DIAGNOSTIC UTILITY OF THE GLASGOW-BLATCHFORD SCORE IN PREDICTING REBLEEDING IN UPPER GASTROINTESTINAL BLEEDING: A TERTIARY CARE STUDY

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ABSTRACT

Objective: *This study was conducted to ascertain the Glasgow-Blatchford bleeding score's diagnostic accuracy in upper GI bleeding patients as risk stratification tool for rebleeding.*

Study design: *Cross-sectional observational study.*

Place and duration of study: *The study was conducted at Medical unit DHQ Hospital, Rawalpindi from 7th August 2022 to 7th February 2023 after ethical approval.*

Patients and Methods: *A total of 165 patients of both genders, aged 20 to 50 years presenting with upper GI bleeding were included and written informed consent was taken. Patients having pre-existing bleeding disorder, anticoagulants or antiplatelets use, history of corrosive intake, traumatic GI bleed cases were excluded. The Glasgow Blatchford score (GBS) was calculated and cut off value >3 was taken as a risk factor for rebleed. Data were analyzed using SPSS-22, sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPPV) for GBS > 3 were calculated. Diagnostic accuracy of Blatchford score was calculated as risk stratification tool for rebleeding.*

Results: *Amongst 165 patients, mean age was 39.4 ± 5.8 years. There were 73(44.2%) females and 92(55.8%) males. There was upper GI rebleed in 32(24.2%) cases. Study found 80% sensitivity and 92% specificity of Glasgow Blatchford (GBS) score to predict the rebleed. The positive predictive value (PPV) was 76.2% and negative predictive value (NPPV) was 93.5%. GBS was 89.09% accurate in diagnosing the rebleed. Age group data stratification was substantial (p-value <0.001). There was a substantial gender-based data stratification (p-value <0.01). Significant data stratification was found for the duration of symptoms (p<0.001).*

Conclusion: *Glasgow Blatchford score is a sensitive and specific score for predicting risk of rebleeding in patients of upper GI bleed demonstrating high sensitivity, specificity and diagnostic accuracy. GBS score should be used to identify the emergency room patients at risk of rebleeding.*

Keywords: *Glasgow Blatchford score, gastrointestinal bleed, rebleeding*

INTRODUCTION

The emergency department is frequently visited due to upper GI bleed which affects approximately average 100 out of every 100,000 people annually. According to estimates, the death rate for these patients range from 2%-15% and in cases when there is rebleeding, it can reach 10% to 30%.[1] A Lahore based study by Butt N et al found mortality of 10.6% at one week and 14.8% at one month after GI bleed.[2] Attari SA et al in a study from Hyderabad concluded that variceal bleed and peptic ulcer disease are the most prevalent causes of GI bleed in their study population.[3] The prognosis of these individuals has been linked to a number of variables including age, hemodynamic state, history of blood transfusion, melena/ hematochezia/ hematemesis and history of chronic hepatic disorders.[4]

Stratification of patients is crucial to resource allocation and optimizing management (such as blood transfusions, endoscopic, radiological interventions or surgery).[5] One significant way towards lowering the

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disease burden, its financial cost and its mortality rate is the screening of people who are at higher risk and the acceleration of diagnostic and therapeutic procedures.[6] Subsequently, several clinical prediction models have been suggested as a tool to identify individuals at risk for a poor outcome in order to optimize in-hospital care of upper GI bleeding. Montiero et al[7] published a review article regarding various scoring systems for upper GI bleed, including the Rockall score,[8] GBS score and T-score. These scores can be used by junior doctors, staff or the healthcare personnel in peripheral units where endoscopy isn't available, hence, filtering out the cases for urgent intervention.

The optimal risk score should be simple to compute at initial presentation and should accurately anticipate the results.[9] There are strengths and weaknesses in each of these models. Glasgow-Blatchford bleeding score (GBS) is one of these clinical rating systems. Although there isn't enough data to support it, this scoring system can be used to evaluate the severity of the illness and the chance of bleeding again.

This study was conducted to re-evaluate the diagnostic accuracy in our population; hence we can justify the use of Glasgow Blatchford score in all patients with upper GI bleed. In our resource limited setups we cannot closely follow up all the patients. This score may help the clinicians to sort high risk patients and keep a close follow-up.

PATIENTS AND METHODS

This cross-sectional observational study was conducted in medical unit DHQ Hospital Rawalpindi from 7th August 2020 till 27th February 2021, ex-post-facto approval from Ethical Review Committee (vide letter no. 149/19/RTH.Rwp dated: 14-09-2023) no ethical concerns were noted by the reviewers. Sample size of 165 was calculated by WHO calculator taking 20% prevalence of upper GI bleed, the GBS score sensitivity of 93.64% and specificity of 37.38%, keeping the confidence interval (CI) at 95% and absolute precision at 7%. The sampling technique was non-probability consecutive sampling.

Total 165 adult patients (age>18 years) of both the genders presenting with upper GI bleed were included. Patients presenting with hematemesis, coffee ground vomit, melena, hematochezia within past 24 hours were labelled as having "upper GI bleeding". Episode of bleeding within 48 hours of first episode was labelled as having "re-occurrence of upper GI bleeding". Patients having pre-existing bleeding disorder, history of

anticoagulant and antiplatelet use, corrosive intake, traumatic GI bleed and those unable to give consent were excluded.

Written informed consent was taken followed by clinical evaluation. History of consuming anti-coagulation drugs or platelet aggregation inhibitors was documented. The Glasgow Blatchford score (GBS) was calculated[10] i.e., a tool for risk assessment to identify the urgency of upper GI endoscopy in upper GI hemorrhage cases. This score includes basic laboratory and clinical parameters (gender, pulse, blood pressure, hemoglobin, blood urea, history of melena, syncope, liver disease and heart failure). The cut off value of GBS score more than 3 was taken as a risk factor for rebleeding.

Demographic data regarding age, gender, duration of disease, baseline vitals including pulse rate, respiratory rate and blood pressure was noted. Laboratory tests including blood complete picture, renal functions, , and liver function tests were sent to hospital laboratory. Endoscopy was done in all patients by qualified consultant gastroenterologist. Patients were treated as per hospital protocols and observed for rebleeding till 48 hours of the first episode. Diagnostic accuracy of Blatchford score was calculated using rebleeding as a gold standard. Data were entered in proforma and confidentiality of data was ensured.

Data were analyzed using SPSS-22. Qualitative variables (gender and rebleeding) were presented as frequencies and percentages. Quantitative variables (age, duration of symptoms) were presented as mean and standard deviation. Data were stratified for age, gender and duration of symptoms. Chi-square test was applied to compare those with rebleed versus without rebleed with respect to various levels of GBS score. P-value <0.05 was taken as statistically significant. The description of true and false positives/negatives is given in table-I.

For upper GI bleed cases, sensitivity was calculated as the ability of GBS high score (>3) to detect rebleeding i.e., sensitivity$=TP/(TP+FN)$. Specificity calculated as the ability of GBS high score to exclude those with no rebleeding i.e., specificity$=TN/(TN+FP)$. Positive predictive value (PPV) calculated as proportion of positives that correspond to the high risk patients on rebleeding i.e, PPV$=TP/(TP+FP)$. Negative predictive value (NPPV) calculated as proportion of negatives that correspond to low-risk patients on rebleeding i.e., NPPV$=TN/(TN+FN)$. Diagnostic Accuracy was calculated as a proportion of correctly classified patients

at low and high risk by GBS score (TP+TN) among all the patients included in the study (TP+TN+FP+FN). The diagnostic accuracy, sensitivity, specificity, PPV and NPPV of GBS > 3 were calculated manually using 2x2 table and re-checked by MedCalc Diagnostic test evaluation calculator.

Table I: Table showing true positive, true negative, false positive and false negative results with respect to GBS score and episode of rebleeding.

		Rebleeding	
		Yes	**No**
Glasgow-Blatchford score > 3	**Yes**	True Positive(TP)	False Negative(FN)
	No	False Positive(FP)	True Negative(TN)

RESULTS

The study included a total of 165 patients of upper GI bleed. The mean age was 39.4±5.8 years. Amongst all, 73(44.2%) cases were females and 92(55.8%) were males. In 32(24.2%) of patients, there was upper gastrointestinal rebleeding. Study found 80% sensitivity and 92% specificity of Glasgow Blatchford's (GBS) score to predict rebleed in our patients. Positive predictive value was 76.2% while negative predictive value was 93.5% (Table-II). GBS was 89.09% accurate in diagnosing the rebleed in this study population. Age group data stratification was substantial (p-value <0.001). There was a substantial gender-based data stratification (p-value <0.01). Significant data stratification was found for the duration of symptoms as well (p-value <0.001; table-III).

DISCUSSION

A frequent reason for emergency department visits is bleeding in the upper GI tract, which carries a risk of bleeding again. Recurrent upper GI bleeding can be minimized by identifying the high-risk patients and

Table II: The diagnostic accuracy, sensitivity/specificity, positive & negative predictive value of Glasgow Blatchford score (n=165).

Glasgow Blatchford score (GBS)	Re-bleeding n (%)						Total
	Yes			**No**			
	n	**% within re-bleed**	**% within GBS**	**n**	**% within re-bleed**	**% within GBS**	
> 3	32	80%	76.2%	10	8%	23.8%	42(25.5%)
= 3	8	20%	6.5%	115	92%	93.5%	123(74.5%)
Sensitivity 80% (CI 64.35%-90.95%); Specificity 92% (CI 85.78%-96.1%); PPV 76.2% (CI 63.39%-85.54%); NPPV 93.5% (CI 88.53%-96.40%); Diagnostic accuracy 89.09% (CI 83.31%-93.41%)							

Table III: The diagnostic accuracy of Glasgow Blatchford score with respect to stratification for age, gender and duration of symptoms in upper gastrointestinal bleed cases (n=165).

Variable for stratification		Glasgow Blatchford score	Re-bleeding n (%)		Total	p-value	Diagnostic accuracy (95% CI)
			Yes n(%)	**No** n(%)			
Age	**41-50 years (n=75)**	> 3	16(21.3%)	2(2.7%)	18(24%)	<0.001	89.3% (80-95.3)
		= 3	6(8%)	51(68%)	57(76%)		
	30-40 years (n=90)	> 3	16(17.8%)	8(8.9%)	24(26.7%)	<0.001	88.8% (80.5-94.5)
		= 3	2(2.2%)	64(71.1%)	66(73.3%)		
Gender	**Female (n=73)**	> 3	18(24.7%)	2(2.7%)	20(27.4%)	<0.01	91.7% (82.9-96.9)
		= 3	4(5.5%)	49(67.1%)	53(72.6%)		
	Male (n=92)	> 3	14(15.2%)	8(8.7%)	22(23.9%)	<0.001	86.96% (78.32-93.1)
		= 3	4(4.3%)	66(71.7%)	70(76.1%)		
Symptom duration	**> 6 months (n=105)**	> 3	28(26.7%)	8(7.6%)	36(34.3%)	<0.001	86.67% (78.6-92.5)
		= 3	6(5.7%)	63(60%)	69(65.7%)		
	< 6 months (n=60)	> 3	4(6.7%)	2(3.3%)	6(10%)	<0.001	93.3% (83.8-98.2)
		= 3	2(3.3%)	52(86.7%)	54(90%)		

initiating therapy early. The current study compared the GBS score to upper gastrointestinal bleeding recurrence.

The results were compared with previous studies. The sensitivity, specificity, positive predictive value, negative predictive value, and accuracy rate of GBS for identifying patients with upper GI bleed in need of endoscopic intervention were calculated as 93.64%, 37.38%, 70.74%, 78.43%, and 72.00%, respectively, in a study by Samreen et al. on patients with upper GI bleeding.[6] Data stratification for age groups, gender and duration of symptoms was significant with p-value <0.001 in all cases.

Research on 174 individuals with upper GI bleeding was done by Srirajaskanthan et al.[11] Compared to the low-risk group (median 1, p < 0.001), the high-risk group (median = 10) had a considerably greater GBS. Receiver-operator characteristic (ROC) curves were produced to evaluate the GBS's validity in distinguishing between low and high-risk groups. The area under the ROC curve for the GBS was 0.96 (95% CI 0.95-1.00). The sensitivity and specificity of GBS for detecting high risk bleeding were 100% and 68%, respectively, whereas cut-off value of > or = 3 was applied. Thus, the GBS can be used to identify patients who have a low risk of upper GI bleeding at a cut-off value of < or = 2.

Similar outcomes were observed in Tatsuhiro Masaoka's study. Seventy-three (75.3%) of the ninety-three patients that were enrolled were categorized as high-risk. The high-risk group's Blatchford score was noticeably greater than the low-risk groups. The Blatchford scoring system of sensitivity and specificity found to be 100% and 13%, respectively, whereas cut-off value of 2 was applied.[12] Thus, it was determined that the Blatchford scoring system was helpful in differentiating between patients with GI hemorrhage admitted to the emergency department (ED) who were high-risk and those who were low-risk. Of the 354 patients, 326 (92%) had a Blatchford score that indicated a high chance of requiring clinical intervention (blood transfusions, endoscopic procedures, or surgical care to stop bleeding). Out of the 354 patients, 289 (81.6%) were divided clinical Rockall score as high-risk, and 248 (70.1%) by the total Rockall score. When using the Blatchford score instead of the clinical or full Rockall scores, the yield of detecting high-risk cases was much higher (p<0.0001).

A comparative study by Elif Yaka et al[13] concluded that GBS score has high sensitivity as compared to AIMS65 in identifying patients who were not likely to require interventions, including emergency endoscopy as per initial emergency room assessment. A recent meta-analysis included sixteen investigations: three compared the GBS, a modified version of the GBS, and cRockall; one compared the GBS and AIMS65; three examined the Glasgow Blatchford score (GBS); two examined AIMS65. Six studies compared the GBS and cRockall. While the cRockall and AIMS65 showed 0.93 and 0.24 and 0.79 and 0.61 overall sensitivity and specificity, respectively, the GBS showed 0.98 and 0.16. The 0.99 sensitivity and 0.08 specificity were displayed by the GBS with a 0-cutoff point. The GBS with a cutoff point of 0 was superior to other cutoff points and risk ratings for identifying patients who were low-risk, while having a somewhat low specificity.[12] We have used the cut-off value of GBS >3, certain international studies have used various cut-off values of GBS e.g. > 3 or > 4. While comparing and interpreting the results, we should consider the cut-off value used in the study that may be the reason for the variable results.[14]

Earlier in 2007 I-Chuan Chen et al[15] stated that Blatchford score may be a useful risk stratification tool to detect the need for intervention in acute non-variceal upper GI bleed cases. This was later verified by sequence of international studies.[16,17] Regional data form Pakistan shows that limited local data is available regarding GBS score in our population. A study by Samreen et al conducted at Holy Family Hospital Rawalpindi is worth mentioning which found a high diagnostic accuracy of GBS. The sensitivity, specificity, positive predictive value, negative predictive value, and accuracy rate of GBS for identifying patients with Upper GI bleed in need of endoscopic intervention were calculated as 93.64%, 37.38%, 70.74%, 78.43%, and 72.00%, respectively in patients with upper GI bleeding.[18] It was suggested by Samreen at al that this rating system's low specificity makes it unsuitable for regular routine use in every upper GI bleed patient.

Ebrahimi et al[19] conducted a meta-analysis on various score for upper GI bleed. He concluded that GBS score was highly sensitive for 30-days mortality and for rebleed risk assessment. The results of Khalil et al[20] in his study conducted at Fauji Foundation Hospital Rawalpindi also showed the significant accuracy of GBS score for risk assessment in upper GI bleed cases. At the cut-off value of ≥ 4, GBS score accurately identifies 97.7% of the high-risk upper GI bleed patients.

The data from our study will contribute to regional data and will also be helpful for international comparison.

This may help our emergency team at their initial encounter to filter out and prioritize the cases with high risk of re-bleed. Hence, intensifying the monitoring and improving the decision making regarding invasive intervention in upper GI bleed cases. All these measures ultimately lead to better outcome in terms of patient care and reduce the mortality in upper GI bleed cases. Also, GBS score can be calculated by physicians, emergency duty doctors and consultants who are in primary care centers or peripheries. This may alert about the severity of the condition followed by immediate referral. Similarly, GBS score may be used as an auxiliary tool by the gastroenterologists or endoscopists to decide for the urgency of the procedure in individual upper GI bleed cases.

Limitations of the study: It was a single center study with limited data. It was difficult to evaluate the GBS in emergency department (overburdened area).

CONCLUSION

The Glasgow-Blatchford Score is a valuable tool for predicting the risk of rebleeding in patients with upper GI bleeding, demonstrating high sensitivity, specificity, and diagnostic accuracy. This scoring system can guide risk stratification and resource allocation, particularly in resource-constrained emergency settings. .

Conflict of interest: The authors declare no conflict of interest.

Authors' Contributions:

Sidra Rehman: Conception of study / Designing / Planning, Experimentation / Study Conduction

Sadia Ahmed: Experimentation / Study Conduction, Analysis / Interpretation / Discussion

Abida Mateen: Experimentation / Study Conduction, Manuscript Writing

Usman Ali: Conception of study / Designing / Planning, Analysis / Interpretation / Discussion

Nadia Shams: Conception of study / Designing / Planning, Facilitated for Reagents / Material Analysis

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