Original Article

Comparing the Blatchford and Rockall Score in Predicting the Need for Endoscopic Therapy in Patients with Upper GI Hemorrhage

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ABSTRACT

Background: The need for therapeutic endoscopy in patients with upper GI Bleeding (UGIB) is important in determining the risk and disposition of these patients. Pre-endoscopic risk scores may be helpful in predicting this need.

Methods: This is a prospective (cohort) study was conducted at Bhumibol Adulyadej Hospital. 212 patients who were admitted to the hospital with a principal diagnosis of UGIB between January 2012 - December 2012 and who arrived at the endoscopy room were recruited in the study.

Results: We identified 212 patients with the following characteristics: mean age of 58.4 years (SD, 16.1 years), 29.7% women, 17.5% with a history of liver disease, and 22.2% with history of previous gastrointestinal bleeding. There were 55 patients (25.9%) need endoscopic therapy. Of these, two patients (0.9%) underwent surgery. Rebleeding was found in 4 patients (1.9%), and 2 patients (0.9%) were rehospitalized for UGIB within 30 days after admission. By ROC curve analysis, the post-endoscopy Rockall score (RS) was superior to the Glasgow Blatchford Score (GBS) for prediction of intervention (AUC 0.75 (95% CI 0.68-0.82) vs. 0.53 (95% CI (0.44-0.61) and the AUC for GBS was inferior to pre-endoscopic RS (AUC 0.61 (95% CI 0.52-0.69). The specificity of GBS and RS was suboptimal at all potential decision thresholds.

Conclusions: Glasgow Blatchford Score of 0 predicts low-risk patients who will not require an immediate EGD for endoscopic hemostasis with 100% accuracy. The specificity of GBS and RS was insufficient to recommend use of either score in clinical practice.

Key words : UGIB, gastrointestinal bleeding, Rockall score, Glasgow Blatchford score

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Introduction

Upper gastrointestinal bleeding (UGIB) is one of the common causes of hospitalization in Thailand. The overall mortality was 6.7% which was comparable to that from Western countries[1]. The accuracy of predictive score can assist the physician to make a decision in patient management. The well-validated clinical predictors for UGIB have potential to reduce the burden of hospitalization and reduce health-care costs. Several UGIB risk scores have been developed[1,4-19]. Most scoring systems require endoscopy including the commonly used Rockall score[2,3], which was introduced to assess risk of death following UGIB. An abbreviated admission Rockall score which excludes the endoscopic parameters is sometimes used, however, this has not been fully validated. The Glasgow Blatchford Score (GBS) are also the well known risk score to predict the outcome and death following UGIB (Table 1). This score does not require endoscopy and is based on simple clinical and laboratory parameters which are available soon after presenting at the Emergency Department.

The recent publications have identified a low-risk UGIB patients who could be safely managed without admission by using GBS[5-8,14] and suggested that the GBS may be superior to the Rockall scores (Table 2) in predicting the combined outcome of intervention or death. Therefore, the aim of this study was to compare the GBS with both the full and admission Rockall scores in predictive outcome accuracy and predictive the need for intervention or death of UGIB patients.

Table 1. The Glasgow Blatchford Score (GBS).

Admission risk marker	Score component value
Blood urea nitrogen level (mg/dL)	
≥ 18.2 to < 22.4	2
≥ 22.4 to < 28	3
≥ 28 to < 70	4
≥ 70	6
Hemoglobin level for men (g/dL)	
≥ 12 to < 13	1
≥ 10 to < 12	3
< 10	6
Hemoglobin level for women (g/dL)	
≥ 10 to < 12	1
< 10	6
Systolic blood pressure (mm Hg)	
≥ 100 to < 109	1
≥ 90 to < 99	2
< 90	3
Other markers	
Pulse rate ≥ 100 beats/min	1
Presentation with melena	1
Presentation with syncope	2
Hepatic disease	2
Heart failure	2

Range of scores is from 0 to 23; matimun score to 23, high risk, greater than 0.

Patients and Methods

Study group

Data of consecutive outpatients who were admitted to the hospital with a principal diagnosis of UGIB and underwent esophagogastroduodenoscopy (EGD) between January 1, 2012 and December 31, 2012 at Bhumibol Adulyadej Hospital were prospectively collected by a team of doctors and research nurses after the patients provided informed consent. 212 patients were enrolled in this study, younger than the age of 18 years and those with primary diagnoses other than UGIB were excluded from the study. UGIB was defined as hematemesis, coffee grounds vomiting, melena, or hematochezia. Data collected including; demographics, modes of presentation, comorbidities, hemodynamics at the presentation, initial hemoglobin and urea levels, endoscopic finding, number of blood transfusion, causes of UGIB, types of endoscopic treatment and history of recent medications (i.e. nonsteroidal anti-inflammatory drugs (NSAIDs), aspirin, antiplatelete, and anticoagulant drugs) were also reviewed. Data collections were made by a blinded research assistant.

EGD was performed within 24 hours after admission in all cases. Causes of bleedings were classified to variceal (esophageal or gastric varices) and non-variceal etiology (others cause). The outcome of bleeding was recorded. Rebleeding[11] was defined as overt fresh bleeding after initial stabilization, or a fall in blood pressure after initial stabilization or a fall in hemoglobin of more than 2 g within 24 h.

Statistical analysis

Descriptive analysis is used to describe the demographic characteristics. Enumerate data type is pre-

Table 2. The Rockall Score (RS)

Variable	Score			
	0	1	2	3
Age (yr.)	< 60	60-79	≥ 90	
Shock		HR > 100 beats/min	SBP < 100 mm Hg	
Comorbidity			IHD, CHF, any major comorbidity	renal failure, liver failure, metastatic malignancy
Endoscopic diagnosis	Mallory-Weiss tear or no lesion observal	peptic ulcer disease, erosive esophagitis	malignancy of upper GI tract	
Stigmata of recent hemorrhage	clean-based ulcer, flat pigmented spot		blood in upper GI tract, clot, visible vessel, bleeding	

sented as frequencies and percentage. The continuous variables are presented with mean and standard deviation. Median, minimum - maximum were used in data that not normal distribution. Continuous variables were analyzed by Unpaired *t*-tests, and categorical variables were analyzed by Chi-square test or Fisher-exact tests. Estimates of sensitivity, specificity, and positive and negative predictive value with 95% confidence intervals (CIs) were calculated at each potential decision threshold for GBS and the pre- and post-endoscopy RS. The validity of the scoring systems were assessed by plotting receiver-operating characteristic (ROC) curves. All statistical analyses were performed with SPSS version 16. A *p*-value of less than 0.05 was taken to be statistically significant.

RESULTS

Between January 1, 2012 and December 31, 2012, 212 patients presented to the Emergency Department of Bhumibol Adulyadej Hospital, with UGIB and subsequently had an EGD as an inpatient within 24 hours. The mean (standard deviation) age of the patients was 58.4 (16.1) years; 70.3% of them were male and 63 were women (29.7%). Blood in vomitus was the most common (49.0%) presenting complaint. There were 17.5% with history of liver disease and 22.2% with history of previous gastrointestinal bleeding. About 35.8% (76/212) were actively taking NSAIDs, 23.6% (50/212) taking antiplatelete drugs before UGIB developed. A total of 50 patients (23.6%) were admitted to the hospital after initial assessment. The patients' demographics and clinical characteristics relevant to

Table 3. Patient demographics and presenting characteristics.

Characteristic	Patients (%) (N=212)
Mean age, (SD)	58.4 (16.1)
Male, (%)	149 (70.3%)
Presenting symptoms	
Blood in vomitus	104 (49.0%)
Coffee ground content	5 (2.4%)
Anemia	13 (6.1%)
Syncope	17 (8.0%)
Melena	72 (34.0%)
Hematochezia	1 (0.5%)
Medical History	
Known coronary artery disease	17 (8.0%)
Chronic renal insufficiency	14 (6.6%)
Liver disease	37 (17.5%)
Previous history of UGIB	47 (22.2%)
Disposition	
Admitted to ER	162 (76.4%)
Admitted to the ICU	2 (0.9%)
Admitted to the observation unit	15 (7.1%)
Ward	33(15.6%)
30 day outcomes	
Need blood transfusion	92 (43.4%)
Endoscopic interventions to stop bleeding	55 (25.9%)
Need surgery	2 (0.9%)
Bleeding recurrence	4 (1.9%)
Hospital readmission for UGIB	2 (0.9%)
Death	3 (1.4%)

the Blatchford and pre-endoscopic Rockall scores are listed in Table 3.

Upper GI endoscopy was performed in 212 patients. Of these, 178 patients (83.9%) were non-variceal and 34 patients (16.1%) were variceal bleeding. The causes of non-variceal bleeding were peptic ulcer disease in 140 patients (66%), Of these, 27 patients (12.8%) had stigmata of recent bleeding. The patients with peptic ulcer disease and varices caused required endoscopic treatment more than patients with erosions and mucosal abnormalities (p <0.001) (Table 4).

There were 55 patients (25.9%) need endoscopic therapy. Two patients (0.9%) underwent surgery. Rebleeding was found in 4 patients (1.9%), and 2 patients (0.9%) were rehospitalized from UGIB within 30 days. Three patients (1.4%) died within 30 days (Table 3).

No death or rebleeding found in these patients with Blatchford score 0. The Blatchford score for patients needed therapeutic endoscopy was not significantly higher than the patients did not therapeutic endoscopy (Table 5, 8). The area under an ROC curve

Table 4. The results of initial EGD finding, patients (%).

Finding	Therapeutic endoscopy not needed (n=159)	Therapeutic endoscopy needed (n=53)	*p*-value
MW Tear	5 (3.14)	1 (1.89)	1.00
Esophagitis	1 (0.63)	0	1.00
Gastritis	16 (10.06)	1 (1.89)	0.08
Malignancy	2 (1.26)	0	1.00
Gastric/Duodenal Ulcer	120 (75.47)	20 (37.74)	<0.001
Esophageal Varices	11 (6.92)	18 (33.96)	0.00
Gastric Varices	2 (1.26)	3 (5.66)	0.10
Other	2 (1.26)	10 (18.87)	<0.001

Table 5. Distribution of the Blatchford score stratified according to the need for intervention, death and rebleeding.

Blatchford score	Death (%)	Rebleeding (%)	Need intervention (%)	Total
0	0	0	0	3
1	0	0	1 (11.1)	9
2	0	0	0	4
3	0	0	0	4
4	0	0	1 (16.7)	6
5	0	0	3 (50.0)	6
6	0	0	2 (25.0)	8
7	0	1 (6.7)	2 (13.3)	15
8	0	0	7 (43.8)	16
9	0	0	4 (25.0)	16
10	0	0	5 (20.8)	24
11	0	0	11 (39.3)	28
12	1 (3.3)	1 (3.3)	7 (23.3)	30
13	0	0	5 (27.8)	18
14	0	1 (11.1)	2 (22.2)	9
15	0	0	2 (18.2)	11
16	0	1 (25.0)	1 (25.0)	4
17	0	0	0	1
Total	**1**	**4**	**53**	**212**

Table 6. Distribution of the Rockall score stratified according to the need for intervention, death and rebleeding.

The Rockall score	Death (%)	Rebleeding (%)	Need intervention (%)	Total
0	0	0	4 (12.5)	32
1	1 (1.8)	0	11 (19.6)	56
2	0	2 (4.8)	11 (26.2)	42
3	0	2 (5.9)	10 (29.4)	34
4	0	0	9 (37.5)	24
5	0	0	7 (35.0)	20
6	0	0	1 (33.3)	3
7	0	0	0	1
Total	**1**	**4**	**53**	**212**

Table 7. Distribution of the post-endoscopic Rockall scores stratified according to the need for intervention, death and rebleeding.

The complete Rockall Score	Death (%)	Rebleed (%)	Intervention (%)	Total
0	0	0	0	2
1	0	0	0	27
2	0	0	3 (7.7)	39
3	1 (2.9)	0	8 (23.5)	34
4	0	1 (2.4)	12 (28.6)	42
6	0	1 (3.6)	11 (39.5)	28
6	0	2 (8.3)	9 (37.5)	24
7	0	0	6 (60.0)	10
8	0	0	4 (66.7)	6
Total	**1**	**4**	**53**	**212**

Table 8. Sensitivity and specificity of GBS, pre-endoscopic RS (at admission), and post-endoscopic RS (full) in predicting need for intervention, rebleeding or death at potential decision thresholds

Score	Need Intervention	Rebleeding	Death
Blatchford score			
Sensitivity	100	100	100
Specificity	1.89	1.44	1.42
Positive predictive value	25.36	1.91	0.48
Negative predictive value	100	100	100
Rockall Score (Pre-endoscopic)			
Sensitivity	92.45	100	100
Specificity	17.61	15.38	15.17
Positive predictive value	27.22	2.22	0.56
Negative predictive value	87.50	100	100
Rockall Score (Post-endoscopic)			
Sensitivity	94.34	100	100
Specificity	40.88	32.69	32.23
Positive predictive value	34.72	2.78	0.69
Negative predictive value	95.59	100	100

was 0.53 (95% CI, 0.44-0.61) (Figure 1). The distribution of the patient scores, stratified according to the need for therapeutic endoscopy, is shown in Figure 2. A threshold of 0 (low risk) and 1 or above (high risk) predicts the need for therapeutic endoscopy with 100% sensitivity; the associated negative predictive value is 100%. The specificity, however, is only 1.89%, and the positive predictive value is 25.36%. Three patients (1.4%) scored 0 and were identified as low risk. Neither of them required endoscopic therapy, rebleeded, nor died within 30 days of admission.

At a score of 0, pre-endoscopic RS had a sensitivity of 92.5% (95% CI 81.8-97.9) and specificity of 17.6% for identified as low risk (Table 9). However, the pre-endoscopic RS was significantly higher in those who required therapeutic endoscopy compared with those who did not, it was unable to definitively discriminate those who required or did not require therapy at any score (Figure 3).

For post-endoscopic RS, 29 patients (13.67%) were classified as low risk at the cutoff score < 2. They had sensitivity 94.34%, specificity 40.8%, negative predictive value 95.59%, and positive predictive value 34.72%.

The Blatchford score, pre-endoscopic RS and post endoscopic RS had AUCs for rebleeding as shown in Table 10 (GBS:0.72, 95% CI 0.62-0.82); pre endoscopic RS:0.28, 95% CI 0.12-0.44; post-endoscopic RS:0.40, 95% CI 0.29-0.51). The Blatchford score, pre-endoscopic RS and post endoscopic RS had AUCs for death as shown in Table 11 (GBS:0.71, 95% CI 0.42-1.0); pre-endoscopic RS:0.60, 95% CI 0.49-0.72; post-endoscopic RS:0.77, 95% CI 0.64-0.89). By ROC curve analysis, the post-endoscopic RS was superior to GBS for prediction of intervention by AUC 0.75 (95% CI 0.68-0.82) vs. 0.53 (95% CI (0.44-0.61) and the AUC for GBS was inferior to pre-endoscopic RS by AUC 0.61 (95% CI 0.52-0.69) (Table 12).

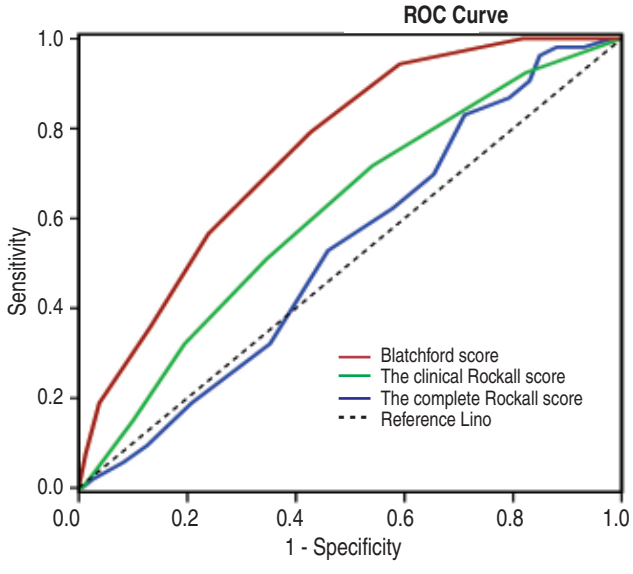

Figure 1. Receiver operating characteristic curves of GBS, post-endoscopic RS, and pre-endoscopic RS. Area under the curve for the prediction of endoscopic or surgical intervention: GBS, 0.53 (0.44-0.69). post-endoscopic RS, 0.75 (95% CI, 0.64-0.80); pre-endoscopic RS, 0.613 (95% CI, 0.52-0.69)

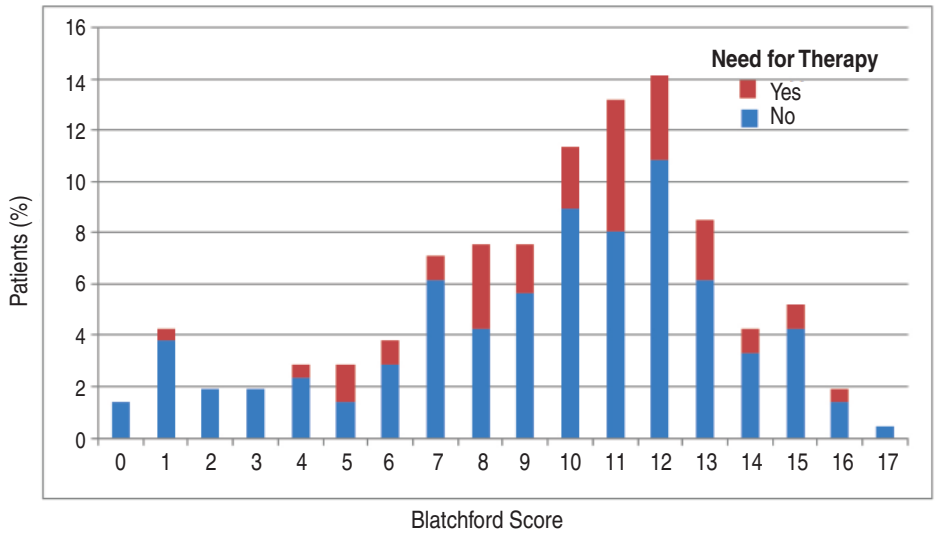

Figure 2. Distribution of the Blatchford score stratified according to the need for therapeutic endoscopy.

Table 9. Sensitivity and specificity of Blatchford score, the clinical Rockall score, and the complete Rockall score in predicting need for intervention.

	Blatchford score		The clinical Rockall score		The complete Rockall score	
Cut off	Sensitivity (95% CI)	Specificity (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)
> 0	100.0 (93.2-100.0)	1.9 (0.4- 5.4)	92.5 (81.8- 97.9)	17.6 (12.0- 24.4)	100.0 (93.2-100.0)	1.3 (0.2- 4.5)
> 1	98.1 (89.9- 99.7)	6.9 (3.5- 12.0)	71.7 (57.7- 83.2)	45.9 (38.0- 54.0)	100.0 (93.2-100)	18.2 (12.6-25.1)
> 2	98.1 (89.9- 99.7)	9.4 (5.4- 15.1)	50.9 (36.8- 64.9)	65.4 (57.5- 72.8)	94.3 (84.3- 98.8)	40.9 (33.2-48.9)
> 3	98.1 (89.9- 99.7)	11.9 (7.4- 18.0)	32.1 (19.9- 46.3)	80.5 (73.5- 86.4)	79.2 (65.9- 89.1)	57.2 (49.2- 65.0)
> 4	96.2 (87.0- 99.4)	15.1 (9.9- 21.6)	15.1 (6.8- 27.6)	89.9 (84.2- 94.1)	56.6 (42.3- 70.2)	76.1 (68.7- 82.5)
> 5	90.6 (79.3- 96.8)	17.0 (11.5- 23.7)	1.9 (0.3- 10.1)	98.1 (94.6- 99.6)	35.8 (23.1- 50.2)	86.8 (80.5- 91.6)
> 6	86.8 (74.7- 94.5)	20.8 (14.7- 27.9)	0.0 (0.0- 6.8)	99.4 (96.5- 99.9)	18.9 (9.5- 32.0)	96.2 (92.0- 98.6)
> 7	83.0 (70.2- 91.9)	28.9 (22.0- 36.6)	0.0 (0.0- 6.8)	100.0 (97.7-100.0)	7.5 (2.1- 18.2)	98.7 (95.5- 99.8)
> 8	69.8 (55.7- 81.7)	34.6 (27.2- 42.5)			0.0 (0.0- 6.8)	100.0 (97.7-100.0)
> 9	62.3 (47.9- 75.2)	42.1 (34.4- 50.2)				
> 10	52.8 (38.6- 66.7)	54.1 (46.0- 62.0)				
> 11	32.1 (19.9- 46.3)	64.8 (56.8- 72.2)				
> 12	18.9 (9.5- 32.0)	79.2 (72.1- 85.3)				
> 13	9.4 (3.2- 20.7)	87.4 (81.2- 92.1)				
> 14	5.7 (1.2- 15.7)	91.8 (86.4-95.6)				
> 15	1.9 (0.3- 10.1)	97.5 (93.7-99.3)				
> 16	0.0 (0.0- 6.8)	99.4 (96.5-99.9)				
> 17	0.0 (0.0- 6.8)	100.0 (97.7-100)				

DISCUSSION

In this study, we validated 3 clinical predictor models for patients with UGIB using GBS and pre- and post- endoscopic RS. This study revealed GBS could identify patients safe for discharge. The performance classification of GBS and RS at potential decision thresholds was suboptimal. The sensitivity was near or at 100% at the cutoff score > 0 for each, the specificities ranged from 2% to 17%. At higher score

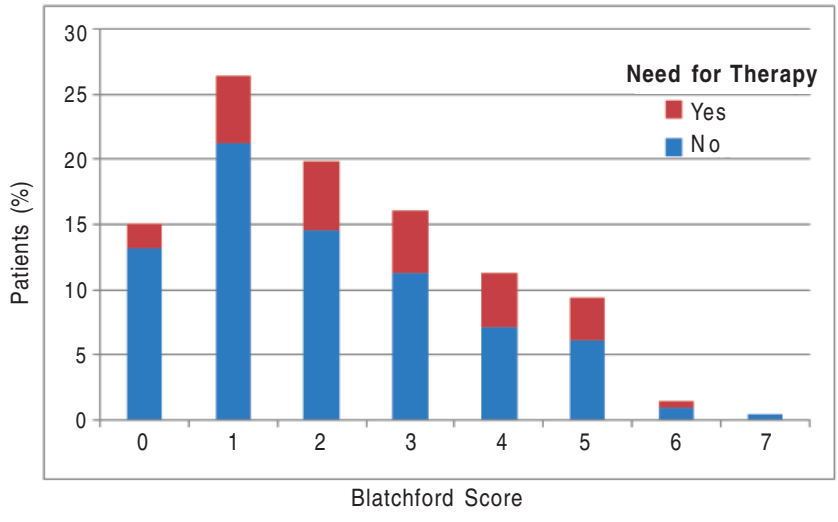

Figure 3. Distribution of the pre-endoscopic Rockall score stratified according to the need for therapeutic endoscopy.

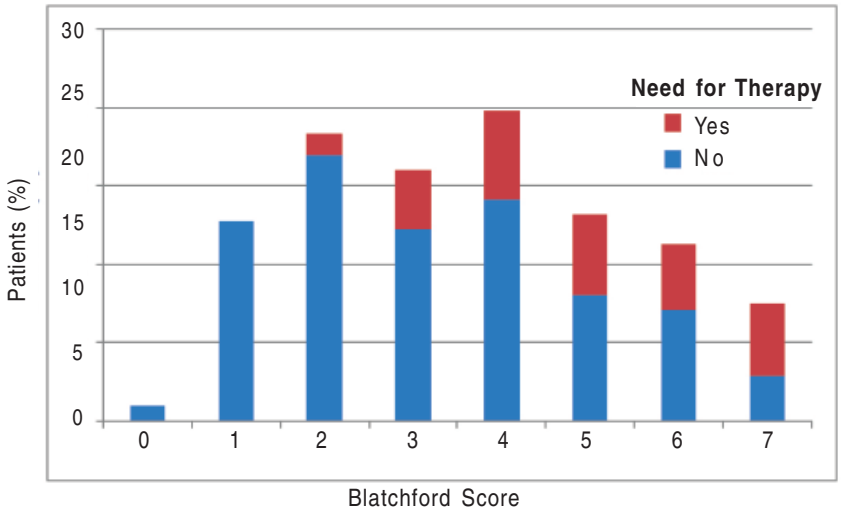

Figure 4. Distribution of the post-endoscopic Rockall score stratified according to the need for therapeutic endoscopy.

Table 10. Comparison of the GBS, pre-endoscopic RS and post-endoscopic RS with area under the curve for the prediction of rebleeding.

Score	AUC	Std. Error	*p*-value	95% CI
Rockall score (Pre)	0.282	0.081	0.452	0.123-0.441
Rockall score (Post)	0.400	0.056	0.731	0.290-0.511
Blatchford score	0.727	0.050	0.433	0.629-0.826

of cutoffs with greater specificity, the sensitivities were suboptimal.

There are some limitations to this study due to our study consisted only of patients who had undergone an EGD and patients who were discharged by the Emergency Department that may have been missed, creating a bias. This number is likely small because it is our institution's policy to admit all UGIB patients and perform EGD within 24 hours. The need for therapeutic endoscopy is a subjective decision. Variations between individual endoscopists in the perception of high-risk stigmata may exist. This has been standard-

Table 11. Comparison of the GBS, pre-endoscopic RS and post-endoscopic RS with area under the curve for the prediction of death.

Score	AUC	Std. error	*p*-value	95% CI
Rockall score (Pre)	0.606	0.059	0.469	0.49-0.72
Rockall score (Post)	0.770	0.066	0.064	0.64-0.89
Blatchford score	0.714	0.150	0.143	0.42-1.00

Table 12. Comparison of the GBS, pre-endoscopic RS and post-endoscopic RS with area under the curve for the prediction of endoscopic or surgical intervention.

Score	AUC	Std. error	*p*-value	95% CI
Rockall score (Pre)	0.613	0.044	0.014	0.52-0.69
Rockall score (Post)	0.751	0.035	0.000	0.68-0.82
Blatchford score	0.530	0.043	0.507	0.44-0.16

ized as much as possible by applying international consensus statements on the treatment of high-risk lesions, and furthermore, by evaluating all endoscopic reports by the principal investigator. The use of intravenous PPI infusion before an EGD performed has since been shown to reduce the need for endoscopic therapy. Moreover, this study was limited by small size population which the result was insufficient to predict intervention, rebleeding or mortality and consisted mainly of Thai patients therefore the results may not be universally applicable.

CONCLUSIONS

A Blatchford score of 0 could predict low-risk patients who will not require an immediate EGD for endoscopic hemostasis with 100% accuracy. The other score value does not reliable to predict the risk and should not be used to guide clinical decision making. The specificity of GBS and RS was insufficient to recommend use of either score in clinical practice. Furthermore studies in the derivation of a score that could more accurately identify patients with high risk of requiring therapeutic endoscopy are needed.

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