sample (Table 2).

In the future, the scientific community should not cease the validation of systems that help predict complications in the treatment of patients with GI bleeding and should regularly assess the patient's condition during inpatient treatment. Furthermore, such tools should c ontinue to be developed, refined, adapted to different conditions, and modified to enhance their performance and utility in clinical practice.

In conclusion, this study confirmed the high effectiveness of an international prognostic system, ABC, in predicting 30-day in-hospital mortality. Within the overall group, ABC outperformed the other systems examined in this study, including post-endoscopic systems. After applying "dispersion", the obtained result (AUROC 0.867; 95% CI 0.844-0.887; p <0.0001) was split into etiological subgroups. ABC was found to provide the best prediction of mortality in patients with peptic ulcers and Mallory-Weiss syndrome. Although the prediction for patients with GI bleeding originating from malignant tumors of the stomach and duodenum using ABC is slightly less precise, the results that were obtained showed a high degree of reliability. Accordingly, in clinical practice, the use of this prognostic system is recommended for patients with a threshold value of >4 points. The least effective results shown by ABC were in groups with variceal bleeding, despite the AUROC being above 0.8.

Notably, ABC demonstrated superiority over other prognostic systems in all subgroups. Among the subgroups with ulcer bleeding, only AIMS65 showed a level that was close to the level of ABC (AUROC 0.831 vs. AUROC 0.864). Regarding subgroups of patients with Mallory-Weiss syndrome, the sensitivity and specificity values of AIMS65 were close to those of ABC, while the area under the curve values showed a significant difference (AUROC 0.782 vs. AUROC 0.867). In a comparative analysis of systems in subgroups with tumor bleeding, ABC was superior to the other systems (AUROC 0.848), which did not even reach an AUROC of 0.7. In subgroups with variceal bleeding, only ABC, AIMS65, and GBS achieved reliable values (AUROC 0.809 vs. AUROC 0.76 vs. AUROC 0.747, respectively). The survey confirmed the suitability of ABC for predicting 30-day in-hospital mortality in patients with UGIB.

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