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Clinical Profile and Predictors of In-Hospital Outcomes Among Patients Presenting with Acute Upper Gastrointestinal Bleeding: A Cross-Sectional Study.

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Abstract

Background: Acute upper gastrointestinal bleeding is a common medical emergency associated with blood transfusion, therapeutic endoscopy, rebleeding, intensive care admission, and mortality. Early identification of high-risk patients is important for appropriate resuscitation, triage, and timely endoscopic intervention. This study evaluated the clinical profile and predictors of adverse in-hospital outcomes among patients presenting with acute upper gastrointestinal bleeding. ***Methods:*** This hospital-based cross-sectional observational study included 200 adult patients presenting with acute upper gastrointestinal bleeding. Demographic characteristics, presenting symptoms, comorbidities, medication exposure, hemodynamic parameters, laboratory findings, Glasgow-Blatchford, AIMS65 and Rockall scores, endoscopic diagnoses, treatment requirements, and in-hospital outcomes were recorded. The primary outcome was a composite adverse outcome comprising rebleeding, ICU admission, mechanical ventilation, repeat therapeutic intervention, radiological or surgical intervention, or in-hospital death. Factors associated with adverse outcomes were evaluated using univariable and multivariable logistic regression. Adjusted odds ratios with 95% confidence intervals were calculated, and $p<0.05$ was considered statistically significant. ***Results:*** The mean age was 52.84±15.37 years, and 137 patients (68.5%) were male. Melena was reported in 149 (74.5%), hematemesis in 123 (61.5%), and hemodynamic instability in 47 (23.5%) patients. The mean admission hemoglobin was 8.43±2.37 g/dL. Chronic liver disease was present in 30.5%; 36.5% had variceal bleeding and 63.5% had a non-variceal source. Packed red-cell transfusion was required in 119 (59.5%), and 107 (53.5%) underwent endoscopic hemostatic intervention. Initial endoscopic hemostasis was achieved in 101/107 treated patients (94.4%). Rebleeding occurred in 23 (11.5%), ICU admission was required in 37 (18.5%), and 13 (6.5%) died during hospitalization. A composite adverse outcome occurred in 47 (23.5%) patients. Independent predictors of an adverse outcome were age ≥60 years (adjusted OR [AOR]=2.31, 95% CI: 1.04-5.14; p=0.040), hemodynamic instability (AOR=5.87, 95% CI: 2.36-14.61; p<0.001), altered mental status (AOR=4.08, 95% CI: 1.03-16.13; p=0.045), chronic liver disease (AOR=2.46, 95% CI: 1.04-5.81; p=0.041), hemoglobin <7 g/dL (AOR=2.64, 95% CI: 1.10-6.34; p=0.030), blood urea nitrogen >40 mg/dL (AOR=2.78, 95% CI: 1.17-6.60; p=0.021), serum albumin <2.8 g/dL (AOR=2.83, 95% CI: 1.19-6.73; p=0.019), Glasgow-Blatchford score ≥12 (AOR=3.92, 95% CI: 1.43-10.73; p=0.008), AIMS65 score ≥2 (AOR=3.21, 95% CI: 1.23-8.38; p=0.017), and active bleeding at endoscopy (AOR=3.46, 95% CI: 1.43-8.38; p=0.006). ***Conclusion:*** Acute upper gastrointestinal bleeding was associated with considerable requirements for transfusion, endoscopic therapy, and intensive care, with an in-hospital mortality rate of 6.5%. Hemodynamic instability, altered mental status, advanced age, chronic liver disease, severe anemia, elevated blood urea, hypoalbuminemia, high Glasgow-Blatchford and AIMS65 scores, and active endoscopic bleeding independently identified patients at increased risk of adverse outcomes. Early risk stratification using these factors may support timely resuscitation, closer monitoring, and appropriate therapeutic intervention.

Keywords: Upper gastrointestinal bleeding; Risk stratification; In-hospital outcomes.

INTRODUCTION

Acute upper gastrointestinal bleeding (AUGIB) is a common medical emergency associated with substantial morbidity, need for hospitalization, blood transfusion, endoscopic intervention, and mortality. It is conventionally defined as bleeding originating proximal to the ligament of Treitz and commonly presents with hematemesis, coffee-ground vomiting, melena, or, in severe cases, hematochezia accompanied by hemodynamic instability. The principal causes include peptic ulcer disease, gastroesophageal varices, erosive gastroduodenitis, Mallory-Weiss tear, vascular lesions, and upper gastrointestinal malignancy. Although advances in resuscitation, pharmacotherapy, therapeutic endoscopy, interventional radiology, and critical care have improved outcomes, mortality remains clinically important, particularly among older patients and those with shock, cirrhosis, renal dysfunction, malignancy, or multiple comorbidities.[1,2]

Initial management requires rapid assessment of airway and circulation, intravenous access, appropriate fluid and blood-component replacement, correction of coagulopathy, and early identification of high-risk patients. Current guidelines recommend formal pre-endoscopic risk assessment and upper gastrointestinal endoscopy within 24 hours after adequate hemodynamic resuscitation.[1,3] Patients with suspected variceal bleeding require vasoactive therapy and antibiotic prophylaxis, whereas those with non-variceal bleeding generally receive proton-pump inhibitor therapy and lesion-specific endoscopic hemostasis.[2,4] Despite standardized recommendations, the clinical presentation, etiological spectrum, availability of endoscopy, treatment patterns, and patient outcomes vary considerably between healthcare settings.

Several clinical and laboratory variables have been associated with poor outcomes, including advanced age, hypotension, tachycardia, altered mental status, low hemoglobin concentration, thrombocytopenia, elevated blood urea, hypoalbuminemia, prolonged international normalized ratio, active bleeding during endoscopy, and underlying liver disease. Risk-stratification systems such as the Glasgow-Blatchford score, pre-endoscopic Rockall score, complete Rockall score, and AIMS65 score combine selected variables to estimate the probability of transfusion, endoscopic intervention, rebleeding, intensive care admission, or death. In an international multicentre study, the Glasgow-Blatchford score demonstrated high accuracy for predicting the composite outcome of clinical intervention or death.[5] However, score performance and relevant predictors may differ according to the prevalence of variceal bleeding, referral patterns, and local patient characteristics.

Assessment of the clinical profile, endoscopic causes, management requirements, and short-term outcomes of AUGIB is therefore essential for improving triage and resource allocation. Identification of independent predictors of adverse in-hospital outcomes may facilitate early intensive monitoring and timely therapeutic intervention. The present study was undertaken to describe patients presenting with AUGIB and determine the factors associated with adverse outcomes during hospitalization.

AIM

To evaluate the clinical profile and predictors of in-hospital outcomes among patients presenting with acute upper gastrointestinal bleeding.

OBJECTIVES

1. To describe the demographic characteristics, clinical presentation, comorbidities, laboratory parameters, and endoscopic findings among patients with acute upper gastrointestinal bleeding.
2. To determine in-hospital outcomes, including blood transfusion, endoscopic intervention, rebleeding, intensive care admission, length of hospital stay, and mortality.
3. To identify the clinical, laboratory, risk-score, and endoscopic factors independently associated with adverse in-hospital outcomes.

MATERIALS AND METHODS

Source of Data

The study data were obtained from patients presenting with features of acute upper gastrointestinal bleeding to the emergency department, medicine wards, intensive care unit, and gastroenterology services of the study hospital. Information was collected from direct patient interviews, accompanying relatives when necessary, clinical examination, investigation reports, endoscopy records, treatment charts, and hospital records.

Study Design

This was a hospital-based, observational cross-sectional study with prospective assessment of patients throughout their index hospitalization. No experimental intervention was performed, and treatment was provided according to the treating unit's standard clinical protocol.

Study Location
The study was conducted in the Departments of General Medicine and Gastroenterology, in coordination with the emergency department, intensive care unit, endoscopy unit, and central laboratory.

Study Duration
The study was conducted over 12 months. Recruitment, clinical evaluation, investigations, endoscopy, and recording of in-hospital outcomes were completed during this period.

Study Population
The study population comprised adult patients admitted with clinical evidence of acute upper gastrointestinal bleeding during the study period.

Sample Size
A total of 200 eligible patients with acute upper gastrointestinal bleeding were included. Patients were enrolled using a consecutive sampling technique until the required sample size was achieved.

Operational Definitions
- Acute upper gastrointestinal bleeding: Recent-onset hematemesis, coffee-ground vomiting, melena, or hematochezia with clinical or endoscopic evidence of bleeding proximal to the ligament of Treitz.
- Hemodynamic instability: Systolic blood pressure below 90 mmHg, mean arterial pressure below 65 mmHg, or persistent tachycardia associated with clinical evidence of hypoperfusion.
- Rebleeding: Fresh hematemesis, recurrent melena or hematochezia with hemodynamic instability, a fall in hemoglobin concentration of at least 2 g/dL after initial stabilization, or endoscopic confirmation of recurrent bleeding.
- In-hospital mortality: Death from any cause during the index hospitalization.
- Adverse in-hospital outcome: Occurrence of one or more of the following: rebleeding, intensive care admission, need for mechanical ventilation, repeat endoscopic intervention, radiological or surgical intervention, or in-hospital death.

Inclusion Criteria
1. Patients aged 18 years or older.
2. Patients presenting with hematemesis, coffee-ground vomiting, melena, or hematochezia suspected to originate from an upper gastrointestinal source.
3. Patients admitted within the defined study period.
4. Patients who underwent clinical and laboratory assessment for acute upper gastrointestinal bleeding.
5. Patients who provided written informed consent; where the patient was unable to consent, consent was obtained from a legally acceptable representative.

Exclusion Criteria
1. Patients younger than 18 years.
2. Patients with an established lower gastrointestinal or non-gastrointestinal source of bleeding.
3. Patients with epistaxis, hemoptysis, or oral bleeding resulting in swallowed blood without an upper gastrointestinal lesion.
4. Patients with chronic occult gastrointestinal blood loss without evidence of an acute bleeding episode.
5. Patients transferred after definitive treatment at another hospital when initial clinical or investigation details were unavailable.
6. Patients discharged against medical advice or transferred before their in-hospital outcome could be determined.
7. Patients with incomplete essential clinical, laboratory, endoscopic, or outcome information.
8. Patients who declined consent for participation.

Procedure and Methodology
After approval from the Institutional Ethics Committee, all patients presenting with suspected AUGIB were screened for eligibility. Written informed consent was obtained before enrolment. Each eligible patient was assigned a unique study identification number, and confidentiality was maintained throughout the study.

A detailed history was recorded, including age, sex, onset and duration of bleeding, hematemesis, coffee-ground vomiting, melena, hematochezia, syncope, abdominal pain, previous bleeding episodes, known peptic ulcer disease, chronic liver disease, portal hypertension, malignancy, alcohol consumption, smoking, and recent drug exposure. Particular attention was given to the use of non-steroidal anti-inflammatory drugs, aspirin, antiplatelet drugs, anticoagulants, corticosteroids, and proton-pump inhibitors.

Comorbidities such as hypertension, diabetes mellitus, ischemic heart disease, heart failure, chronic kidney disease, cerebrovascular disease, chronic liver disease, respiratory disease, and malignancy were documented. Initial vital parameters included pulse rate, respiratory rate, blood pressure, oxygen saturation, temperature, mental status, and urine output. Pallor, icterus, dehydration, peripheral edema, ascites, hepatosplenomegaly, signs of chronic liver disease, abdominal tenderness, and evidence of hypoperfusion were assessed.

Initial management, including airway protection, intravenous fluids, blood-component transfusion, proton-pump inhibitor therapy, vasoactive drugs, antibiotics, correction of coagulopathy, and intensive care support, was recorded. Packed red-cell transfusion requirements were documented as the total number of units administered during hospitalization.

The Glasgow-Blatchford score and AIMS65 score were calculated using admission findings. The pre-endoscopic Rockall score was calculated before endoscopy, and the complete Rockall score was calculated after incorporating the endoscopic diagnosis and stigmata of recent hemorrhage.

Following adequate resuscitation, upper gastrointestinal endoscopy was performed, preferably within 24 hours of presentation or earlier when clinically indicated. The timing of endoscopy, bleeding source, lesion location, variceal or non-variceal etiology, ulcer characteristics, Forrest classification, presence of active bleeding, and endoscopic treatment were recorded. Endoscopic therapy included injection, thermal coagulation, mechanical clipping, variceal band ligation, or other appropriate modalities.

Patients were observed until discharge, transfer, or death. Rebleeding, repeat endoscopy, intensive care admission, mechanical ventilation, radiological embolization, surgery, blood transfusion, hospital stay, and mortality were documented.

Sample Processing

Venous blood samples were collected under aseptic precautions at admission, preferably before transfusion. Samples for complete blood count were collected in ethylenediaminetetraacetic acid tubes and analyzed using an automated hematology analyzer. Hemoglobin, total leukocyte count, platelet count, hematocrit, and red-cell indices were recorded.

Samples for coagulation testing were collected in sodium-citrate tubes and analyzed for prothrombin time and international normalized ratio. Blood collected in plain or serum-separator tubes was centrifuged, and serum was used to measure blood urea, creatinine, glucose, electrolytes, bilirubin, total protein, albumin, and liver enzymes. Blood grouping and cross-matching were performed according to the blood bank protocol. Viral markers and other investigations were performed when clinically indicated.

All samples were labelled with the study identification number, transported promptly to the central laboratory, and processed using standardized quality-control procedures. Post-resuscitation or post-transfusion laboratory results were recorded separately and were not substituted for admission values in predictor analyses.

Data Collection

Data were collected using a predesigned and pretested case-record form. The following categories were documented:

- Demographic characteristics and presenting symptoms
- Duration, nature, and estimated severity of bleeding
- Drug exposure, alcohol use, previous bleeding, and comorbidities
- Admission vital signs and physical examination findings
- Hematological, biochemical, and coagulation parameters
- Glasgow-Blatchford, AIMS65, and Rockall scores
- Timing and findings of upper gastrointestinal endoscopy
- Medical, endoscopic, radiological, and surgical treatments
- Blood-component requirements
- Rebleeding and repeat intervention
- Intensive care admission and mechanical ventilation
- Duration of hospitalization and survival status at discharge

The completed forms were reviewed daily for completeness and consistency. Data were entered into a password-protected database, and random verification against source records was performed to minimize transcription errors.

Outcome Measures

Primary Outcome

The primary outcome was the occurrence of an adverse in-hospital outcome, defined as a composite of rebleeding, intensive care admission, mechanical ventilation, repeat therapeutic intervention, radiological or surgical intervention, or in-hospital mortality.

Secondary Outcomes

Secondary outcomes included:

1. In-hospital mortality.
2. Rebleeding during hospitalization.
3. Requirement and number of packed red-cell transfusions.
4. Requirement for endoscopic hemostasis.
5. Intensive care admission and mechanical ventilation.
6. Radiological or surgical intervention.
7. Length of hospital stay.

Statistical Methods

Data were analyzed using IBM SPSS Statistics version 28.0. Continuous variables were assessed for normality using histograms, Q-Q plots, and the Shapiro-Wilk test. Normally distributed variables were expressed as mean and standard deviation, whereas non-normally distributed variables were summarized as median and interquartile range. Categorical variables were presented as frequencies and percentages. Where appropriate, estimates were reported with 95% confidence intervals.

Continuous variables were compared between patients with and without adverse outcomes using the independent-samples Student's t test for normally distributed data and the Mann-Whitney U test for non-normally distributed data. Categorical variables were compared using the Pearson chi-square test or Fisher's exact test when expected cell frequencies were small. Unadjusted associations were expressed as odds ratios with 95% confidence intervals. Variables that were clinically important or demonstrated a univariable association at $p<0.10$ were considered for multivariable binary logistic regression. Multicollinearity was assessed before model construction. Adjusted odds ratios with 95% confidence intervals were reported to identify independent predictors of adverse in-hospital outcomes and mortality. Model calibration and discrimination were assessed using the Hosmer-Lemeshow test and area under the receiver operating characteristic curve, respectively.

The predictive performance of the Glasgow-Blatchford, AIMS65, and Rockall scores was evaluated using receiver operating characteristic curves. Areas under the curve, optimal cut-off points, sensitivity, specificity, positive predictive value, and negative predictive value were calculated. A two-sided p value below 0.05 was considered statistically significant.

RESULTS

Table 1. Overall clinical profile and in-hospital outcomes among patients with acute upper gastrointestinal bleeding (N=200)

Parameter	Mean (SD) or n (%)	95% CI	Test of significance	P value
Age, years	52.84 (15.37)	50.70-54.98	One-sample t=2.61†	0.010*
Male sex	137 (68.5%)	61.8%-74.5%	Proportion z=5.23‡	<0.001*
Hematemesis	123 (61.5%)	54.6%-68.0%	Proportion z=3.25‡	0.001*
Melena	149 (74.5%)	68.0%-80.0%	Proportion z=6.93‡	<0.001*
Hematochezia	17 (8.5%)	5.4%-13.2%	Proportion z=-11.74‡	<0.001*
Syncope or presyncope	43 (21.5%)	16.4%-27.7%	Proportion z=-8.06‡	<0.001*
Hemodynamic instability at admission	47 (23.5%)	18.2%-29.8%	Proportion z=-7.50‡	<0.001*
Mean hemoglobin, g/dL	8.43 (2.37)	8.10-8.76	One-sample t=-9.37§	<0.001*
Chronic liver disease	61 (30.5%)	24.5%-37.2%	Proportion z=-5.52‡	<0.001*
Peptic ulcer disease	67 (33.5%)	27.3%-40.3%	Proportion z=-4.67‡	<0.001*
Variceal source of bleeding	73 (36.5%)	30.1%-43.4%	Proportion z=-3.82‡	<0.001*
Non-variceal source of bleeding	127 (63.5%)	56.6%-69.9%	Proportion z=3.82‡	<0.001*
Packed red-cell transfusion	119 (59.5%)	52.6%-66.1%	Proportion z=2.69‡	0.007*
Endoscopic hemostatic intervention	107 (53.5%)	46.6%-60.3%	Proportion z=0.99‡	0.322
Rebleeding during hospitalization	23 (11.5%)	7.8%-16.7%	Proportion z=-10.89‡	<0.001*
ICU admission	37 (18.5%)	13.7%-24.5%	Proportion z=-8.91‡	<0.001*
In-hospital mortality	13 (6.5%)	3.8%-10.8%	Proportion z=-12.30‡	<0.001*

Composite adverse in-hospital outcome	47 (23.5%)	18.2%-29.8%	Proportion z=-7.50‡	<0.001*
Length of hospital stay, days	6.84 (3.71)	6.32-7.36	One-sample t=3.20¶	0.002*

†Compared with a reference mean age of 50 years.
‡One-sample proportion test against 50%.
§Compared with a reference hemoglobin concentration of 10 g/dL.
Compared with a reference hospital stay of 6 days.
*Statistically significant at p<0.05.

Among the 200 patients with acute upper gastrointestinal bleeding, the mean age was 52.84 ± 15.37 years (95% CI: 50.70–54.98), which was significantly higher than the reference mean of 50 years (p=0.010). Males constituted 68.5% of the study population (95% CI: 61.8%–74.5%; p<0.001). Melena was the most common presenting manifestation, reported in 74.5% of patients, followed by hematemesis in 61.5%, syncope or presyncope in 21.5%, and hematochezia in 8.5%. Hemodynamic instability at admission was observed in 23.5% of patients. The mean hemoglobin concentration was 8.43 ± 2.37 g/dL (95% CI: 8.10–8.76), which was significantly lower than the reference value of 10 g/dL (p<0.001), indicating a substantial burden of anemia. Chronic liver disease and peptic ulcer disease were present in 30.5% and 33.5% of patients, respectively. A variceal source of bleeding was identified in 36.5%, whereas non-variceal bleeding accounted for 63.5% of cases. Packed red-cell transfusion was required in 59.5% of patients, and 53.5% underwent an endoscopic hemostatic intervention. During hospitalization, rebleeding occurred in 11.5%, ICU admission was required in 18.5%, and in-hospital mortality occurred in 6.5%. Overall, 23.5% of patients experienced a composite adverse in-hospital outcome. The mean hospital stay was 6.84 ± 3.71 days (95% CI: 6.32–7.36), significantly longer than the reference duration of six days (p=0.002).

Table 2. Demographic, clinical, laboratory, and endoscopic profile according to in-hospital outcome (N=200)

Parameter	Overall (N=200)	No adverse outcome (n=153)	Adverse outcome (n=47)	Effect estimate (95% CI)	Test of significance	P value
Demographic characteristics						
Age, years	52.84 (15.37)	49.93 (14.28)	62.31 (14.62)	MD 12.38 (7.65-17.11)	t=5.16	<0.001*
Age ≥60 years	71 (35.5%)	43 (28.1%)	28 (59.6%)	OR 3.77 (1.91-7.44)	χ^2=15.30	<0.001*
Male sex	137 (68.5%)	102 (66.7%)	35 (74.5%)	OR 1.46 (0.70-3.05)	χ^2=1.01	0.315
Female sex	63 (31.5%)	51 (33.3%)	12 (25.5%)	Reference		
Clinical presentation						
Hematemesis	123 (61.5%)	87 (56.9%)	36 (76.6%)	OR 2.49 (1.19-5.19)	χ^2=5.92	0.015*
Melena	149 (74.5%)	111 (72.5%)	38 (80.9%)	OR 1.60 (0.71-3.61)	χ^2=1.30	0.254
Hematochezia	17 (8.5%)	8 (5.2%)	9 (19.1%)	OR 4.29 (1.55-11.89)	Fisher's exact	0.006*
Syncope or presyncope	43 (21.5%)	23 (15.0%)	20 (42.6%)	OR 4.19 (2.04-8.62)	χ^2=16.13	<0.001*
Systolic blood pressure, mmHg	107.62 (21.38)	113.74 (17.83)	87.70 (18.37)	MD -26.04 (-31.95 to -20.13)	t=-8.68	<0.001*
Pulse rate, beats/minute	101.36 (19.42)	96.14 (16.23)	118.36 (18.95)	MD 22.22 (16.70-27.74)	t=7.94	<0.001*
Hemodynamic instability	47 (23.5%)	17 (11.1%)	30 (63.8%)	OR 14.11 (6.69-29.77)	χ^2=58.39	<0.001*
Altered mental status	17 (8.5%)	4 (2.6%)	13 (27.7%)	OR 14.25 (4.42-45.93)	Fisher's exact	<0.001*
Comorbidities and risk factors						
Chronic liver disease	61 (30.5%)	37 (24.2%)	24 (51.1%)	OR 3.27 (1.65-6.50)	χ^2=12.29	<0.001*

Chronic kidney disease	19 (9.5%)	9 (5.9%)	10 (21.3%)	OR 4.32 (1.65-11.32)	Fisher's exact	0.003*
Diabetes mellitus	47 (23.5%)	31 (20.3%)	16 (34.0%)	OR 2.03 (0.99-4.17)	χ^2=3.75	0.053
Ischemic heart disease	23 (11.5%)	12 (7.8%)	11 (23.4%)	OR 3.59 (1.48-8.70)	Fisher's exact	0.006*
NSAID exposure	57 (28.5%)	47 (30.7%)	10 (21.3%)	OR 0.61 (0.28-1.31)	χ^2=1.57	0.210
Antiplatelet or anticoagulant use	31 (15.5%)	19 (12.4%)	12 (25.5%)	OR 2.42 (1.08-5.42)	χ^2=4.69	0.030*
Previous upper GI bleeding	39 (19.5%)	24 (15.7%)	15 (31.9%)	OR 2.52 (1.19-5.33)	χ^2=6.14	0.013*
Laboratory parameters						
Hemoglobin, g/dL	8.43 (2.37)	8.91 (2.19)	6.87 (2.28)	MD -2.04 (-2.77 to -1.31)	t=-5.48	<0.001*
Platelet count, $\times 10^3/\mu L$	184.63 (86.74)	198.41 (82.63)	139.77 (84.36)	MD -58.64 (-85.96 to -31.32)	t=-4.24	<0.001*
Blood urea nitrogen, mg/dL	42.76 (24.83)	36.21 (18.47)	64.08 (30.11)	MD 27.87 (18.85-36.89)	t=6.78	<0.001*
Serum creatinine, mg/dL	1.38 (0.91)	1.18 (0.61)	2.03 (1.36)	MD 0.85 (0.43-1.27)	t=4.58	<0.001*
Serum albumin, g/dL	3.09 (0.72)	3.26 (0.63)	2.54 (0.72)	MD -0.72 (-0.93 to -0.51)	t=6.67	<0.001*
INR	1.43 (0.69)	1.27 (0.42)	1.95 (1.02)	MD 0.68 (0.37-0.99)	t=4.98	<0.001*
Risk scores						
Glasgow-Blatchford score	10.26 (4.11)	8.91 (3.47)	14.66 (2.53)	MD 5.75 (4.84-6.66)	t=10.47	<0.001*
AIMS65 score	1.42 (1.18)	1.01 (0.87)	2.77 (1.07)	MD 1.76 (1.42-2.10)	t=11.41	<0.001*
Complete Rockall score	4.32 (2.17)	3.69 (1.83)	6.38 (1.86)	MD 2.69 (2.09-3.29)	t=8.78	<0.001*
Endoscopic findings						
Variceal bleeding	73 (36.5%)	47 (30.7%)	26 (55.3%)	OR 2.79 (1.43-5.45)	χ^2=9.38	0.002*
Peptic ulcer bleeding	67 (33.5%)	56 (36.6%)	11 (23.4%)	OR 0.53 (0.25-1.12)	χ^2=2.80	0.094
Erosive gastroduodenitis	29 (14.5%)	26 (17.0%)	3 (6.4%)	OR 0.33 (0.10-1.15)	Fisher's exact	0.081
Mallory-Weiss tear	11 (5.5%)	10 (6.5%)	1 (2.1%)	OR 0.31 (0.04-2.49)	Fisher's exact	0.460
Upper GI malignancy	13 (6.5%)	8 (5.2%)	5 (10.6%)	OR 2.16 (0.67-6.94)	Fisher's exact	0.184
Other endoscopic causes	7 (3.5%)	6 (3.9%)	1 (2.1%)	OR 0.53 (0.06-4.50)	Fisher's exact	1.000
Active bleeding at endoscopy	43 (21.5%)	21 (13.7%)	22 (46.8%)	OR 5.53 (2.68-11.43)	χ^2=23.16	<0.001*
High-risk ulcer stigmata†	31 (15.5%)	17 (11.1%)	14 (29.8%)	OR 3.39 (1.52-7.56)	χ^2=9.74	0.002*

†Forrest Ia, Ib, IIa, or IIb ulcer stigmata.
MD, mean difference; OR, odds ratio; INR, international normalized ratio; NSAID, non-steroidal anti-inflammatory drug.
*Statistically significant at p<0.05.

Among the 200 patients with acute upper gastrointestinal bleeding, the mean age was 52.84 ± 15.37 years (95% CI: 50.70–54.98), which was significantly higher than the reference mean of 50 years (p=0.010). Males constituted 68.5% of the study population (95% CI: 61.8%–74.5%; p<0.001). Melena was the most common presenting manifestation, reported in 74.5%

of patients, followed by hematemesis in 61.5%, syncope or presyncope in 21.5%, and hematochezia in 8.5%. Hemodynamic instability at admission was observed in 23.5% of patients. The mean hemoglobin concentration was 8.43 ± 2.37 g/dL (95% CI: 8.10–8.76), which was significantly lower than the reference value of 10 g/dL (p<0.001), indicating a substantial burden of anemia. Chronic liver disease and peptic ulcer disease were present in 30.5% and 33.5% of patients, respectively. A variceal source of bleeding was identified in 36.5%, whereas non-variceal bleeding accounted for 63.5% of cases. Packed red-cell transfusion was required in 59.5% of patients, and 53.5% underwent an endoscopic hemostatic intervention. During hospitalization, rebleeding occurred in 11.5%, ICU admission was required in 18.5%, and in-hospital mortality occurred in 6.5%. Overall, 23.5% of patients experienced a composite adverse in-hospital outcome. The mean hospital stay was 6.84 ± 3.71 days (95% CI: 6.32–7.36), significantly longer than the reference duration of six days (p=0.002).

Table 2: Clinical characteristics according to in-hospital outcome

Of the 200 patients, 47 (23.5%) experienced an adverse in-hospital outcome, while 153 (76.5%) had no adverse outcome. Patients with adverse outcomes were significantly older than those without adverse outcomes (62.31 ± 14.62 versus 49.93 ± 14.28 years; mean difference: 12.38 years, 95% CI: 7.65–17.11; p<0.001). Age ≥60 years was associated with 3.77 times higher odds of an adverse outcome (95% CI: 1.91–7.44; p<0.001), while sex was not significantly associated with outcome. Hematemesis, hematochezia, and syncope or presyncope were significantly more frequent among patients with adverse outcomes, with odds ratios of 2.49, 4.29, and 4.19, respectively. These patients also had substantially lower systolic blood pressure (87.70 versus 113.74 mmHg), higher pulse rate (118.36 versus 96.14 beats/minute), and markedly greater frequencies of hemodynamic instability and altered mental status. Hemodynamic instability increased the odds of an adverse outcome approximately fourteen-fold (OR: 14.11, 95% CI: 6.69–29.77), while altered mental status had a similarly strong association (OR: 14.25, 95% CI: 4.42–45.93; both p<0.001).

Among the comorbidities and risk factors, chronic liver disease, chronic kidney disease, ischemic heart disease, antiplatelet or anticoagulant use, and previous upper GI bleeding were significantly associated with adverse outcomes. Diabetes mellitus showed a borderline association (p=0.053), whereas NSAID exposure was not significantly associated with outcome (p=0.210). Patients with adverse outcomes had significantly lower mean hemoglobin, platelet count, and serum albumin levels and significantly higher blood urea nitrogen, serum creatinine, and INR values than those without adverse outcomes (all p<0.001). All three risk-assessment scores were substantially higher in the adverse-outcome group: the mean Glasgow–Blatchford score was 14.66 versus 8.91, the AIMS65 score was 2.77 versus 1.01, and the complete Rockall score was 6.38 versus 3.69 (all p<0.001). Endoscopically, variceal bleeding was more frequent among patients with adverse outcomes (55.3% versus 30.7%; OR: 2.79, p=0.002). Active bleeding at endoscopy demonstrated a particularly strong association with adverse outcomes (OR: 5.53, 95% CI: 2.68–11.43; p<0.001), while high-risk ulcer stigmata were associated with 3.39 times higher odds (p=0.002). Peptic ulcer bleeding, erosive gastroduodenitis, Mallory–Weiss tear, upper GI malignancy, and other endoscopic causes did not show statistically significant associations with adverse outcomes.

Table 3. Treatment requirements and in-hospital outcomes among patients with acute upper gastrointestinal bleeding (N=200)

Outcome	Mean (SD) or n (%)	95% CI	Test of significance	P value
Packed red-cell transfusion	119 (59.5%)	52.6%-66.1%	Proportion z=2.69†	0.007*
≥3 units of packed red cells	43 (21.5%)	16.4%-27.7%	Proportion z=-2.55‡	0.011*
Packed red-cell units transfused§	2.74 (1.63)	2.45-3.03	One-sample t=4.95¶	<0.001*
Fresh frozen plasma transfusion	37 (18.5%)	13.7%-24.5%	Proportion z=-3.73‡	<0.001*
Endoscopic hemostatic intervention	107 (53.5%)	46.6%-60.3%	Proportion z=0.99†	0.322
Variceal band ligation	61 (30.5%)	24.5%-37.2%	Proportion z=0.15#	0.881
Injection, clip, or thermal therapy	43 (21.5%)	16.4%-27.7%	Proportion z=-2.55‡	0.011*
Combined endoscopic therapy	23 (11.5%)	7.8%-16.7%	Proportion z=0.68**	0.497
Initial endoscopic hemostasis achieved††	101/107 (94.4%)	88.3%-97.4%	Exact binomial test‡‡	<0.001*
Rebleeding during hospitalization	23 (11.5%)	7.8%-16.7%	Proportion z=0.68**	0.497
Repeat upper GI endoscopy	17 (8.5%)	5.4%-13.2%	Proportion z=-0.95§§	0.342
Repeat endoscopic hemostasis	13 (6.5%)	3.8%-10.8%	Proportion z=-1.65§§	0.099

Interventional radiological embolization/TIPS	7 (3.5%)	1.7%-7.0%	Exact binomial test¶¶	0.143
Surgical intervention	3 (1.5%)	0.5%-4.3%	Exact binomial test##	0.480
ICU admission	37 (18.5%)	13.7%-24.5%	Proportion z=-0.49***	0.624
Mechanical ventilation	17 (8.5%)	5.4%-13.2%	Proportion z=-0.95§§	0.342
Vasopressor requirement	29 (14.5%)	10.3%-20.0%	Proportion z=-1.69***	0.091
Acute kidney injury	27 (13.5%)	9.4%-18.9%	Proportion z=1.10**	0.271
Mean length of hospital stay, days	6.84 (3.71)	6.32-7.36	One-sample t=3.20†††	0.002*
Hospital stay >7 days	53 (26.5%)	20.9%-33.0%	Proportion z=0.46‡‡‡	0.646
In-hospital mortality	13 (6.5%)	3.8%-10.8%	Exact binomial test§§§	0.086
Composite adverse outcome	47 (23.5%)	18.2%-29.8%	Proportion z=1.09¶¶¶	0.276

†Compared with a reference proportion of 50%.
‡Compared with a reference proportion of 30%.
§Calculated among 119 transfused patients.
¶Compared with a reference mean of 2 units.
#Compared with a reference proportion of 30%.
**Compared with a reference proportion of 10%.
††Among 107 patients who underwent endoscopic hemostasis.
‡‡Compared with an expected initial hemostasis rate of 80%.
§§Compared with a reference proportion of 10%.
¶¶Compared with a reference proportion of 2%.
##Compared with a reference proportion of 1%.
***Compared with a reference proportion of 20%.
†††Compared with a reference mean of 6 days.
‡‡‡Compared with a reference proportion of 25%.
§§§Compared with a reference mortality of 4%.
¶¶¶Compared with a reference adverse-outcome rate of 20%.
TIPS, transjugular intrahepatic portosystemic shunt.
*Statistically significant at p<0.05.

Packed red-cell transfusion was required in 119 patients (59.5%; 95% CI: 52.6%–66.1%), a proportion significantly greater than the reference value of 50% (p=0.007). Of the total population, 43 patients (21.5%) received at least three units of packed red cells. Among the 119 transfused patients, the mean number of units administered was 2.74 ± 1.63 (95% CI: 2.45–3.03), significantly exceeding the reference mean of two units (p<0.001). Fresh frozen plasma was administered to 18.5% of patients. Endoscopic hemostatic intervention was performed in 53.5%, including variceal band ligation in 30.5%, injection, clip, or thermal therapy in 21.5%, and combined endoscopic therapy in 11.5%. Initial endoscopic hemostasis was successfully achieved in 101 of the 107 treated patients, corresponding to a success rate of 94.4% (95% CI: 88.3%–97.4%), which was significantly higher than the expected rate of 80% (p<0.001).

Rebleeding during hospitalization occurred in 11.5% of patients, while repeat upper GI endoscopy and repeat endoscopic hemostasis were required in 8.5% and 6.5%, respectively. Interventional radiological embolization or TIPS was required in 3.5%, and only 1.5% underwent surgical intervention. ICU admission was required in 18.5%, mechanical ventilation in 8.5%, and vasopressor support in 14.5%. Acute kidney injury developed in 13.5% of patients. The mean hospital stay was 6.84 ± 3.71 days, significantly longer than the reference mean of six days (p=0.002), and 26.5% remained hospitalized for more than seven days. In-hospital mortality was 6.5% (95% CI: 3.8%–10.8%), while the composite adverse-outcome rate was 23.5% (95% CI: 18.2%–29.8%). However, these rates were not statistically different from the respective predefined reference rates of 4% and 20%.

Table 4. Univariable and multivariable predictors of adverse in-hospital outcomes (N=200)

Predictor	Adverse outcome/total, n/N (%)	Unadjusted OR (95% CI)	Univariable P value	Adjusted OR (95% CI)	Wald χ^2	Adjusted P value

Age ≥60 years	28/71 (39.4%)	3.77 (1.91-7.44)	<0.001*	2.31 (1.04-5.14)	4.20	0.040*
Male sex	35/137 (25.5%)	1.46 (0.70-3.05)	0.315	1.19 (0.49-2.89)	0.15	0.702
Hematemesis	36/123 (29.3%)	2.49 (1.19-5.19)	0.015*	1.38 (0.56-3.41)	0.49	0.486
Hematochezia	9/17 (52.9%)	4.29 (1.55-11.89)	0.006*	2.56 (0.78-8.42)	2.39	0.122
Syncope or presyncope	20/43 (46.5%)	4.19 (2.04-8.62)	<0.001*	1.74 (0.70-4.32)	1.42	0.233
Hemodynamic instability	30/47 (63.8%)	14.11 (6.69-29.77)	<0.001*	5.87 (2.36-14.61)	14.47	<0.001*
Altered mental status	13/17 (76.5%)	14.25 (4.42-45.93)	<0.001*	4.08 (1.03-16.13)	4.03	0.045*
Chronic liver disease	24/61 (39.3%)	3.27 (1.65-6.50)	<0.001*	2.46 (1.04-5.81)	4.19	0.041*
Chronic kidney disease	10/19 (52.6%)	4.32 (1.65-11.32)	0.003*	2.73 (0.83-8.98)	2.72	0.099
Ischemic heart disease	11/23 (47.8%)	3.59 (1.48-8.70)	0.006*	1.81 (0.58-5.63)	1.05	0.305
Antiplatelet/anticoagulant use	12/31 (38.7%)	2.42 (1.08-5.42)	0.030*	1.69 (0.61-4.68)	1.01	0.315
Hemoglobin <7 g/dL	24/53 (45.3%)	3.73 (1.86-7.48)	<0.001*	2.64 (1.10-6.34)	4.71	0.030*
Platelet count <100×10³/µL	17/37 (45.9%)	3.44 (1.61-7.34)	0.001*	1.86 (0.70-4.93)	1.55	0.213
Blood urea nitrogen >40 mg/dL	34/87 (39.1%)	4.95 (2.40-10.20)	<0.001*	2.78 (1.17-6.60)	5.35	0.021*
Serum creatinine >1.5 mg/dL	23/49 (46.9%)	4.17 (2.03-8.57)	<0.001*	1.93 (0.77-4.85)	1.96	0.162
Serum albumin <2.8 g/dL	27/57 (47.4%)	4.69 (2.31-9.51)	<0.001*	2.83 (1.19-6.73)	5.54	0.019*
INR >1.5	23/47 (48.9%)	4.50 (2.16-9.38)	<0.001*	2.18 (0.86-5.53)	2.69	0.101
Glasgow-Blatchford score ≥12	39/97 (40.2%)	8.84 (3.83-20.38)	<0.001*	3.92 (1.43-10.73)	7.07	0.008*
AIMS65 score ≥2	37/83 (44.6%)	7.44 (3.43-16.14)	<0.001*	3.21 (1.23-8.38)	5.66	0.017*
Complete Rockall score ≥6†	31/63 (49.2%)	5.86 (2.89-11.87)	<0.001*			
Variceal bleeding	26/73 (35.6%)	2.79 (1.43-5.45)	0.002*	1.97 (0.83-4.68)	2.38	0.123
Active bleeding at endoscopy	22/43 (51.2%)	5.53 (2.68-11.43)	<0.001*	3.46 (1.43-8.38)	7.54	0.006*
High-risk ulcer stigmata	14/31 (45.2%)	3.39 (1.52-7.56)	0.002*	2.59 (0.92-7.29)	3.25	

On univariable logistic regression analysis, several demographic, clinical, comorbidity-related, laboratory, risk-score, and endoscopic variables were significantly associated with adverse in-hospital outcomes. These included age ≥60 years, hematemesis, hematochezia, syncope or presyncope, hemodynamic instability, altered mental status, chronic liver disease, chronic kidney disease, ischemic heart disease, antiplatelet or anticoagulant use, hemoglobin <7 g/dL, platelet count <100×10³/µL, blood urea nitrogen >40 mg/dL, serum creatinine >1.5 mg/dL, serum albumin <2.8 g/dL, INR >1.5, Glasgow–Blatchford score ≥12, AIMS65 score ≥2, complete Rockall score ≥6, variceal bleeding, active bleeding at endoscopy, and high-risk ulcer stigmata. The strongest unadjusted associations were observed for altered mental status (OR: 14.25), hemodynamic instability (OR: 14.11), Glasgow–Blatchford score ≥12 (OR: 8.84), and AIMS65 score ≥2 (OR: 7.44).

After adjustment for potential confounders in the multivariable model, hemodynamic instability remained the strongest independent predictor of an adverse outcome, increasing the adjusted odds almost six-fold (adjusted OR [AOR]: 5.87, 95% CI: 2.36–14.61; p<0.001). Altered mental status was independently associated with approximately four-fold higher odds (AOR: 4.08, 95% CI: 1.03–16.13; p=0.045). Other independent clinical and laboratory predictors included age ≥60 years (AOR: 2.31; p=0.040), chronic liver disease (AOR: 2.46; p=0.041), hemoglobin <7 g/dL (AOR: 2.64; p=0.030), blood urea nitrogen >40 mg/dL (AOR: 2.78; p=0.021), and serum albumin <2.8 g/dL (AOR: 2.83; p=0.019). Glasgow–Blatchford score ≥12 (AOR: 3.92; p=0.008) and AIMS65 score ≥2 (AOR: 3.21; p=0.017) also independently predicted adverse outcomes. Among endoscopic variables, active bleeding at endoscopy remained an independent predictor (AOR: 3.46, 95% CI: 1.43–8.38; p=0.006). In contrast, male sex, presenting bleeding manifestations, chronic kidney disease, ischemic heart disease, antithrombotic use, thrombocytopenia, elevated creatinine, elevated INR, variceal bleeding, and high-risk ulcer stigmata lost statistical significance after adjustment.

DISCUSSION

The present study evaluated the clinical profile, treatment requirements, and predictors of adverse in-hospital outcomes among 200 patients with acute upper gastrointestinal bleeding (AUGIB). Overall, the findings demonstrate that AUGIB predominantly affected middle-aged and older men, commonly presented with melena and hematemesis, and frequently required blood transfusion and therapeutic endoscopy. Approximately one-fourth of the patients developed an adverse in-hospital outcome, while mortality was 6.5%. Advanced age, hemodynamic instability, altered mental status, chronic liver disease, severe anemia, elevated blood urea nitrogen, hypoalbuminemia, high Glasgow-Blatchford and AIMS65 scores, and active bleeding at endoscopy independently predicted adverse outcomes.

Overall clinical profile and outcomes

The mean age of the study population was 52.84±15.37 years, and 35.5% of patients were aged ≥60 years. The male predominance of 68.5% was consistent with Bhattarai et al. (2020)[1], who observed that AUGIB occurred predominantly among men and middle-aged or older patients. Almadi et al. (2021)[2] similarly reported a mean patient age of approximately 57 years and a male proportion of 66.8%. The predominance of men may reflect their greater exposure to alcohol, smoking, chronic liver disease, NSAIDs, and other risk factors for peptic ulcer and variceal bleeding. The present study's relatively younger mean age compared with some Western cohorts may be related to the earlier occurrence of alcohol-associated liver disease and portal hypertension in the local population.

Melena was the most frequent presenting symptom, occurring in 74.5% of patients, followed by hematemesis in 61.5%, syncope or presyncope in 21.5%, and hematochezia in 8.5%. This pattern was comparable to the findings of Bhattarai et al. (2020)[1], in which melena and hematemesis were the dominant presentations. Rajan et al. (2019)[3], in a prospective study from Tanzania, also described hematemesis and melena as the principal manifestations of AUGIB. Hematochezia was less common in the present series but was associated with a greater likelihood of an adverse outcome, probably because hematochezia in AUGIB generally indicates brisk bleeding with rapid intestinal transit.

Hemodynamic instability was documented in 23.5% of the patients at admission. The mean hemoglobin concentration was only 8.43±2.37 g/dL, indicating substantial blood loss before hospital presentation. Redondo-Cerezo et al. (2024)[4] found that patients with massive gastrointestinal bleeding had higher rates of shock, comorbidity, transfusion, rebleeding, and mortality. Their findings support the present observation that physiological deterioration at presentation was more relevant to prognosis than the presenting symptom alone.

Chronic liver disease was present in 30.5% of patients, and 36.5% had a variceal source of bleeding. Conversely, 63.5% had non-variceal bleeding, with peptic ulcer disease accounting for 33.5%. This etiological distribution reflects the coexistence of a considerable burden of portal hypertension with the continued importance of peptic ulcer disease. Bhattarai et al. (2020)[1] reported a high frequency of variceal bleeding in a South Asian tertiary-care setting, while Almadi et al. (2021)[2] observed that peptic ulcer disease remained an important cause of AUGIB. Differences between studies are likely to reflect geographical variation in alcohol use, viral hepatitis, cirrhosis, Helicobacter pylori, NSAID exposure, and referral patterns. The higher variceal proportion in the present study than in many Western cohorts is particularly relevant because variceal hemorrhage is generally associated with greater hemodynamic compromise and underlying hepatic dysfunction.

Packed red-cell transfusion was required in 59.5% of patients, and 53.5% underwent endoscopic hemostasis. These figures indicate that a large proportion presented with clinically important bleeding. Stanley et al. (2017)[5], in an international multicentre prospective study of 3,012 patients, included transfusion and therapeutic intervention within the major composite clinical outcome and demonstrated that the Glasgow-Blatchford score was particularly accurate in predicting this requirement. Current guidelines recommend a generally restrictive transfusion strategy, commonly using a hemoglobin threshold near 7 g/dL in hemodynamically stable patients, while allowing individualization for ongoing hemorrhage or cardiovascular disease.[6,7]

Rebleeding occurred in 11.5% of patients, ICU admission in 18.5%, and the composite adverse outcome in 23.5%. Almadi et al. (2021)[2] reported a rebleeding rate of 8.9%, which was slightly lower than the present rate. Alzoubaidi et al. (2020)[8] found a rebleeding rate of 10.3% following initial endoscopic hemostasis, closely corresponding to the present finding. Variation in rebleeding rates may be related to lesion severity, variceal case load, endoscopic modality, time to endoscopy, coagulopathy, and adherence to post-endoscopic pharmacotherapy.

The in-hospital mortality rate was 6.5%, which falls within the commonly reported range for AUGIB. Almadi et al. (2021)[2] reported an in-hospital mortality rate of 4.4%, whereas Bhattarai et al. (2020)[1] reported a higher mortality rate of 14.8% in their tertiary-care population. The present mortality was substantially lower than the 20.1% 30-day mortality reported by Alzoubaidi et al. (2020)[8]; however, their registry included selected patients requiring hemostatic powder treatment for severe or difficult-to-control bleeding. These comparisons indicate that mortality is strongly influenced by case mix and outcome period. The mean hospital stay in the present study was 6.84±3.71 days, with 26.5% remaining hospitalized for more than seven days, reflecting the need for resuscitation, endoscopic therapy, surveillance for rebleeding, and management of comorbidities.

Factors associated with adverse outcomes

Patients with adverse outcomes were significantly older than those without adverse outcomes (62.31 versus 49.93 years), and age ≥60 years increased the unadjusted odds of an adverse outcome by nearly fourfold. After adjustment, older age remained an independent predictor with an adjusted OR of 2.31. Advanced age is associated with reduced physiological reserve, greater comorbidity, antithrombotic exposure, and poorer tolerance of anemia and hypotension. Laursen et al. (2021)[9], while developing the ABC mortality score, identified age as an important component in estimating death following gastrointestinal bleeding. The present findings therefore support the inclusion of age in prognostic assessment.

The association of hematemesis, hematochezia, and syncope with adverse outcomes in univariable analysis suggests that overt or rapid bleeding identifies patients with greater initial severity. However, these symptoms lost significance after adjustment, indicating that their prognostic effect was largely mediated through measurable physiological abnormalities such as hypotension, tachycardia, anemia, and azotemia. Melena was common but did not significantly differentiate outcomes, further demonstrating that the presence of a symptom is less informative than its accompanying hemodynamic and biochemical effects.

Hemodynamic instability was the strongest independent clinical predictor of an adverse outcome, with an adjusted OR of 5.87. Patients with adverse outcomes had a mean systolic blood pressure approximately 26 mmHg lower and a pulse rate approximately 22 beats/minute higher than those without adverse outcomes. Redondo-Cerezo et al. (2024)[4] similarly found that massive bleeding was associated with poorer short- and longer-term outcomes. The Glasgow-Blatchford score also gives substantial weight to systolic blood pressure and pulse rate, reflecting the established prognostic importance of circulatory compromise.[5]

Altered mental status occurred in 27.7% of patients with adverse outcomes compared with 2.6% of those without such outcomes and remained independently significant (adjusted OR=4.08). Altered consciousness may indicate cerebral hypoperfusion, severe hepatic dysfunction, uremia, hypoxia, or systemic decompensation. It is also one of the five components of the AIMS65 score. Chang et al. (2021)[10] found that AIMS65 was particularly valuable for predicting mortality in AUGIB, consistent with the independent importance of altered mental status observed in the present study.

Chronic liver disease was associated with more than threefold higher unadjusted odds of an adverse outcome and remained independently significant after adjustment (adjusted OR=2.46). Cirrhotic patients often have portal hypertension, thrombocytopenia, impaired coagulation, renal dysfunction, bacterial infection, and reduced hepatic reserve. The Baveno VII consensus emphasized that outcomes following acute variceal bleeding are determined not only by control of bleeding but also by the severity of underlying liver disease and associated decompensation.[11] Although variceal bleeding was significant in univariable analysis, it lost significance after adjustment, suggesting that the excess risk was better explained by liver disease severity, hemodynamic compromise, biochemical abnormalities, and active bleeding.

Chronic kidney disease and ischemic heart disease were associated with adverse outcomes in univariable analysis but were not independent predictors after adjustment. Similarly, antiplatelet or anticoagulant use showed a significant unadjusted association but lost significance in the multivariable model. These factors may increase the likelihood or severity of hemorrhage but share prognostic information with age, anemia, shock, renal biochemical markers, and comorbidity. NSAID exposure was not associated with adverse outcomes despite being an established cause of mucosal injury, suggesting that factors precipitating bleeding may differ from those determining its prognosis.

Laboratory predictors

Patients with adverse outcomes had significantly lower hemoglobin, platelet count, and serum albumin and significantly higher blood urea nitrogen, serum creatinine, and INR. Hemoglobin <7 g/dL remained independently associated with adverse outcomes (adjusted OR=2.64). Severe anemia indicates substantial blood loss and reduces tissue oxygen delivery, particularly in older patients or those with cardiovascular disease. The finding supports guideline recommendations for careful transfusion assessment and prompt resuscitation in patients with severe anemia.[6,7]

Blood urea nitrogen >40 mg/dL independently increased the odds of an adverse outcome by approximately 2.8 times. Elevated blood urea in AUGIB may result from digestion and absorption of blood proteins, decreased renal perfusion due to hypovolemia, or underlying renal disease. Blood urea is consequently an important component of the Glasgow-Blatchford score. The significant association of elevated urea, but not creatinine after adjustment, suggests that urea may better reflect the combined effects of bleeding severity and prerenal hypoperfusion.

Serum albumin <2.8 g/dL was another independent predictor (adjusted OR=2.83). Hypoalbuminemia may reflect chronic liver disease, malnutrition, systemic inflammation, malignancy, or overall physiological frailty. It is also a component of AIMS65. Laursen et al. (2021)[9] incorporated albumin and creatinine into the ABC score, confirming their relevance to mortality prediction. Saade et al. (2022)[12] subsequently validated the ABC score for 30-day mortality, further supporting the prognostic importance of biochemical indicators of systemic illness.

Thrombocytopenia, elevated creatinine, and INR >1.5 were significant in univariable analysis but not after adjustment. These abnormalities may have overlapped with chronic liver disease, renal impairment, hypoalbuminemia, and clinical shock. Their loss of statistical significance should not be interpreted as clinical irrelevance; rather, it suggests that they did not add independent prognostic information after stronger correlated variables were incorporated.

Risk scores

The mean Glasgow-Blatchford, AIMS65, and complete Rockall scores were significantly higher among patients with adverse outcomes. A Glasgow-Blatchford score ≥12 independently predicted adverse outcomes with an adjusted OR of 3.92, while AIMS65 ≥2 had an adjusted OR of 3.21. The complete Rockall score ≥6 was strongly associated with adverse outcomes in univariable analysis but was excluded from the adjusted model because it incorporates age, comorbidity, shock, diagnosis, and endoscopic stigmata that were already entered separately.

Stanley et al. (2017)[5] demonstrated that the Glasgow-Blatchford score performed best for predicting the composite outcome of intervention or death, while scores designed around mortality performed differently. Rout et al. (2019)[13], in a prospective Indian cohort including both variceal and non-variceal bleeding, found that the performance of prognostic scores varied according to bleeding etiology and the specific outcome examined. Chang et al. (2021)[10] reported that AIMS65 was superior for mortality prediction, whereas GBS was useful for predicting the requirement for clinical intervention. The present results agree with this complementary interpretation: GBS captured the severity and treatment burden of bleeding, while AIMS65 reflected systemic deterioration and mortality risk.

The independent predictive value of both scores suggests that early calculation at admission could help prioritize resuscitation, monitored care, and early endoscopy. However, these scores should supplement rather than replace clinical judgment, particularly among patients with variceal bleeding, evolving shock, or severe comorbid illness.

Endoscopic findings and treatment outcomes

Variceal bleeding was significantly more common among patients with adverse outcomes, but it was not independently significant after adjustment. In contrast, active bleeding at endoscopy remained an independent predictor with an adjusted OR of 3.46. Active endoscopic bleeding is direct evidence of ongoing hemorrhage and is associated with failure of spontaneous hemostasis, greater transfusion requirements, rebleeding, and need for intervention. High-risk Forrest stigmata were associated with adverse outcomes in univariable analysis but narrowly missed significance after adjustment (adjusted OR=2.59, p=0.071), possibly because of the limited number of patients with high-risk ulcers and overlap with the active-bleeding variable.

The European Society of Gastrointestinal Endoscopy recommends endoscopic treatment for actively bleeding ulcers and nonbleeding visible vessels and recommends early endoscopy within 24 hours following adequate resuscitation.[7] The American College of Gastroenterology similarly recommends endoscopic therapy for active spurting, oozing, and visible vessels and repeat endoscopic treatment for recurrent ulcer bleeding.[6] In the present study, initial hemostasis was achieved in 94.4% of treated patients, exceeding the prespecified benchmark of 80%. This high success rate was comparable to the 89.5% immediate hemostasis reported by Alzoubaidi et al. (2020)[8], although their patients received hemostatic powder and represented a more selected high-risk population.

Despite high initial hemostatic success, 11.5% of patients experienced rebleeding, 8.5% required repeat endoscopy, and 6.5% underwent repeat endoscopic treatment. Only 3.5% required radiological embolization or TIPS and 1.5% required surgery. These findings indicate that modern endoscopic management controlled most bleeding episodes and limited the need for invasive rescue procedures. Nevertheless, the occurrence of rebleeding and mortality confirms that successful endoscopic hemostasis does not eliminate the risks arising from shock, organ dysfunction, cirrhosis, and comorbidity.

CONCLUSION

Acute upper gastrointestinal bleeding predominantly affected middle-aged and older men, with melena and hematemesis being the most frequent clinical presentations. Non-variceal bleeding was more common than variceal bleeding, although chronic liver disease and variceal hemorrhage constituted a substantial proportion of cases. More than half of the patients required packed red-cell transfusion and endoscopic hemostatic intervention. Rebleeding occurred in 11.5%, ICU admission was required in 18.5%, and in-hospital mortality was 6.5%, while 23.5% experienced a composite adverse in-hospital outcome.

Hemodynamic instability was the strongest independent predictor of an adverse outcome. Other independent predictors included age ≥60 years, altered mental status, chronic liver disease, hemoglobin <7 g/dL, blood urea nitrogen >40 mg/dL, serum albumin <2.8 g/dL, Glasgow-Blatchford score ≥12, AIMS65 score ≥2, and active bleeding at endoscopy. Early assessment of these readily available clinical, laboratory, risk-score, and endoscopic factors may facilitate prompt identification of high-risk patients. Rapid resuscitation, appropriate level-of-care allocation, early endoscopy, and close monitoring may reduce rebleeding, organ dysfunction, and mortality among patients with acute upper gastrointestinal bleeding.

LIMITATIONS OF STUDY

1. The study was conducted at a single tertiary-care hospital; therefore, its findings may not be generalizable to primary-care facilities, peripheral hospitals, or populations with different referral and etiological patterns.
2. The cross-sectional observational design permitted identification of predictive associations but could not establish causal relationships between the assessed factors and adverse outcomes.
3. Consecutive hospital-based enrolment may have produced referral bias because patients presenting to a tertiary centre may have had more severe bleeding, advanced liver disease, or greater comorbidity than patients treated in the community.
4. The sample size of 200 patients and the relatively small number of adverse events, particularly 13 in-hospital deaths, limited the statistical power for mortality-specific analyses and the number of variables that could be included reliably in multivariable regression.
5. A composite adverse outcome was used to improve statistical power. However, its individual components including rebleeding, ICU admission, repeat intervention, and mortality differed in clinical severity and might not have shared identical predictors.
6. The study assessed outcomes only during the index hospitalization. Rebleeding, readmission, and mortality occurring after discharge, particularly within 30 days or six weeks, were not evaluated.
7. Management decisions, including transfusion, timing of endoscopy, ICU admission, and selection of endoscopic therapy, may have varied according to clinician judgment and resource availability, potentially influencing the observed outcomes.
8. Estimates of bleeding duration, blood loss, alcohol intake, medication exposure, and previous bleeding were partly based on patient or relative recall and were therefore susceptible to recall and reporting bias.
9. Endoscopic findings and Forrest classification may have been influenced by interobserver variability, timing of endoscopy, pre-endoscopic treatment, and spontaneous cessation of bleeding.
10. Although multivariable regression was performed, residual confounding from unmeasured variables such as lactate concentration, Child-Pugh and MELD scores, frailty, nutritional status, Helicobacter pylori infection, time from symptom onset to presentation, and endoscopist experience could not be excluded.
11. The Glasgow-Blatchford, AIMS65, and Rockall scores were evaluated, but external validation and direct comparison with newer prognostic systems such as the ABC score were not performed.
12. The risk-score cut-offs used in the analysis were derived from the study data or existing literature and require validation in a larger independent population before routine clinical implementation.

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