JGPEMN
ISSN 2091-279X
eISSN 2362-1168

ORIGINAL ARTICLE

Clinical profile, etiology, and diagnostic accuracy of a UGIB etiology score in patients presenting to the emergency department

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Date of submission: 27 Apr 2026

Date of acceptance: 27 Jun 2026

Date of Publication: 14 Jul 2026

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How to cite:
Bhandari B, Shrestha SK, Sapkota S, Prajapati S, Gohiwar S. Clinical profile, etiology, and diagnostic accuracy of a UGIB etiology score in patients presenting to the emergency department. J Gen Pract Emerg Med Nepal. 2026 Jun;13(1):42-46.

Online information
DOI:
https://doi.org/10.59284/jgpeman412

Abstract

Introduction: Upper gastrointestinal bleeding (UGIB) is one of the commonest causes of Emergency Department (ED) visits and is associated with high mortality. Early identification of etiology is essential as it guides initial pharmacological management before endoscopy. However, endoscopy is not readily available in all centers. This study aimed to describe clinical profile and etiology of UGIB and to assess the accuracy of validated UGIB etiology score in predicting variceal bleeding.

Method: This prospective observational study included patients presenting to ED with UGIB over one-year period at tertiary care center with endoscopy facilities. Clinical features, laboratory parameters, and endoscopic findings were recorded. UGIB etiology predicted by the scoring system was compared with endoscopic diagnosis.

Result: A total of 49 patients were included, with a mean age of 49.5 years. Variceal bleeding was observed in 63.3% of cases and non-variceal bleeding in 36.7%. Anemia was present in 81.6% of patients at presentation, and 57.1% had red nasogastric aspirate. Hepatomegaly was noted in 26 patients and splenomegaly in 18 patients. According to the UGIB etiology score, 31 patients were classified as variceal and 18 as non-variceal. Endoscopy confirmed variceal bleeding in 30 of the 31 predicted cases. The score showed a sensitivity of 90.9%, specificity of 93.8%, positive predictive value of 96.8%, and negative predictive value of 83.3%.

Conclusion: UGIB Etiology Score correctly identified 30 of 33 patients with variceal bleeding and correctly classified 15 of 16 patients with non-variceal bleeding in comparison with the endoscopic findings.

Keywords: Etiology; Non-variceal bleeding; Predictive score; Upper gastrointestinal bleeding; Variceal bleeding

INTRODUCTION

Acute upper gastrointestinal bleeding (UGIB) is a common and potentially life-threatening medical emergency, accounting for significant hospital admissions and healthcare burden worldwide.[1] UGIB refers to bleeding proximal to the ligament of Treitz and carries an overall mortality of 3–15%, with higher mortality among hemodynamically unstable patients.[1] In Nepal, approximately 2.5% of Emergency Department (ED) visits are due to UGIB.[2] Despite advances in management, UGIB continues to impose substantial economic and clinical burden, with more than 300,000 hospital admissions annually and healthcare costs exceeding USD 2.5 billion.[3] Early risk stratification and identification of bleeding etiology are emphasized in international guidelines, including those of the American College of Gastroenterology, to guide triage and initial management.[4]

Endoscopy remains the cornerstone for diagnosis and treatment of UGIB and is recommended within 24 hours of presentation.[5]. However, in many low-resource settings, immediate access to emergency endoscopy is limited due to shortages of trained personnel, infrastructure constraints, and logistical challenges, particularly outside regular working hours. Consequently, emergency physicians are often required to initiate empirical pharmacotherapy without definitive diagnosis. Vasoactive agents significantly reduce bleeding and mortality in variceal hemorrhage, and proton pump inhibitors are preferred in non-variceal bleeding.[6,7] Clinical features such as signs of portal hypertension, hemodynamic instability, NSAID use, or nasogastric aspirate findings have been suggested to differentiate etiology, but these predictors are largely based on expert opinion and lack formal validation.[8]

Given the high early mortality and rebleeding rates associated with variceal bleeding, accurate early differentiation between variceal and non-variceal UGIB is critical, particularly in resource-limited settings.[9] Dhulikhel Hospital, a tertiary referral center in Nepal, receives a large number of UGIB cases from surrounding districts, yet immediate access to emergency endoscopy is often constrained by manpower and logistical limitations. In this context, this study was undertaken to evaluate clinical and basic laboratory parameters that may help differentiate UGIB etiology prior to endoscopy and to assess the utility of a validated UGIB Etiology Score in predicting variceal bleeding in the Emergency Department

METHOD

This prospective cross-sectional diagnostic accuracy study was conducted in the Emergency Department of Dhulikhel Hospital, Kathmandu University Hospital, Nepal, from October 2021 to April 2023. Ethical approval was obtained from the Institutional Review Committee of Kathmandu University School of Medical Sciences (IRC Reference No. 215/2021), and written informed consent was obtained from all participants before enrolment.

Patients aged 18 years or older presenting with clinical features suggestive of upper gastrointestinal bleeding (UGIB), including hematemesis, melena, or coffee-ground vomitus, were eligible for inclusion. Patients who did not undergo upper gastrointestinal endoscopy, had a bleeding source distal to the ligament of Treitz, had inconclusive endoscopic findings, or declined to participate were excluded. The minimum required sample size was calculated using the formula $n = Z^2pq/e^2$, assuming a prevalence of UGIB of 6.4%, a 95% confidence level, and a 7% margin of error, with an additional 10% allowance for non-response, resulting in a target sample size of 47 participants.

Eligible patients were consecutively recruited after initial assessment in the emergency department. Clinical history, physical examination findings, and laboratory investigations were recorded using a structured data collection form. Nasogastric tube aspiration was performed when clinically indicated according to institutional protocol, and the aspirate was classified as red or non-red. The UGIB Etiology Score was calculated using the validated formula: *(3.1 × presence of cirrhosis or signs of chronic liver disease) + (1.5 × red vomitus) + (1.2 × red nasogastric aspirate)*, with a score ≥3.1 indicating a predicted variceal source of bleeding. All patients subsequently underwent upper gastrointestinal endoscopy performed by the gastroenterology unit, and the endoscopic diagnosis served as the reference standard for determining the bleeding etiology.

Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics version 21.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarised as mean ± standard deviation (SD) or median with interquartile range (IQR), as appropriate, while categorical variables were presented as frequencies and percentages. The association between the UGIB Etiology Score classification and endoscopic diagnosis was assessed using Pearson's chi-square test. Diagnostic performance was evaluated by calculating sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall diagnostic accuracy using endoscopic diagnosis as the reference standard. A two-sided *p*-value <0.05 was considered statistically significant.

RESULT

During the study period, 15,679 patients attended the Emergency Department, of whom 107 presented with symptoms suggestive of upper gastrointestinal bleeding (UGIB). Forty-nine patients fulfilled the eligibility criteria and were included in the final analysis. The median age was 49.5 years (IQR: 22 years; range: 21–78 years), and 37 (75.5%) participants were male. The largest proportion of patients belonged to the 40–49 years age group (12, 24.5%), followed by the 30–39 years and 60–69 years age groups (11, 22.4% each) (Table 1). Based on the UGIB Etiology Score, 31 (63.3%) patients were classified as having variceal bleeding and 18 (36.7%) as having non-variceal bleeding.

Table 1. Gender distribution (N=49)

Gender	*f* (%)
Female	12 (24.5%)
Male	37 (75.5%)
Total	49 (100.0%)

Table 2. Etiology based on UGIB endoscopy (N= 49)

Etiology	*f* (%)
Esophageal varices	30 (61.2%)
Duodenal Ulcer	6 (12.2%)
Gastric Ulcer	3 (6.1%)
Gastric Mass? Malignancy	2 (4.1%)
Mallory Weiss	2 (4.1%)
Antral Gastritis	1 (2%)
Esophageal varices and gastric ulcer	1 (2%)
Esophageal varices and Gastric ulcer	1 (2%)
Gastric varices	1 (2%)
Inconclusive	1 (2%)
Mallory-weiss with small esophageal varices	1 (2%)

Table 3. Based on history (N= 49)

History	*f* (%)
Chronic NSAID use	4 (8.2%)
Chronic abdominal pain	31 (63.3%)
Previous diagnosis of cirrhosis	9 (18.4%)
Chronic Liver disease	19 (38.8%)
Chronic Hepatitis infections	1 (2.0%)
Prior GI bleeds	8 (16.3%)
Anticoagulant medication	1 (2.0%)
History of malignancies	1 (2.0%)

Table 4. Stigmata of liver disease frequencies (N=49)

Stigmata of liver disease frequencies	*f* (%)
Muscle wasting	25 (51.0%)
Scratch Marks	13 (26.5%)
Parotid enlargement	12 (24.5%)
Xanthelesma	2 (4.1%)
Clubbing	4 (8.2%)
Palmar erythema	16 (32.7%)
Duputyren's contracture	15 (30.6%)
Spider angioma	22 (44.9%)
Petechiae / purpura	7 (14.3%)
Gynecomastia	7 (14.3%)
Testicular atrophy	5 (10.2%)
Caput medusa	30 (61.2%)
Edema, ascites	17 (34.7%)
Asterixis	19 (38.8%)
Fetor hepaticus	25 (51.0%)

Upper gastrointestinal endoscopy identified esophageal varices as the most common etiology of bleeding (30, 61.2%), followed by duodenal ulcer (6, 12.2%), gastric ulcer (3, 6.1%), and Mallory–Weiss tear (2, 4.1%) (Table 2). Melena was the most common presenting symptom. Chronic abdominal pain was reported by 31 participants (63.3%), while 19 (38.8%) had a history of chronic liver disease and 8 (16.3%) had previous gastrointestinal bleeding. Forty (81.6%) participants consumed alcohol and 34 (69.4%) were current or former smokers. Muscle wasting was the most frequently observed stigmata of chronic liver disease (25, 51.0%), with the remaining clinical findings presented in Table 4. Pallor was present in 40 (81.6%)

Table 5. Presence of NG aspirate and endoscopy diagnosis (N=49)

Endoscopy Diagnosis	Presence of NG aspirate		Total
	Absent	Present	
Antral Gastritis	1	0	1
Duodenal Ulcer	5	1	6
Esophageal varices	8	22	30
Esophageal varices and gastric ulcer	1	0	1
Esophageal varices and Gastric ulcer	1	0	1
Gastic varices	0	1	1
Gastric Mass ? Malignancy	2	0	2
Gastric Ulcer	2	1	3
Inconclusive	0	1	1
Mallory weiss	3	1	4
Mallory weiss with small esophageal varices	0	1	1
Total	21	28	49

Table 6. Contingency table for the UGIB etiology score and endoscopic diagnosis

	Variceal (Endoscopy)	Non variceal (endoscopy)	Total
Variceal (UGIB etiology score)	30 (True Positive)	1 (False Positive)	31
Non variceal (UGIB etiology score)	3 (False Negative)	15 (True Negative)	18
Total	33	16	49

participants, hepatomegaly in 26 (53.1%), splenomegaly in 18 (36.7%), jaundice in 17 (34.7%), and red nasogastric aspirate in 28 (57.1%). Among patients with red nasogastric aspirate, 22 had esophageal varices confirmed on endoscopy, whereas eight patients with endoscopically confirmed variceal bleeding had no red nasogastric aspirate (Table 5).

When compared with endoscopic findings, the UGIB Etiology Score correctly identified 30 of 33 patients with variceal bleeding and correctly classified 15 of 16 patients with non-variceal bleeding (Table 6). The score demonstrated a sensitivity of 90.9% (30/33), specificity of 93.8% (15/16), positive predictive value of 96.8% (30/31), negative predictive value of 83.3% (15/18), and an overall diagnostic accuracy of 91.8%. There was a significant association between the UGIB Etiology Score classification and endoscopic diagnosis ($\chi^2 = 33.23$, $p < 0.001$). This finding was based on a post hoc analysis because the sample was initially drawn for a prevalence study

DISCUSSION

This prospective study evaluated the diagnostic performance of the UGIB Etiology Score for differentiating variceal from non-variceal upper gastrointestinal bleeding (UGIB) in patients presenting to the emergency department. The score demonstrated good diagnostic performance, with a sensitivity of 90.9%, specificity of 93.8%, positive predictive value of 96.8%, negative predictive value of 83.3%, and an overall diagnostic accuracy of 91.8% when compared with endoscopic findings. These findings suggest that the score may be a useful bedside tool for the early identification of

variceal bleeding, particularly in emergency settings where immediate endoscopy is unavailable or delayed.

Unlike commonly used risk stratification tools, such as the Glasgow-Blatchford Score, pre-endoscopic Rockall Score, AIMS65, and Baylor Score, which primarily predict clinical outcomes, the UGIB Etiology Score is designed to predict the underlying cause of bleeding. Early differentiation between variceal and non-variceal bleeding is clinically important because it facilitates timely initiation of appropriate empirical therapy, including vasoactive agents for suspected variceal hemorrhage and proton pump inhibitors for non-variceal bleeding. The diagnostic performance observed in the present study is comparable to that reported by Pongprasobchai et al., supporting the applicability of this scoring system in different clinical settings.

The demographic and clinical characteristics of the study population were generally consistent with previous reports from Nepal and other low- and middle-income countries. Most patients were middle-aged men, reflecting the predominance of chronic liver disease among patients presenting with UGIB in tertiary referral hospitals.[15] Esophageal varices were the leading cause of bleeding, followed by duodenal ulcer and gastric ulcer, findings similar to previous studies conducted in Nepal. The high proportion of variceal bleeding observed in this study is likely attributable to the referral nature of the study hospital, where patients with advanced chronic liver disease are frequently managed.

Clinical findings suggestive of chronic liver disease, including muscle wasting, hepatomegaly, splenomegaly, jaundice, and pallor, were common among patients with variceal bleeding. Likewise, red nasogastric aspirate was strongly associated with endoscopically confirmed variceal bleeding, supporting its inclusion in the UGIB Etiology Score. These observations are consistent with the established clinical manifestations of portal hypertension and advanced chronic liver disease described in previous studies.

Several non-invasive methods have been proposed to predict variceal bleeding, including the AST-to-platelet ratio index (APRI) and the platelet count-to-spleen diameter ratio. Although these tools have demonstrated moderate diagnostic performance in patients with established cirrhosis, they are less suitable for undifferentiated patients presenting with acute UGIB in the emergency department. In comparison, the UGIB Etiology Score relies on simple clinical variables that are readily available during the initial assessment and may therefore be more practical in resource-limited settings. Nevertheless, direct comparison between these diagnostic approaches should be interpreted cautiously because they were developed and validated in different patient populations.

The present study has several strengths. It employed a prospective design, used upper gastrointestinal endoscopy as the reference standard, and evaluated a simple bedside scoring system that requires no additional laboratory investigations beyond routine emergency assessment. These features enhance its potential applicability in settings where emergency endoscopy is not immediately available.

The study also has important limitations. It was conducted at a single tertiary referral hospital using convenience sampling, which may limit the generalisability of the findings and increase the proportion of patients with variceal bleeding. The relatively small sample size limited the precision of the diagnostic accuracy estimates, and confidence intervals for sensitivity and specificity were not calculated. Also the calculation of the sample size and the post hoc analysis of prediction and association emerge as an important limitation to this study. In addition, external validation in different healthcare settings was not performed. Larger multicentre studies with broader patient populations are needed to validate the performance of the UGIB Etiology Score and determine its applicability across diverse clinical settings.

CONCLUSION

When compared with endoscopic findings, the UGIB Etiology Score correctly identified 30 of 33 patients with variceal bleeding and correctly classified 15 of 16 patients with non-variceal bleeding. The score demonstrated a sensitivity of 90.9% (30/33), specificity of 93.8% (15/16), positive predictive value of 96.8% (30/31), negative predictive value of 83.3% (15/18), and an overall diagnostic accuracy of 91.8%. Because the score is based on readily available clinical findings, it may assist emergency physicians in initiating appropriate empirical therapy while awaiting definitive endoscopic evaluation, particularly in resource-limited settings. Further multicentre studies with larger sample sizes are recommended to externally validate the score before its widespread implementation in routine clinical practice.

DECLARATIONS

Acknowledgement
Department of Internal Medicine, Dhulikhel Hospital and Department of General Practice and Emergency Medicine, Dhulikhel Hospital.

Conflict of Interest
None

Funding
None

Ethical Clearance
It was taken from the IRC of Kathmandu University School of Medical Sciences(IRC Reference No. 215/2021).

Consent of the Study
Verbal and written consent was taken from all the participants.

Consent for Publication from Authors
All authors consented to publication.

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