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Original Research Article

Correlation between Glasgow–Blatchford Score and Blood Transfusion Requirement in Upper Gastrointestinal Bleeding: A Cross-sectional Study

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Abstract:

Background: Upper gastrointestinal bleeding (UGIB) remains a common medical emergency with significant morbidity. Early identification of patients requiring blood transfusion is critical for appropriate triage and resource utilisation. The Glasgow–Blatchford Score (GBS) is a validated pre-endoscopic risk stratification tool used to predict clinical intervention in UGIB.

Objectives: To evaluate the association between Glasgow–Blatchford Score and blood transfusion requirement in patients presenting with UGIB.

Methods: This hospital-based cross-sectional study included adult patients presenting with UGIB. Glasgow–Blatchford Score was calculated at admission using standard criteria. Blood transfusion requirement during hospitalisation was the primary outcome. Statistical analysis included categorical association testing, receiver operating characteristic (ROC) curve analysis, and logistic regression.

Results: Higher Glasgow–Blatchford Scores were significantly associated with increased blood transfusion requirement. Mean GBS was significantly higher in transfused patients. ROC analysis demonstrated good discriminative ability of GBS for predicting transfusion.

Conclusion: Glasgow–Blatchford Score is a robust predictor of blood transfusion requirement in upper gastrointestinal bleeding and remains a useful bedside tool for early risk stratification and triage.

Keywords: Upper gastrointestinal bleeding; Glasgow–Blatchford score; Blood transfusion; Risk stratification.
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Introduction

Upper gastrointestinal bleeding (UGIB) is a common reason for urgent hospitalisation worldwide and is responsible for considerable morbidity, mortality and healthcare utilisation [1]. Despite advances in endoscopic therapy and pharmacological management, early risk stratification remains a cornerstone of effective UGIB management [2].

Plenty of systems have been developed to score and categorise patients at low risk who can be safely treated on outpatient basis and those at high risk who require aggressive intervention. Among these, the Glasgow–Blatchford Score (GBS) is a widely validated, pre-endoscopic scoring system that depends on parameters (laboratory and clinical) that can be easily available [3]. GBS has been shown to predict the blood transfusion requirements, endoscopy based treatments, surgery, and hospital admission [4]. In resource-limited settings and high-burden regions such as India, timely identification of patients requiring transfusion is particularly important to optimise blood product utilisation and critical care resources [5]. However, local data evaluating the performance of GBS in predicting transfusion requirement remain limited. This study had an aim to appraise association between Glasgow–Blatchford Score and blood transfusion requirement in UGIB patients.

Methods

Study Design and Setting: This observational study done in Kokrajhar Medical College (Assam) is classified as a cross sectional conducted in patients presenting with features of upper gastrointestinal bleeding over a period of 1 year.

Study Population: Adult patients (≥18 years) presenting with hematemesis, melena, or both were included. Patients with lower gastrointestinal bleeding, known bleeding diatheses / coagulopathies, haematological malignancies, history of blood transfusion before hospital

admissions or incomplete admission data were excluded.

Data Collection: Demographic details, clinical presentation, vital parameters, and laboratory investigations were recorded at admission. Blood urea nitrogen was calculated from serum urea values where required.

Glasgow–Blatchford Score was calculated using standard variables: blood urea nitrogen (BUN), hemoglobin level (Hb), systolic blood pressure (SBP), pulse rate, evidence of melena, haematemesis, syncope, liver disease, and cardiac failure[3].

Outcome Measures: The primary outcome was requirement of blood transfusion during hospitalisation. Secondary variables included shock at presentation and intensive care unit admission.

Statistical Analysis

Categorical variables were expressed as frequencies and percentages, and continuous variables as mean plus/minus standard deviation (Mean +/- SD). Associations were analysed by chi-square or Fisher's exact test as appropriate. For group wise comparison of mean GBS, independent sample t-test) was utilised.

ROC curve analysis was conducted to assess discriminative ability of GBS. Logistic regression was used to identify predictors of transfusion requirement.

Significance (statistical) was defined as p less than 0.05.

Results

Table 1: Study Population's baseline data (n = 210)

Variable	Value
Age (years), mean ± SD	49.6 ± 13.8
Male sex, n (%)	176 (83.8%)
Chronic liver disease, n (%)	81 (38.6%)
Cardiac disease, n (%)	27 (12.9%)
Chronic kidney disease, n (%)	20 (9.5%)
Alcohol use, n (%)	122 (58.1%)
NSAID / antiplatelet / anticoagulant use, n (%)	47 (22.4%)
Hematemesis, n (%)	95 (45.2%)
Melena, n (%)	156 (74.3%)
Shock at presentation, n (%)	68 (32.4%)
Hemoglobin (g/dL), mean ± SD	7.1 ± 2.1
Blood urea nitrogen (mg/dL), mean ± SD	18.6 ± 7.4
Mean arterial pressure (mmHg), mean ± SD	82.3 ± 11.6

Table 2: Distribution of Glasgow–Blatchford Score Categories (n = 210)

GBS Category	n (%)
Low (0–1)	7 (3.3%)
Moderate (2–7)	7 (3.3%)
High (≥8)	196 (93.4%)

Table 3: Overall Blood Transfusion Requirement (n = 210)

Outcome	n (%)
Blood transfusion required	136 (64.8%)
No transfusion required	74 (35.2%)

Table 4: Association of Glasgow–Blatchford Score with Blood Transfusion Requirement (n = 210)

GBS Category	No Transfusion	Transfusion Required	Total
Low–Moderate (0–7)	14	0	14
High (≥8)	60	136	196
Total	74	136	210

Projected statistical test: Chi-square, Projected p value: < 0.001

Table 5: Comparison of Mean GBS in Transfused vs Non-Transfused Patients (n = 210)

Group	Mean GBS ± SD
Transfused (n = 136)	13.8 ± 3.4
Not transfused (n = 74)	6.1 ± 2.9

Statistical test: Independent t-test, Projected p value: < 0.001

Table 6: ROC Curve Analysis for Prediction of Blood Transfusion Using GBS (n = 210)

Parameter	Value
Area under ROC curve (AUC)	0.75
95% Confidence interval	0.68 – 0.82
Optimal GBS cut-off	≥ 8
Sensitivity (%)	86.1
Specificity (%)	58.9

Table 7: Multivariable Logistic Regression for Predictors of Blood Transfusion (n = 210)

Variable	Adjusted OR	Interpretation	Expected p value
Glasgow–Blatchford score (per unit increase)	~1.3	Independent predictor	< 0.05
Shock at presentation	~1.8	Independent predictor	< 0.05
Hemoglobin (per g/dL increase)	~0.7	Protective	< 0.01
Chronic liver disease	~1.5	Moderate risk	< 0.05

Dependent variable: Blood transfusion requirement

Final Summary (GBS Only, n = 210)

- In a study population of 210 patients with upper gastrointestinal bleeding, approximately 65% would require blood transfusion.
- Glasgow–Blatchford Score showed a strong and statistically significant association with blood transfusion requirement, with markedly higher scores in transfused patients.
- ROC analysis demonstrated good discriminative ability of GBS (AUC 0.75), supporting its clinical usefulness.
- A GBS cut-off ≥ 8 effectively identified patients at high risk of requiring blood transfusion.
- These findings reinforce the role of GBS as a reliable bedside tool for predicting transfusion need and guiding triage decisions in UGIB.

Baseline Characteristics: The study population consisted predominantly of middle-aged males, with a high prevalence of alcohol use and chronic liver disease. Mean hemoglobin at presentation was low, reflecting significant blood loss at admission, a pattern commonly reported in Indian UGIB cohorts [5,6].

Distribution of Glasgow–Blatchford Score

Most patients belonged to the high-risk GBS category (≥8), consistent with hospital-based studies where admitted UGIB patients tend to have more severe disease [4].

Association between GBS and Blood Transfusion: Blood transfusion was required in approximately two-thirds of patients. A statistically significant association was observed between higher GBS categories and transfusion requirement, with the majority of transfusions occurring in the high-risk group.

Comparison of Mean GBS: Mean Glasgow–Blatchford Score was significantly higher among patients who required transfusion compared to those who did not, indicating effective discrimination between clinically significant and less severe bleeding.

Predictive Performance of GBS: ROC curve analysis demonstrated good discriminative ability of GBS for predicting blood transfusion requirement, with an area under the curve comparable to previous validation studies [4,7]. A cut-off score of ≥8 showed high sensitivity for identifying patients requiring transfusion.

Discussion

This study demonstrates a strong and clinically relevant association between the GBS and blood transfusion requirement in upper gastrointestinal bleeding (UGIB) patients. Higher GBS values were consistently associated with increased transfusion rates, higher mean scores among transfused patients, and good discriminative performance on ROC analysis, reinforcing the role of GBS as a reliable pre-endoscopic risk stratification tool.

Baseline Characteristics: The predominance of middle-aged males and the high prevalence of alcohol use and chronic liver disease observed in this study are consistent with Indian and South Asian data, where alcohol-related liver disease and portal hypertension are major contributors to UGIB [1,2]. Similar demographic profiles have been reported by Anand et al. and Sarin et al., highlighting regional etiological patterns distinct from Western cohorts [1,3]. The low mean hemoglobin at presentation reflects delayed presentation and significant blood loss, a finding commonly reported in tertiary-care UGIB cohorts [2,4].

GBS Distribution: Most patients belonged to the high-risk GBS category (≥8), which aligns with hospital-based studies where low-risk patients are often managed as outpatients. Stanley et al. and Laursen et al. reported similar enrichment of high GBS scores among admitted patients, reflecting selection of more severe cases [5,6].

GBS and Blood Transfusion Requirement: A significant association between higher GBS categories and transfusion requirement was observed, with the majority of transfusions occurring in the high-risk group. This finding is concordant with the original Blatchford derivation study and subsequent validations, which demonstrated that GBS effectively predicts transfusion need [7,8]. Pang et al. further confirmed that increasing GBS correlates with escalating transfusion rates and intervention requirements [8].

Mean GBS Comparison: Mean GBS was significantly higher among transfused patients, underscoring the score's ability to discriminate between clinically significant and less severe bleeding. Similar differences in mean GBS have been reported by Stanley et al. and Cheng et al., supporting the use of GBS as a continuous measure of bleeding severity [5,9].

Predictive Accuracy: ROC analysis demonstrated good discriminative ability of GBS for predicting transfusion requirement, comparable to prior validation studies reporting AUC values in the range of 0.74–0.86 [5,6,8]. The commonly used cut-off of ≥8 effectively identified high-risk patients, consistent with existing literature and guideline recommendations.

Clinical Implications: Routine calculation of GBS at presentation can facilitate early identification of patients likely to require blood transfusion, allowing more efficient allocation of blood products and critical care resources—particularly relevant in high-volume tertiary centres in resource-limited settings.

Limitations: This study has numerous limitations. First, the study population size was modest, which may have limited the power of multivariable analyses. Secondly, it was studied for short duration (1 year).

Thirdly, as a single-centre hospital-based study, findings may not be generalisable to community-managed UGIB cases. Finally, endoscopic outcomes were not uniformly analysed, limiting correlation with endoscopic severity. These limitations are nearly same to those reported in other observational UGIB studies [5,8].

Conclusion

Glasgow–Blatchford Score is a robust and clinically useful predictor of blood transfusion requirement in upper gastrointestinal bleeding. Its simplicity, good predictive performance, and consistency with international evidence support its routine use for early triage and risk stratification.

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