

Evaluating the Effectiveness of Modified Early Warning, Glasgow Blatchford, and Pre - Endoscopic Rockall Scoring Systems in Predicting Outcomes of Upper Gastrointestinal Bleeding in Emergency Care

Dorasanamma Malli¹, Gadam Sai Teja², Gujjula Sidhartha³

¹Associate Professor, Department of General Medicine, Narayana Medical College and Hospital, Chintareddypalem, Nellore, Andhra Pradesh, India - 524003

Email: [dorasanammamalli\[at\]gmail.com](mailto:dorasanammamalli[at]gmail.com)

²Narayana Medical College and Hospital, Chintareddypalem, Nellore, Andhra Pradesh, India – 524003

Email: [sajtejagadam\[at\]gmail.com](mailto:sajtejagadam[at]gmail.com)

³Narayana Medical College and Hospital, Chintareddypalem, Nellore, Andhra Pradesh, India – 524003

Email: [gujtin77\[at\]gmail.com](mailto:gujtin77[at]gmail.com)

Abstract: Upper Gastrointestinal Bleeding (UGIB) is a common potentially life - threatening presentation to an Emergency Department (ED). In a busy ED, proper risk stratification and disposition of this critical presentation is critical for better patient management and resource utilization. Triage and scoring systems, which divide patients into low - risk and high - risk groups based on admission criteria prior to endoscopy, may be more practical. For patients suffering from acute GIS bleeding, risk scores based on clinical and endoscopic variables have been developed. We compared the utility of three scoring systems [Modified early warning score (MEWS), pre - endoscopic Rockall Score (PERS), and Glasgow Blatchford Score (GBS)] in predicting 15 - day mortality and predicting blood transfusion need, re bleeding, and outcome within a 15 - day period. By comprehending the predictable nature of UGIB, healthcare professionals can identify individuals at risk and offer timely interventions. In conclusion, the GBS predicted the need for packed red blood cell transfusions better than the MEWS score and the pre - endoscopic Rockall score. In comparison to other scoring systems, the MEWS score is better at predicting admission and bleeding type. This study presents a remarkable insight of UGIB with profound implications for management and future therapeutic approaches.

Keyword: Upper Gastrointestinal Bleed, Modified early warning score (MEWS), pre - endoscopic Rockall Score (PERS), and Glasgow Blatchford Score (GBS)

1. Introduction

Upper gastrointestinal bleeding (UGIB) is a common emergency that can be fatal and originates from a site close to the ligament of Treitz. UGIB patients may present with wide variety of clinical severity for which early detection and treatment is required. UGIB is classified as either variceal (which includes portal hypertension) and Non - variceal bleed (which includes peptic ulcer, erosive gastritis, reflux esophagitis, Mallory Weiss syndrome, tumours etc.)

To distinguish between high risks critical patients who require an immediate endoscopic intervention and low risk patients for outpatient examination, proven risk grading systems should be employed. To forecast the risk of

mortality prior to endoscopy, there are a few risk score methods such as The Modified Early Warning Score, Glasgow Blatchford Scores, and Pre - Endoscopic Rockall Score can be utilized in an emergency.

There is a lack of a single scoring method that can be **GLASGOW BLATCHFORD SCORE** applied universally to upper GI bleeding before endoscopy or in ER. Hence the purpose of this study is designed to assess how well each scoring system can forecast 15 - day death in patients who have UGIB. This study sought to establish the effectiveness of the GBS, MEWS, and PER scores in predicting the type of bleeding, the need for blood transfusion, the outcome, and rebleeding within a 15 - day window.

Modified Early Warning Score (MEWS)

Score	3	2	1	0	1	2	3
SBP mmHg	<70	71- 80	81-100	101-199	-	>200	-
Heart rate, bpm	-	<40	41- 50	51-100	101-110	111-129	>130
Respiratory rate, rpm	-	<9	-	9-14	15-20	21- 29	>30
Temperature, IC	-	<35	-	35- 38.4	-	>38.5	-
AVPU	-	-	-	A	V	P	U

AVPU: A alert, V reacting to voice, P reacting to pain, U unresponsive

Pre – Endoscopic Rockall Score

Variables	Score Component Value	Patient value
Age in years		
<60	0	
60 to 79	1	
≥ 80	2	
Shock		
No Shock: SBP ≥100mm of Hg, Pulse < 100 beats per min	0	
Tachycardia: SBP ≥100mm of Hg, Pulse ≥ 100 beats per min	1	
Hypotension: SBP <100mm of Hg	2	
Comorbidity		
No major Comorbidity	0	
Congestive heart failure, Ischemic heart disease, any major comorbidity	2	
Renal failure, Liver Failure, Disseminated malignancy	3	
Clinical Rockall Score		

Score	% chance of mortality
0	0.2%
1	2.4%
2	5.6%
3	11%
4	24.6%
5	39.6%
6	48.9%
7	50%

Admission risk markers	Score Component Value	Patient value
Blood Urea nitrogen (mg/dL)		
≥ 18.2 to <22.4	2	
≥ 22.4 to < 28	3	
≥ 28 to < 70	4	
≥ 70	6	
Hemoglobin (g/dL) for men		
≥ 12 to < 13	1	
≥ 10 to < 12	3	
< 10	6	
Hemoglobin (g/dL) for women		
≥ 10 to < 12	1	
< 10	6	
Systolic blood pressure (mm Hg)		
≥ 100 to < 109	1	
≥ 90 to < 99	2	
< 90	3	
Other Markers		
Pulse > 100 per min	1	
Presentation with melena	1	
Presentation with syncope	2	
Hepatic disease	2	
Cardiac failure	2	

Score 0-minimum risk of need an intervention
 Any Score- 0 is high risk for need intervention
 Score ≥ 6 - ≥ 50% risk of need an intervention

Study Design: This is a Prospective observational cohort study. SAMPLE SIZE: 51 patients

Sampling Method: Convenience sampling

Duration of Study: From February 2020 to June 2022.

Inclusion Criteria:

All patients >18 years of age presenting to the Emergency department with the complaint of upper GI bleed.

Exclusion Criteria:

- 1) Patients <18 years of age
- 2) Pregnant woman
- 3) Trauma patients.
- 4) Non upper GI - bleed.

Statistical Analysis:

SPSS (Statistical Package for Social Sciences) version 20. (IBM SPASS statistics [IBM corp. released 2011] was used to perform the statistical analysis. Descriptive statistics of the explanatory and outcome variables were calculated by mean, standard deviation for quantitative variables, frequency, and proportions for qualitative variables.

Inferential Statistics:

Chi - square test was applied for qualitative variables ROC curve was computed to find the cut - off values, sensitivity and specificity of MEW, GBS and PERS scale to predict Bleeding type, admission, follow – up presentation, Blood transfusion and outcome.

2. Literature Survey

The approach to upper FIB consists of maintaining hemodynamic stability and determining the amount and location of bleeding. Physical examination, diagnostic procedures, and therapeutic efforts should all be initiated simultaneously in UGIB, as in all life - threatening conditions in an emergency department, and patients should be resuscitated and stabilized. Despite numerous studies on prognostic risk factors of UGIB, patient management lacks a universal scoring system which can be used in an emergency for both variceal and non- variceal bleeding. This research holds promise for improved management strategies in the future. In conclusion, the literature survey highlights the use of scoring system for UGIB, its clinical significance, and the ongoing efforts to better understand and manage UGIB in a sequential and predictable manner.

3. Discussion

In the present study, total of 51 patients were managed for Upper GI Bleeding by the Emergency medicine and Medical Gastroenterology departments during 2020 to 2022. The results of 51 patients were analysed systematically and represented below with tables and graphs. The youngest patient in this study was 20 years old and the oldest patient was 84 years old. The mean age was 51.8 years. Endoscopy was performed on all patients in our study as per hospital policy.

Demographical and clinical data of the patients included in the study:

Data	Number	%
Gender		
Female	42	82.3%
Male	9	17.6%
Complaint		
Melena	15	29%

Hematemesis	30	58%
Syncope	6	11.7%
Bleeding Type		
Varicous	15	29.4%
Non Varicous	36	70.58%
Hospital Outcome		
Discharge	47	92.1%
Death	4	7.84%
Hospitalization place		
Intensive care unit	25	49.01%
Ward	26	50.9%
Blood Transfusion		
Yes	14	27.4%
No	37	72.5%
Rebleeding within 15 days		
Yes	7	1.36%
No	40	78.43%

	6	5 (9.8%)
	> 6	6 (11.76%)
GLASGOW BLATCHFORD SCORE (GBS)	0- 5	9 (17.6%)
	> 6	42 (82.3%)

Diagnostic Accuracy Test of MEWS, GBS and PERS Score to predict bleeding type

	Area	Std. Error	p Value	Asymptotic 95% confidence Interval	
				Lower Bound	Upper Bound
MEWS	.854	.072	.041*	.713	.996
GBS	.635	.103	.435	.433	.838
PERS	.698	.068	.254	.565	.831

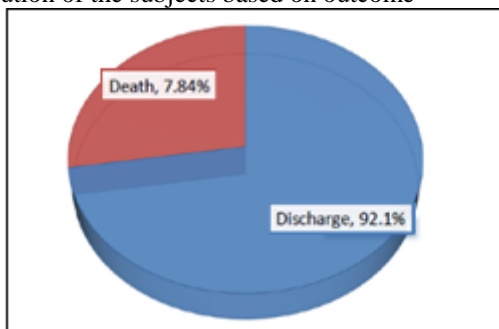
* significant

Descriptive statistics of study subjects:

Variables	Mean	Standard Deviation
Age	51.8	14.96
HR	89.01	9.19
SBP	119.60	22.44
HB	8.85	2.69
BUN	25.90	20.33
GBS	10.03	3.35
PER	0.74	1.35
MES	1.31	0.73

HR – Heart rate, SBP – Systolic Blood Pressure, HB - Haemoglobin, BUN – Blood Urea Nitrogen, GBS – Glasgow Blatchford Score, PER – Pre - Endoscopic Rockall Score, MES - Modified Early Warning Score

Distribution of the subjects based on outcome



In present study 47 [72.5%] patients discharged after one week of admission. 4 [27.5%] patients died during hospital admission.

Mean Age distribution of the Subjects

	N	Minimum	Maximum	Mean	SD
MEWS	51	.0	4.0	1.569	.90
GBS	51	.0	19.0	8.765	3.94
PERS	51	1.0	12.0	3.706	2.59

Scoring System	Score	Number (%)
MODIFIED EARLY WARNING SCORE (MEWS)	0	3 (5.88%)
	1	26 (50.9%)
	2	13 (25.4%)
	>3	9 (17.64%)
PRE ENDOSCOPIC ROCKALL SCORE (PERS)	1	17 (33.3%)
	2	4 (7.84%)
	3	3 (5.88%)
	4	6 (11.76%)
	5	10 (19.6%)

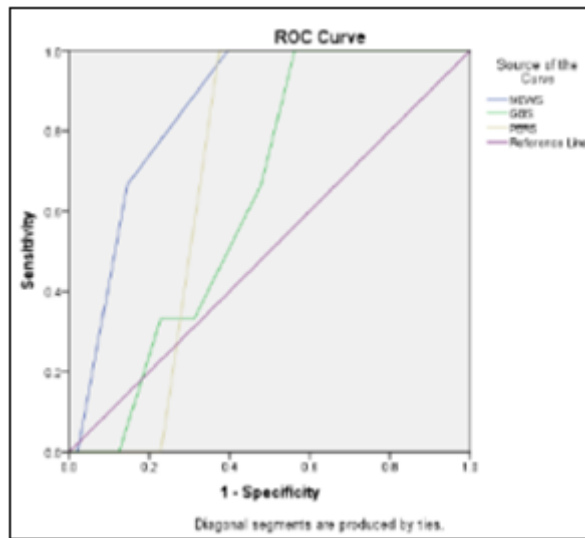


Table 23: Diagnostic Accuracy test of MEWS, GBS and PERS Score to Predict Admission

	Area	Std. Error	p Value	Asymptotic 95% confidence Interval	
				Lower Bound	Upper Bound
MEWS	.652	.077	.062	.501	.804
GBS	.645	.077	.077	.493	.796
PERS	.628	.079	.116	.474	.783

The MEWS, GBS, and PERS scores were 1.5, 8.5, and 4.5, respectively, to predict the type of bleeding. In ROC analyses, MEWS outperformed GBS and pre - ERS scores in predicting bleeding type (AUC 0.85 vs 0.63 vs 0.69, respectively). The P value is statistically significant (p=0.04).

The MEWS, GBS and PERS score to predict Admission was 1.5, 8.5 and 4.5 respectively.

On ROC analyses, MEWS was superior to GBS and pre - ERS scores in predicting Admission (AUC 0.65 vs 0.64 vs 0.62, respectively). P value is statistically Insignificant (p=0.06).

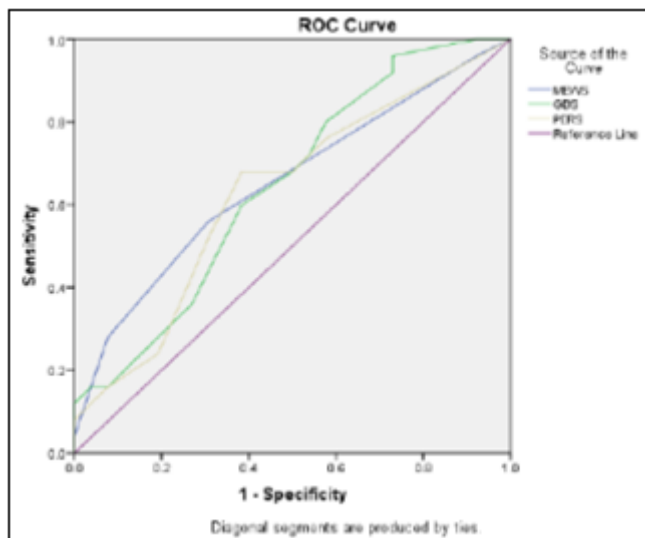


Table 23: Diagnostic Accuracy test of MEWS, GBS and PERS Score to Predict Blood Transfusion

	Area	Std. Error	p Value	Asymptotic 95% confidence Interval	
				Lower Bound	Upper Bound
MEWS	.702	.089	.027*	.527	.877
GBS	.771	.070	.003*	.633	.909
PERS	.569	.093	.454	.385	.752

* significant

The MEWS, GBS and PERS score to predict blood transfusion was 1.5, 8.5 and 4.5 respectively. 41

On ROC analyses, GBS was superior to PERS and MEWS scores in predicting blood transfusion (AUC 0.77 vs 0.56 vs 0.70, respectively). P value is statistically significant (p=0.03).

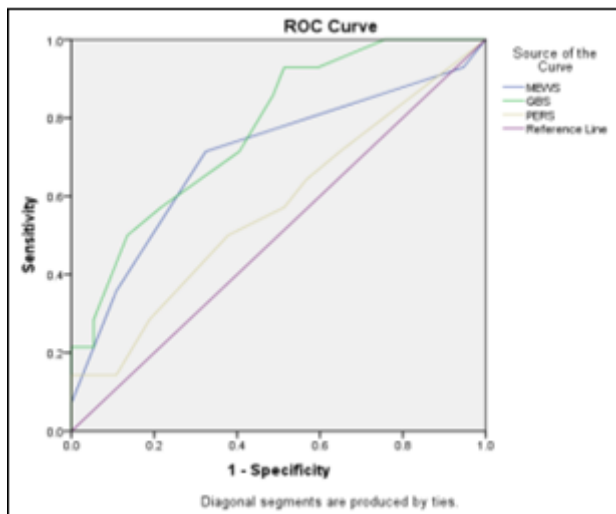


Table 24: Diagnostic Accuracy test of MEWS, GBS and PERS Score to Predict Rebleeding

	Area	Std. Error	p Value	Asymptotic 95% confidence Interval	
				Lower Bound	Upper Bound
MEWS	.558	.131	.622	.302	.815
GBS	.310	.119	.109	.077	.543
PERS	.792	.066	.014*	.663	.922

* significant

The MEWS, GBS and PERS score to predict Re bleeding was 1.5, 8.5 and 4.5 respectively. On ROC analyses, PERS was superior to GBS and MEWS scores in predicting Re bleeding (AUC 0.79 vs 0.31 vs 0.55, respectively). P value is statistically significant (p=0.01).40

On ROC analyses, PERS was superior to GBS and MEWS scores in predicting Re bleeding (AUC 0.79 vs 0.31 vs 0.55, respectively). P value is statistically significant (p=0.01).

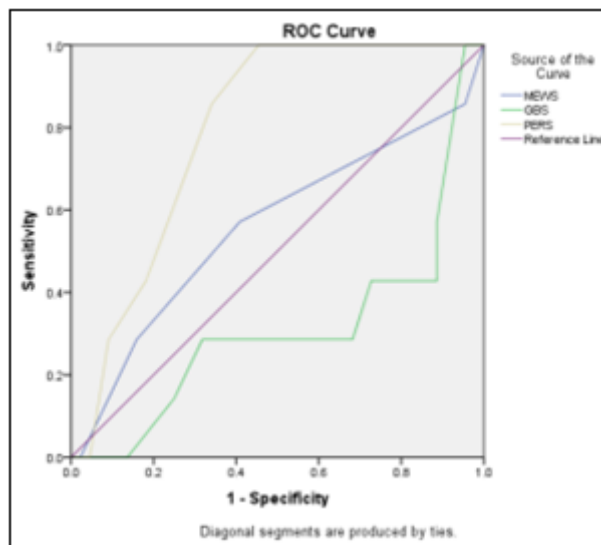
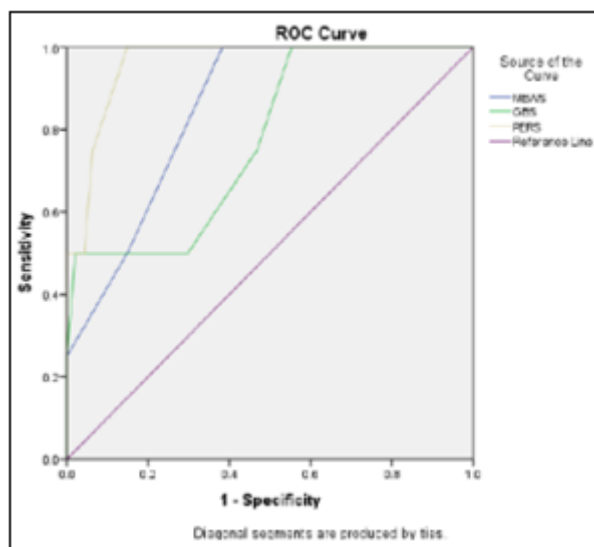


Table 26: Diagnostic Accuracy test of MEWS, GBS and PERS Score to Predict Outcome

	Area	Std. Error	p Value	Asymptotic 95% confidence Interval	
				Lower Bound	Upper Bound
MEWS	.848	.075	.022*	.702	.995
GBS	.774	.120	.071	.539	1.000
PERS	.960	.031	.002*	.900	1.000

* significant

The MEWS, GBS and PERS score to predict outcome was 1.5, 8.5 and 4.5 respectively. On ROC analyses, PERS was superior to GBS and MEWS scores in predicting outcome (AUC 0.96 vs 0.77 vs 0.84, respectively). P value is statistically significant (p=0.02).



In comparison to MEWS and Glasgow Blatchford, the ROC curve for 15 days mortality calculated for PERS was 0.96; 95% CI of 0.9 - 1.0, which indicates good accuracy. ROC for predicting rebleed by PERS score showed area under curve - 0.79, which also better than the other 2 scoring systems. ROC for prediction of bleeding type by MEWS showed AUC of 0.854 better than other two scoring systems, and for prediction of Admission by MEWS showed area under the curve 0.65 showed good accuracy in comparison to PERS and GBS. In comparison to PERS and MEWS, the receivers operating curve for predicting the need for a blood transfusion by GBS showed an area under the curve of 0.77 with a p value of 0.003.

4. Conclusion

In our study, we observed that the PERS score predicted rebleeding and mortality within 15 days better than other scoring systems. The GBS predicted the need for packed red blood cell transfusions better than the MEWS score and the pre - endoscopic Rockall score. In comparison to other scoring systems, the MEWS score is better at predicting admission and bleeding type.

5. Future Scope

There are only a few reports on the validation of MEWS, GBS, and pre - ERS risk scores in patients with Upper Gastrointestinal bleed in an Emergency Department, and no such studies in Indian patients. Rebleeding has an impact on patient's outcomes and is regarded as the most important risk factor for mortality. Hence, it is critical to forecast this complication as accurately as possible. Ongoing research and interdisciplinary collaboration will be instrumental in improving the management and prevention of Upper Gastrointestinal bleed.

References:

- [1] Mahajan P, Chandail VS. Etiological and endoscopic profile of middle aged and elderly patients with upper gastrointestinal bleeding in a Tertiary Care Hospital in North India: A retrospective analysis. *Journal of Mid - life Health*.2017 Jul; 8 (3): 137.
- [2] Wedi E, Fischer A, Hochberger JA, Jung C, Orkut S, Richter - Schrag HJ. Multicenter evaluation of first - line endoscopic treatment with the OTSC in acute nonvariceal upper gastrointestinal bleeding and comparison with the Rockall cohort: the FLETRock study. *Surgical Endoscopy*.2018 Jan; 32 (1): 307 - 14.
- [3] Hsu S - C, Chen C - Y, Weng Y - M, Chen S - Y, Lin C - C, Chen J - C. Comparison of 3 scoring systems to predict mortality from unstable upper gastrointestinal bleeding in cirrhotic patients. *Am J Emerg Med*.2014 May; 32 (5): 417-20.
- [4] Subhash Chandra, Erik P. Hess, Dipti Agarwal et al., External validation of the Glasgow - Blatchford Bleeding Score and the Rockall Score in the US setting. *American Journal of Emergency Medicine* (2012) 30, 673-79
- [5] Reed EA, Dalton H, Blatchford O, Ashley D, Mowat C, Gaya DR, et al. Is the Glasgow Blatchford score useful in the risk assessment of patients presenting

with variceal haemorrhage: *Eur J Gastroenterol Hepatol*.2014 Apr; 26 (4): 432-7.

- [7] Robertson M, Majumdar A, Boyapati R, Chung W, Worland T, Terbah R, Wei J, Lontos S, Angus P, Vaughan R. *GastrointestEndosc*.2016 Jun; 83 (6): 1151 - 60. doi: 10.1016/j. gie.2015.10.021. Epub 2015 Oct 26.
- [8] Farooq FT, Lee MH, Das A, Dixit R, Wong RC. Clinical triage decision vs riskscores in predicting the need for endotherapy in upper gastrointestinal bleeding. *Am J Emerg Med*.2012; 30: 129-34.
- [9] Choe JW, Kim SY, Hyun JJ, Jung SW, Jung YK, Koo JS, et al. Is the AIMS 65score useful in predicting clinical outcomes in Korean patients with variceal and nonvariceal upper gastrointestinal bleeding? *Gut Liver*.2017; 11 (6): 813 - 20.