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ORIGINAL RESEARCH

Validating the CHAMPS Score: A Novel and Reliable Prognostic Score of Non-Variceal Upper Gastrointestinal Bleeding

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Introduction: 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 (CHAMPS) score is a novel and promising prognostic tool. We present an initial external validation of the CHAMPS score for predicting mortality in acute nonvariceal upper gastrointestinal bleeding (NVUGIB) across multiple clinical outcomes.

Methods: A prospective cohort study was conducted on adult patients with NVUGIB admitted to the Department of Gastroenterology between November 2022 and June 2023. The CHAMPS score performance in predicting in-hospital outcomes was evaluated by employing area under the receiver operating characteristic (AUROC) curves, followed by a comparative analysis with five pre-existing scores.

Results: A total of 140 patients were included in the study. The CHAMPS score showed its highest performance in predicting mortality rates (AUROC = 0.89), significantly outperforming the Glasgow-Blatchford Bleeding Score (GBS) as well as the Albumin level <3.0 mg/dL, International normalized ratio >1.5, altered Mental status, Systolic blood pressure ≤90 mmHg, and age >65 years (AIMS65) score (AUROC = 0.72 and 0.71, respectively; all $p < 0.05$). Subgroup analysis for bleeding-related and non-bleeding-related mortality further confirmed the robust predictive capability of the CHAMPS score (AUROC = 0.88 and 0.87, respectively). The CHAMPS score failed to predict rebleeding and intervention reliably, exhibiting AUROC values of 0.43 and 0.55, respectively. The optimal CHAMPS score cutoff value for predicting mortality was 3 points, achieving 100% sensitivity and 71.2% specificity. In the low-risk category defined by both CHAMPS and GBS scores, mortality and rebleeding rates were 0%. However, within the CHAMPS score-based low-risk group, 58.8% required intervention, contrasting with a 0% intervention rate for the GBS score-based low-risk group (GBS score ≤1).

Conclusion: The CHAMPS score consistently demonstrated a robust predictive performance for mortality (AUROC > 0.8), facilitating the identification of high-risk patients requiring aggressive treatment and low-risk patients in need of localized treatment or safe discharge after successful bleeding control.

Keywords: non-variceal upper gastrointestinal bleeding, CHAMPS, mortality prediction, risk scores, GBS

Introduction

Acute non-variceal upper gastrointestinal bleeding (NVUGIB) is a common emergency. Despite significant advancements in endoscopic techniques and proton pump inhibitor (PPI) development, the mortality rate remains between 2% and 14%, and is frequently associated with severe comorbidities.[1–3] Therefore, current guidelines recommend concurrent initial evaluation and resuscitation, advocating for risk stratification to guide treatment strategies.[4–6] Based on current evidence, only the Glasgow-Blatchford score (GBS) is recommended for identifying the very low-risk group for safe discharge.[4–6]

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However, risk stratification has further potential advantages, supporting post-hospital admission decisions, such as intensive care unit necessity, endoscopy timing, rebleeding risk post-intervention, and discharge timing. Consequently, the risk prediction scores were designed for primary outcomes and expanded to address various needs. However, to date, many outcomes still lack a score with a reliable predictive value, such as the timing of endoscopy and length of hospital stay. Regarding transfusion requirements, almost all scores lack predictive value, and guidelines are often based on the subjective Forrest classification during endoscopy.[7–9] Regarding mortality, the recently introduced Age, Blood tests, and Comorbidities (ABC) score outperformed other scores in various studies; however, the area under the receiver operating characteristic (AUROC) values varied, and identifying the low-risk group was a limitation of this score, with a sensitivity of only 60% and a mortality rate of up to 2.3%.[10,11]

Recently, 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 (CHAMPS) score has been developed and validated by incorporating comorbidity and performance status assessments, thereby enhancing its predictive capabilities. The CHAMPS score comprises six variables of equal weight, including the Charlson Comorbidity Index, in-hospital onset, albumin level, altered mental status, Eastern Cooperative Oncology Group performance status, and steroid use.[12] Through various studies, the CHAMPS score has consistently demonstrated good predictive ability for mortality (AUROC > 0.8), better than four other commonly used scores, namely GBS, Rockall score, Albumin level <3.0 mg/dL, International normalized ratio >1.5, altered Mental status, Systolic blood pressure ≤90 mm Hg, and age >65 years (AIMS65), and the ABC score, in predicting mortality ($p < 0.05$ for all). Furthermore, CHAMPS identified 15% of patients in the high-risk group with a significantly higher mortality rate of 25–26.5%. We therefore recommend early and aggressive intervention for this group. Furthermore, CHAMPS identified 40% of the low-risk patients with a mortality rate of 0.2–0.7%, outperforming other systems. The GBS, although showing a zero mortality rate, identified only 0.8–2% of the low-risk patients, limiting its practical utility.[12,13] Despite its significant potential, the paucity of research on the CHAMPS score and its unexplored extension to other outcomes prompted us to validate its predictive capability across multiple in-hospital outcomes, helping clinical decision-making.

Methods

Study Design

A prospective cohort study was conducted on adult patients with acute NVUGIB admitted to the Department of Gastroenterology at Cho Ray Hospital, Ho Chi Minh City, Vietnam, between November 2022 and June 2023. This study was approved by the Ethics Committee of the University of Medicine and Pharmacy, Ho Chi Minh City, Vietnam (Ethical Approval Number: 814/HDDD-DHYD).

Sample Size

The sample size was calculated using the formula: $n_{disease} = n_{non-disease} \frac{Z^2_{\left(1-\frac{\alpha}{2}\right)} V_{AUC}}{d^2}$; $V_{AUC} = (0.0099 \times e^{-a^2/2})(6a^2 + 16)$; $a = 1.414 \times Z_{AUC.}$ Where: α, type 1 error rate; $Z_{(1-\alpha/2)}$, corresponding z-score for the desired confidence level (1-α); d, margin of error; V_{AUC}, Variance of the Area Under the Curve (AUC); $n_{disease}$, number of high-risk patients to be estimated; $n_{non-disease}$, number of low-risk patients to be estimated. We chose: $Z_{(1-\alpha/2)}=1.96$ for $\alpha=0.05$ (95% confidence); $d = 0.1$; AUC of the CHAMPS score, according to Tamotsu Matsuhashi's study, is 0.812.[12] Therefore, the minimum sample size is 90 patients, including at least 45 high-risk patients.

Study Population

The inclusion criteria consisted of evidence of NVUGIB on esophagogastroduodenoscopy, along with one of the following symptoms: (a) hematemesis, (b) melena, and (c) a decrease in hemoglobin level >2 g/dL compared to the previous examination. Patients with bleeding from the tumor or post-procedural complications were excluded.[12,13]

Data on CHAMPS, ABC, AIMS65, full Rockall score (fRS), clinical Rockall score (cRS) and GBS scores were collected. Subsequently, patient outcomes, including mortality (bleeding- and non-bleeding-related), rebleeding, blood transfusion, and endoscopic and surgical interventions, were recorded until discharge. Rebleeding was defined as the recurrence of bleeding

during hospitalization, manifested through a new episode of hematemesis, melena, or unstable hemodynamics, and reconfirmed by identification of the same source on esophagogastroduodenoscopy.[12] Intervention was defined as a composite endpoint of the need for intervention during hospitalization (blood transfusion, endoscopic or surgical intervention). Based on the collected data, we validated the CHAMPS score for each specific outcome and determined the optimal cutoff thresholds. We compared the CHAMPS scores with other scores based on various outcomes. The cutoff points for the other scores were similar to those used in previous studies. Specifically, the cutoffs of low-risk groups for ABC, AIMS65, cRS, fRS, and GBS were set at ≤3, ≤1, ≤2, ≤2, and ≤1, respectively. In parallel, the high-risk thresholds for the aforementioned scores were established at ≥8, ≥2, ≥3, ≥8, and ≥5, respectively.[12–14]

Statistical Analysis

The software used for data analysis included Stata 16.0 and Excel Office 365 (facilitating chart creation).

Continuous variables with a normal distribution were presented as mean ± standard deviation (mean ± SD), while continuous variables without a normal distribution were presented as median and interquartile range (IQR). Categorical variables were presented as counts and percentages.

Interpretation of score values was performed using the AUROC curve, and the DeLong test was used to compare different AUROC curves. The optimal cutoff threshold was calculated using the Youden index and the distance "d" (the shortest distance from the point (0, 1) to the ROC curve).

Statistically significant results were defined as those having a p-value of less than 0.05.

Results

Patient Characteristics and Outcomes

The present study included 140 patients (70% men, with a mean age of 63.5 ± 15.5 years). Table 1 presents a detailed description of the baseline characteristics of the study population. Regarding in-hospital outcomes, 15 deaths (10.7%) were recorded, with non-bleeding-related deaths being the most frequent (73.3%). Of all patients, 103 (73.6%) required intervention and three (2.1%) experienced rebleeding.

Table 1 Patient Baseline Characteristics and Outcomes

Characteristics	Results
Male sex, n (%)	98 (70.0)
Age, years, mean ± SD	63.6 ± 15.5
Findings at endoscopy, n (%)	
Esophageal ulcer	4 (2.9)
Gastric ulcer	49 (35.0)
Duodenal ulcer	51 (36.4)
Multiple ulcer positions	19 (13.6)
Erosions	9 (6.4)
Mallory Weiss syndrome	6 (4.3)
Other sources	2 (1.4)

(*Continued*)

Table 1 (Continued).

Characteristics	Results
Bleeding-related features, n (%)	
Melena	77 (55.0)
Hematemesis	7 (5.0)
Both	52 (37.1)
Other symptoms	4 (2.9)
Laboratory results	
Hemoglobin (g/L), mean ± SD	73.6 ± 24.0
Albumin (g/dL), median (IQR)	2.8 (2.4–3.3)
Components of CHAMPS, n (%)	
CCI ≥ 2	74 (52.9)
In-hospital onset	11 (7.9)
Albumin < 2.5 g/dL	38 (27.1)
Altered mental status	25 (17.9)
ECOG-PS ≥ 2	95 (67.9)
Steroid	34 (24.3)
Outcomes, n (%)	
Intervention	103 (73.6)
Blood infusion	98 (70.0)
Endoscopic intervention	48 (34.3)
Surgical intervention	4 (2.9)
Rebleeding	3 (2.1)
Mortality	15 (10.7)
Bleeding-related mortality	4 (2.7)
Non-bleeding-related mortality	11 (7.9)

Abbreviations: CHAMPS, 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; CCI, Charlson Comorbidity Index; ECOG-PS, Eastern Cooperative Oncology Group Performance Status; IQR, interquartile range; SD, standard deviation.

CHAMPS Performance

The CHAMPS score showed robust predictive accuracy for mortality (AUROC 0.89; 95% Confidence Interval (CI): 0.83–0.94), with AUROC values consistently exceeding 0.8 even within subgroups of bleeding-related and non-bleeding-related mortality. Concerning rebleeding and intervention, the CHAMPS score showed no predictive value in our study, with AUROC values (95% CI) of 0.43 (0.09–0.76) and 0.55 (0.44–0.66), respectively.

The optimal cutoff threshold for mortality was determined to be 3 points, yielding the highest Youden index and a minimal distance "d", achieving a sensitivity of 100% and a specificity of 71.2%. This threshold was also identified as

optimal for bleeding- and non-bleeding-related mortality. Owing to the suboptimal predictive performance of the intervention and rebleeding endpoints, we refrained from identifying an optimal cutoff threshold for these outcomes. At a cutoff threshold of 3, the sensitivity and specificity for both intervention and bleeding were suboptimal at 38.8% and 70.3%, respectively, for intervention and 33.3% and 63.5%, respectively, for rebleeding.

A threshold of 0 served as the optimal cutoff for the low-risk mortality group, with a sensitivity of 100%, specificity of 13.6%, positive predictive value of 12.2%, and a negative predictive value of 100%. With this cutoff threshold, the low-risk group, according to CHAMPS, showed mortality and rebleeding rates equal to zero.

Comparison with Five Pre-Existing Scores

Subsequently, we compared the performance of the CHAMPS score with that of other scores by (1) evaluating their predictive abilities for various outcomes, (2) differentiating high-risk individuals, and (3) distinguishing low-risk individuals suitable for discharge or localized treatment.

For mortality prediction, the CHAMPS score exhibited superior performance (AUROC = 0.89) that was significantly better than that of AIMS65 (AUROC = 0.71; p = 0.02) and GBS (AUROC = 0.72; p < 0.05) scores. Regarding intervention, only the GBS score demonstrated a predictive value with an AUROC of 0.75, while the others lacked predictive value. Specifically, for blood transfusion, endoscopic intervention, and surgical intervention, the AUROC values were either average or lacked a predictive value. Concerning rebleeding, the AIMS65 score exhibited good predictive ability, the GBS and Rockall scores provided moderate predictive ability, and the CHAMPS score had no predictive value (Table 2 and Figure 1).

Table 2 Discriminative Ability of the Scores by Outcome

Outcomes	Scores	AUROC	95% CI	p
Mortality	CHAMPS	0.89	0.83–0.94	–
	ABC	0.79	0.68–0.91	0.157
	AIMS65	0.71	0.59–0.84	**0.021**
	cRS	0.76	0.62–0.91	0.110
	fRS	0.74	0.58–0.91	0.097
	GBS	0.72	0.57–0.87	**0.047**
Rebleeding	CHAMPS	0.43	0.09–0.76	–
	ABC	0.51	0.31–0.71	0.672
	AIMS65	0.84	0.68–1.00	**0.005**
	cRS	0.67	0.23–1.00	0.232
	fRS	0.77	0.42–1.00	0.053
	GBS	0.75	0.54–0.96	**0.000**
Intervention	CHAMPS	0.55	0.44–0.66	**–**
	ABC	0.57	0.46–0.68	0.663
	AIMS65	0.66	0.56–0.74	**0.039**
	cRS	0.58	0.47–0.69	0.602
	fRS	0.68	0.58–0.77	**0.027**
	GBS	0.75	0.66–0.85	**0.003**

(*Continued*)

Table 2 (Continued).

Outcomes	Scores	AUROC	95% CI	p
Blood infusion	CHAMPS	0.58	0.48–0.69	–
	ABC	0.61	0.51–0.71	0.477
	AIMS65	0.71	0.62–0.79	**0.017**
	cRS	0.60	0.50–0.70	0.763
	fRS	0.68	0.59–0.77	0.070
	GBS	0.75	0.66–0.84	**0.013**
Endoscopic intervention	CHAMPS	0.61	0.51–0.71	–
	ABC	0.57	0.47–0.67	0.419
	AIMS65	0.59	0.50–0.69	0.765
	cRS	0.54	0.44–0.64	0.181
	fRS	0.75	0.67–0.83	**0.004**
	GBS	0.61	0.51–0.71	0.931
Surgical intervention	CHAMPS	0.56	0.21–0.90	–
	ABC	0.47	0.06–0.89	0.229
	AIMS65	0.51	0.33–0.70	0.662
	cRS	0.51	0.26–0.76	0.849
	fRS	0.53	0.27–0.78	0.896
	GBS	0.46	0.23–0.70	0.673

Note: Bolded p-values indicated statistically significant results.
Abbreviations: AUROC, area under the receiver operating characteristic curve; CI, confidence interval; CHAMPS, 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; ABC, Age, Blood tests, and Comorbidities; AIMS65, Albumin level <3.0 mg/dL, International normalized ratio >1.5, altered Mental status, Systolic blood pressure ≤90 mm Hg, and age >65 years; cRS, clinical Rockall score; fRS, full Rockall score; GBS, Glasgow-Blatchford score.

In the high-risk cohort, CHAMPS identified 36.4% of patients classified as high-risk, with a mortality rate of 29.4%. The mortality rate in the high-risk group according to the CHAMPS score was higher than that in the other groups. With a threshold of ≥5, the GBS score recognized 92.9% of patients as high-risk, but the mortality rate within this group was only 10.8%, resulting in a notably low specificity of 7.2%, indicating poor GBS performance in identifying the high-risk group for mortality (Table 3).

Sensitivity is of the utmost importance for low-risk patient groups. Both the CHAMPS and GBS scores achieved 100% sensitivity for outcomes related to mortality and rebleeding. Regarding intervention, the GBS cutoff maintained 100% sensitivity, while that of CHAMPS was only 90.3% (Table 4). Although low-risk individuals identified by both CHAMPS and GBS scores had rebleeding and mortality rates of 0%, a more detailed analysis revealed that the CHAMPS score outperformed other scoring systems by identifying as many as 12.1% of patients in the low-risk category, whereas GBS only identified 1.4%. However, a disadvantage of the CHAMPS scoring system was its recognition of up to 58.8% of patients as low-risk cases who may require intervention, while patients with a GBS score ≤1 had a 0% intervention rate (Table 5).

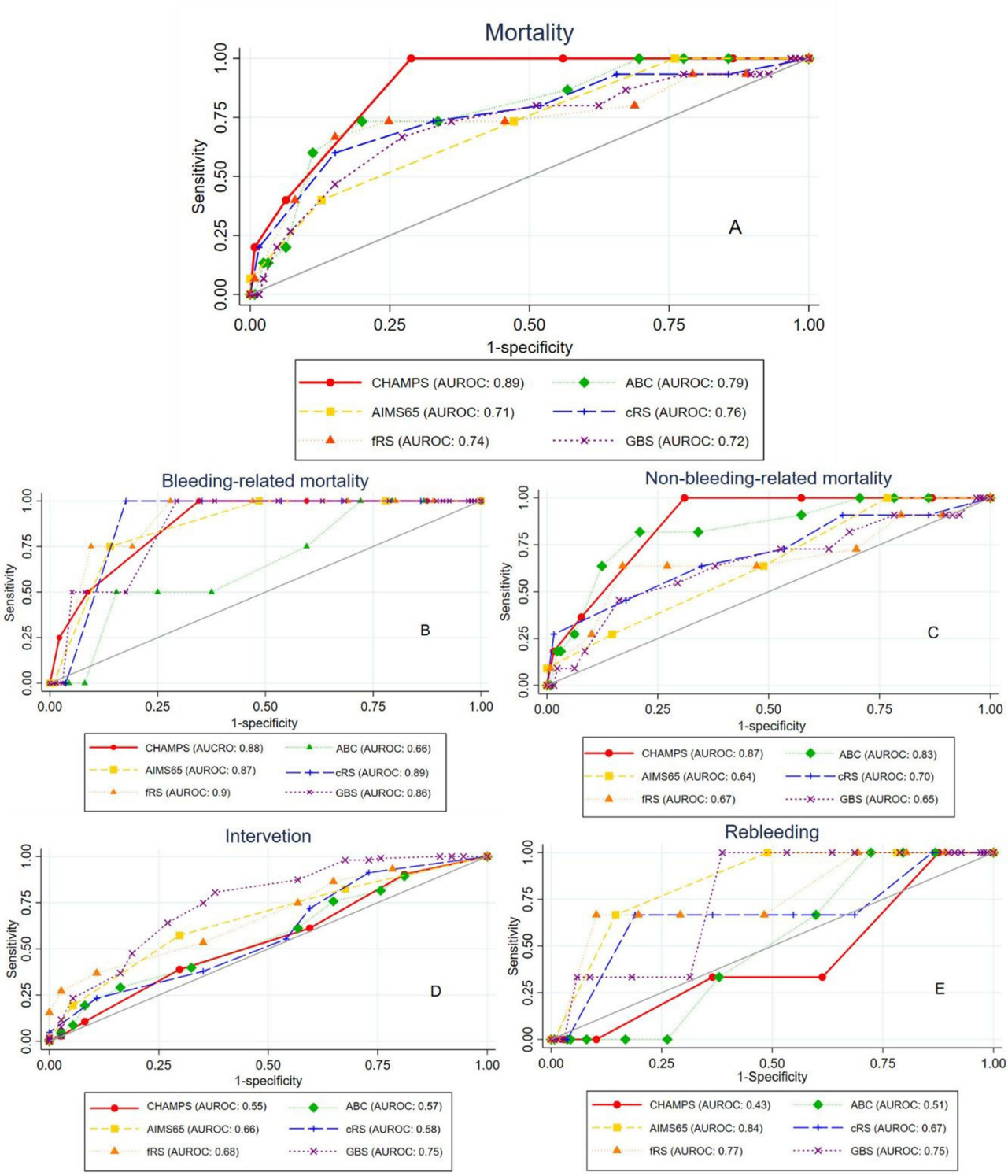

Figure 1 Comparison of scores in prediction of (**A**) mortality, (**B**) bleeding-related mortality, (**C**) non-bleeding-related mortality, (**D**) intervention, and (**E**) rebleeding.
Abbreviations: AUROC, area under receiver operating characteristic; CHAMPS, The Charlson comorbidity Index ≥2, in-Hospital onset, Albumin <2.5 g/dL, altered Mental status, Eastern Cooperative Oncology Group Performance status ≥2, Steroid use; ABC, Age, Blood tests, and Comorbidities; AIMS65, Albumin level <3.0 mg/dL, International normalized ratio >1.5, altered Mental status, Systolic blood pressure ≤90 mm Hg, and age >65 years; cRS, clinical Rockall score; fRS, full Rockall score; GBS, Glasgow Blatchford score.

Table 3 The Predictive Performance and Discriminative Abilities for Identification of Patients at High-Risk of Mortality

Score	Patients n (%)	Mortality n (%)	Sensitivity %	Specificity %	PPV %	NPV %
CHAMPS	**51 (36.4)**	**15 (29.4)**	100	71.2	29.4	100
ABC	11 (7.9)	3 (27.3)	20.0	93.6	27.3	90.7
AIMS65	0 (0.0)	–	–	–	–	–
cRS	77 (55.0)	12 (15.6)	80.0	48.0	15.6	95.2
fRS	7 (5.0)	1 (14.3)	12.5	88.2	14.3	86.5
GBS	130 (92.9)	14 (10.8)	93.3	7.2	10.8	90.0

Note: The bold numbers were the results related to the CHAMPS score.
Abbreviations: CHAMPS, 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; ABC, Age, Blood tests, and Comorbidities; AIMS65, Albumin level <3.0 mg/dL, International normalized ratio >1.5, altered Mental status, Systolic blood pressure ≤90 mm Hg, and age >65 years; cRS, clinical Rockall score; fRS, full Rockall score; GBS, Glasgow-Blatchford score; NPV, negative predictive value; PPV, positive predictive value.

Table 4 The Predictive Performance for Different Outcomes in the Low-Risk Group Among Six Scores

Outcomes	Scores	Sensitivity %	Specificity %	PPV %	NPV %
Mortality	CHAMPS	**100**	13.6	12.2	**100**
	ABC	86.7	43.2	15.5	96.4
	AIMS65	73.3	52.8	15.7	94.3
	cRS	80.0	48.0	15.6	95.2
	fRS	93.3	20.8	12.4	96.3
	GBS	100	1.6	10.9	100
Intervention	CHAMPS	**90.3**	18.9	75.6	**41.2**
	ABC	61.2	43.2	75.0	28.6
	AIMS65	57.3	70.3	84.3	37.1
	cRS	55.3	46.0	74.0	27.0
	fRS	86.4	35.1	78.8	48.2
	GBS	100	5.41	74.6	100
Rebleeding	CHAMPS	**100**	12.4	2.4	**100**
	ABC	66.7	40.2	2.4	98.2
	AIMS65	100	51.1	4.3	100
	cRS	66.7	45.3	2.6	98.4
	fRS	100	19.7	2.7	100
	GBS	100	1.46	2.2	100

Note: The bold numbers were the sensitivity values and negative predictive values related to the CHAMPS score.
Abbreviations: CHAMPS, 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; ABC, Age, Blood tests, and Comorbidities; AIMS65, Albumin level <3.0 mg/dL, International normalized ratio >1.5, altered Mental status, Systolic blood pressure ≤90 mm Hg, and age >65 years; cRS, clinical Rockall score; fRS, full Rockall score; GBS, Glasgow–Blatchford score; NPV, negative predictive value; PPV, positive predictive value.

Table 5 The Distribution of Outcomes Within the Low-Risk Group

Scores	Patients n (%)	Mortality n (%)	Intervention n (%)	Rebleeding n (%)
CHAMPS	**17 (12.1)**	**0 (0.0)**	**10 (58.8)**	**0 (0.0)**
ABC	56 (40.0)	2 (3.6)	40 (71.4)	1 (1.79)
AIMS65	70 (50.0)	4 (5.7)	44 (55.7)	0 (0.0)
cRS	63 (45.0)	3 (4.8)	46 (73.0)	1 (1.59)
fRS	27 (19.3)	1 (3.7)	14 (51.9)	0 (0.0)
GBS	2 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)

Note: The bold numbers were the results related to the CHAMPS score.
Abbreviations: CHAMPS, 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; ABC, Age, Blood tests, and Comorbidities; AIMS65, Albumin level <3.0 mg/dL, International normalized ratio >1.5, altered Mental status, Systolic blood pressure ≤90 mm Hg, and age >65 years; cRS, clinical Rockall score; fRS, full Rockall score; GBS, Glasgow–Blatchford score.

Discussion

The CHAMPS score, initially designed to assess in-hospital mortality, was validated in our study for this outcome and extended to assess intervention and rebleeding. Regarding mortality, our results indicated that the CHAMPS score (AUROC: 0.91) outperformed ABC, AIMS65, GBS, and cRS scores both in the derivation and validation cohorts (all p-values <0.05).[12] Another validation study by Hakan Aydin reported that CHAMPS robustly predicted mortality with an AUROC value of 0.812 (95% CI: 0.78–0.84), outperforming GBS (AUROC: 0.683; p = 0.008), and showed no significant difference compared to ABC and AIMS65 scores.[13] In our study, CHAMPS was the only score showing good overall mortality prediction (AUROC: 0.89; 95% CI: 0.83–0.94), while other scores exhibited only moderate predictive ability. The CHAMPS score significantly outperformed AIMS65 (AUROC: 0.71) and GBS (AUROC: 0.72) ($p < 0.05$) scores, whereas no significant differences were observed compared to ABC (AUROC: 0.79), cRS (AUROC: 0.76), and fRS (AUROC: 0.74) scores (Figure 1). Upon detailed analysis, CHAMPS demonstrated significantly superior mortality prediction compared to the ABC score for bleeding-related mortality (AUROCs of CHAMPS and ABC were 0.88 and 0.66, respectively; $p < 0.05$). Additionally, it performed significantly better than AIMS65 and GBS for predicting non-bleeding-related mortality (AUROC values of CHAMPS, AIMS65, and GBS were 0.87, 0.64, and 0.65, respectively; all $p < 0.05$). Overall, CHAMPS appears to have a better mortality prediction score than the others, with AUROC values consistently exceeding 0.8 in various studies.

Rebleeding requires continued treatment and intervention, leading to prolonged hospitalization and increased costs. Identifying patients at high risk of rebleeding allows stratified care and discharge decisions. To date, the Forrest classification has been exclusively employed in current guidelines,[4–6] however, subjectivity in endoscopist interpretation remains a limitation. Concerning pre-endoscopic risk scores for rebleeding, several previous studies favored the Progetto Nazionale Emorragia Digestiva (PNED) score (AUROC: 0.85–0.87) over other pre-endoscopic risk scores in predicting rebleeding.[8,15] In our study, the AIMS65 score exhibited good predictive ability for rebleeding (AUROC: 0.84), whereas the fRS (AUROC: 0.77) and GBS (AUROC: 0.75) scores displayed moderate predictive capabilities, and the CHAMPS score demonstrated no predictive ability for this outcome (AUROC: 0.43). Additional research is required to further investigate the application of risk scores to predict rebleeding outcomes.

Regarding the prediction of interventions, the findings of our study closely parallel those of previous reports. According to previous studies, the GBS score exhibits superior predictive performance compared to other risk scores in predicting the need for either endoscopic or surgical intervention. With regard to predicting the need for blood transfusion, the GBS score consistently outperformed other risk scores in multiple comparative studies.[8] Using a composite endpoint of the need for intervention during hospitalization, the GBS score demonstrated a moderate level of predictive efficacy in the present study (AUROC: 0.75), while fRS and AIMS65 showed limited predictive capabilities, recording AUROC values of 0.68 and 0.66, respectively. However, the

CHAMPS score failed to predict this outcome. The GBS score maintained its standing as the most reliable predictive score for blood transfusion, despite a modest AUROC value of 0.75, whereas the CHAMPS score demonstrated no predictive value for this outcome.

With the global concern over healthcare system overload, the identification of very low-risk patients for early discharge or outpatient treatment has gained attention. Prioritizing patient safety, the decision to discharge emphasizes high sensitivity and specificity. Based on recent evidence, a GBS score of ≤1 is still chosen for safe outpatient treatment.[4–6] In our study, considering mortality and rebleeding outcomes, low-risk patients identified by CHAMPS and GBS scores had a 0% mortality and rebleeding rate, with 100% sensitivity and negative predictive value. Upon more detailed analysis, we observed a notable advantage of the CHAMPS score in identifying 17 cases (12.1%) in the low-risk group, whereas the GBS score identified only two cases (1.4%). However, regarding intervention prediction, the low-risk group predicted by CHAMPS had a 58.8% intervention rate, while the low-risk group defined via GBS (GBS ≤ 1) had a 0% intervention rate. Thus, while the low-risk threshold of CHAMPS may not determine outpatient treatment, its 0% mortality and rebleeding rates suggest treatment at lower-level hospitals with facilities for endoscopic and surgical interventions to avoid transfer to facilities with better intensive care capabilities. Additionally, for low-risk patients who have undergone successful intervention for bleeding, the CHAMPS score may assist in making safe and early discharge decisions.

Limitations

Our study was conducted at a single center over a short period of time. Therefore, further multicenter studies with larger sample sizes are required to validate the performance of the CHAMPS risk prediction scoring system.

Conclusion

The CHAMPS score is a simple mnemonic score (with each letter corresponding to a variable), accessible on mobile phones, cost-effective with only one albumin test, and has consistently shown good predictive value for mortality in various studies. In practice, the CHAMPS score can be used to distinguish patients with a high-risk of mortality, leading to early aggressive treatment and reduced mortality rates. The low-risk group identified using the CHAMPS score may only require localized treatment, avoiding the need for advanced intensive care facilities and allowing for safe early discharge after successful bleeding control.

Abbreviations

CHAMPS, Charlson Comorbidity Index ≥2, in-Hospital onset, Albumin <2.5 g/dL, altered Mental status, Eastern Cooperative Oncology Group Performance status ≥2, Steroid use; AUROC, area under the receiver operating characteristic; CCI, Charlson Comorbidity Index; CI, confidence interval; cRS, clinical Rockall score; ECOG-PS, Eastern Cooperative Oncology Group Performance Status; fRS, full Rockall score; GBS, Glasgow-Blatchford score; IQR, interquartile range; NPV, negative predictive value; NVUGIB, non-variceal upper gastrointestinal bleeding; PPI, proton pump inhibitor; PPV, positive predictive value; SD, standard deviation.

Data Sharing Statement

The data analyzed during this study are available from the corresponding author on reasonable request.

Ethics Approval

All procedures performed in studies involving human participants adhered to the ethical standards of the institutional and/or national research committee and to the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The protocol of the present study was approved by the Ethical Committee of the University of Medicine and Pharmacy in Ho Chi Minh City. IRB number: 814/HDDD-DHYD (Vietnam). All participants signed a written informed consent.

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Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agreed to be accountable for all aspects of the work.

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Disclosure

All authors declare no conflicts of interest in this work.

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