Comparison of Two Scoring Systems in Predicting Outcomes in Non-Variceal Upper Gastrointestinal Bleeding in Taiwanese Population

Cheng-Hsien Wang[1,2], Ming-Szu Hung[3,4], Kuan-Han Wu[4,5], Yi-Chuan Chen[1,2,*]

[1]Department of Emergency Medicine, Chang Gung Memorial Hospital, Chiayi County, Taiwan

[2]Department of Nursing, Chang Gung University of Science and Technology, Chiayi County, Taiwan

[3]Division of Thoracic Oncology, Department of Pulmonary and Critical Care Medicine, Chang Gung Memorial Hospital, Chiayi County, Taiwan

[4]School of medicine, Chang Gung University College of Medicine, Taoyuan County, Taiwan

[5]Department of Emergency Medicine, Kaohsiung Chang Gung Memorial Hospital, Chang Gung University College of Medicine, Kaohsiung, Taiwan

Background: The role of scoring systems in detecting outcomes of non-variceal upper gastrointestinal bleeding in Taiwanese population remains uncertain.

Aims: The aim of our study was to compare Glasgow-Blatchford score with pre-endoscopic Rockall score in their utilities in predicting clinical outcomes in Taiwanese population.

Methods: We designed a prospective study to compare the performance of the Glasgow-Blatchford score and pre-endoscopic Rockall score in predicting endoscopic therapy, rebleeding and 30-day mortality in non-variceal upper gastrointestinal bleeding patients. The area under receiver operating characteristic curve was analyzed. 234 consecutive patients admitted during a 8-month period were enrolled.

Results: For prediction of therapeutic endoscopy, area under receiver operating characteristic curvewas obtained for Glasgow-Blatchford score (0.629), and pre-endoscopic Rockall score (0.599). For prediction of rebleeding, area under receiver operating characteristic curvewas obtained for Glasgow-Blatchford score (0.687), and pre-endoscopic Rockall score (0.581). For prediction of mortality, area under receiver operating characteristic curve was obtained for Glasgow-Blatchford score (0.505), and pre-endoscopic Rockall score (0.734).

Conclusions: In detecting low risk patients requiring endoscopy therapy, the AUC for GBS shows that it is a poor stratification tool, and the AUC for PRS reveals that it is a worthless stratification test. In detecting rebleeding, Glasgow-Blatchford score has a better performance than pre-endoscopic Rockall score. In contrast, pre-endoscopic Rockall score has a better performance in predicting 30-day mortality than Glasgow-Blatchford score.

Key words: *non-variceal UGIB, upper gastrointestinal bleeding, Glasgow-Blatchford score, Rockall score*

Introduction

Nonvariceal upper gastrointestinal bleeding (UGIB) remains the most common medical emergency managed by gastroenterologists with an incidence of 50-170 per 100,000 of the population each year.[1-3] The frequency and severity of this problem and its associated costs imposea significant burden on limited health care resources.[4] The indications for

admission to the hospital are based on the need for blood transfusion, endoscopic intervention to control bleeding, or surgical intervention to control bleeding. In most cases the need for endoscopic therapy is usually not made clear until anendoscopic therapy is performed. The need for endoscopic therapy remains one of the most clinically relevant questions because it has implications for the UGIB patient's disposition and the timing of endoscopic therapy.Currently, endoscopy within the initial 24 hours is the standard therapy for the management of UGIB.[5] However, most UGIB patients do not need blood transfusion or emergent endoscopic intervention.[1] About 23% patients with UGIB need blood transfusion and another 14% patients require endoscopic or surgical intervention.[6] UGIB causes about 2%-15% mortality and10%-30% rebleeding.[6-10] Patients at high risk of rebleeding or mortality are also of great concern since clinical treatment aims to prevent patients from dying or from suffering complications. While thereis no doubt that hospitalization is mandatory for variceal UGIB in cirrhotic patients,[11] it has become increasingly clear that peptic ulcer bleeding (by far the most common cause of nonvariceal UGIB) is highly variable in severity and outcome.[7] Due to the variety in severity and outcome of nonvariceal UGIB patients, accurate identification of high risk patients can help doctors decide about hospital admission or discharge, the level of assistance (early endoscopy or not), and the type of treatment (medical, endoscopic, or surgical intervention).Several scoring systems have been designed to identifythese high- and low-risk UGIB patients. The pre-endoscopic Rockall score (PRS) and Glasgow-Blatchford score (GBS) only require clinical and laboratory data so they can be applied immediately without need for urgent endoscopy.[12-16] To our knowledge, the utility of these two scoring systems in predicting outcomes of patients with non-variceal UGIB in Taiwan has not been well investigated before. The aim of our study was to compare PRS with GBS in predicting clinical outcomes in patients with nonvariceal UGIB in Taiwanese populations.

Methods

Study Design and Population

This was a prospective cohort study. All non-trauma adult patients presenting UGIB admitted to the hospital via emergency department (ED) from January 1, 2011 to August 31, 2011 would be evaluated.

This study was conducted at one university-affiliated teaching hospital which was located inthe center of Taiwan with approximately 70,000 visits to the emergency room every year.

This study had been approved by our hospitals' Institute Reviewing Board and informed consents were obtained from all enrolled patients.

Survey Content and Administration

All non-trauma adult (i.e., >18 years old) patients with UGIB who visited our ED were evaluated. The diagnosis of UGIB was based on patients' presentations, including coffee ground vomits, hematemesis, melena and blood on nasogastric aspirate. All UGIB patients who received endoscopy were enrolled prospectively into our study after informed consents were obtained. Patients with history of liver cirrhosis or the causes of UGIB which were esophageal varices or gastric varices confirmed by endoscopy were also excluded.Variables including age, gender, chief complaints, presenting illness, vital signs, laboratory data,presence of co-morbid medical conditions, findings of endoscopy, number of unit of blood transfusion, types of treatment, and time from ED admission to endoscopy were recorded.The need for endoscopic therapy was defined asinjection of saline, epinephrine, or thermal therapy (heat probe, bipolar electro-coagulation and argon plasma coagulation). Rebleeding was defined as any of the following: 1. repeated endoscopy within 3 days, 2. continuous blood transfusion for more than 3 days, and 3. surgical intervention to control bleeding within 3 days. Glasgow-Blatchford score (GBS) and pre-endoscopy Rockall score (PRS) were calculated based on the criteria documented in the original articles[16,17] (Tables 1 and 2) and recorded for all enrolled patients.

All clinical management decisions were left to the discretionof the main responsible attending physician. The standard management for all patients with nonvariceal UGIB in our ED wasan administration of an intravenous proton pump inhibitor before endoscopy. The choice of intermittent or continuous infusionwas left to the discretion of the main responsible physicians. Blood transfusion was indicated for patients with hemoglobin less than 10 g/dL or with signs of hemodynamic instabilitydespite fluid resuscitation. The decision of transfusion was made by the main responsible physicians.

The primary outcome was defined as patients

needingtherapeutic endoscopy to control bleeding. The secondary outcome was 30-day mortality and re-bleeding.

Table 1. Glasgow-Blatchford score

Admission risk marker	Score component value
Blood Urea Nitrogen (mg/dL)	
≥ 18.2 < 22.4 mg/dL	2
≥ 22.4 < 28 mg/dL	3
≥ 28< 70 mg/dL	4
≥ 70 mg/dL	6
Hemoglobin for Men (g/dL)	
≥ 12 < 13 g/dL	1
≥ 10 < 12 g/dL	3
< 10 g/dL	6
Hemoglobin for Women(g/dL)	
≥ 10 < 12 g/dL	1
< 10 g/dL	6
Systolic Blood Pressure (SBP)	
≥ 100 < 109 mmHg	1
≥ 90 < 99 mmHg	2
< 90 mmHg	3
Other Markers	
Pulse ≥ 100 per minute	1
Presentation with Melena	1
Presentation with	2
Syncope	
Hepatic disease	2
Heart failure	2

Range of scores = 0 to 23 (maximum score = 23); high risk > 0.

Data Analysis

Statistical analysis was carried out using the software SPSS 17.0 (SPSS Inc., Chicago, IL). Test-characteristics (sensitivity, specificity, positivepredictive value [PPV], and negative predictive value [NPV]) for Glasgow-Blatchford score (GBS) and pre-endoscopic Rockall score (PRS) were calculated usingstandard 2×2 tables. Sensitivity and specificity in primary and secondary outcomes werecalculated for GBS and PRS with confidence interval (CI).The cut-off values in detecting primary and secondary outcomes were GBS greater than 0 and PRS greater than 0.[18,19] Receiver-operator characteristic curves were calculated to identify Glasgow-Blatchford score (GBS) and pre-endoscopic Rockall score (PRS) cut-off values for predicting primary and secondary outcomes.

Results

During the study period, a total of 234 patients presented with non-variceal UGIB were enrolled in this study. All enrolled patients underwent endoscopy for UGIB. Of these patients, 18 patients (7.7%) died after a 30-day follow up and 40 patients (17.1%) re-bled. 164 (70.1%) patients were male. The mean age of the enrolled patients was 64.9 ± 15.8 years. Melena (82.9%), epigastric pain (46.6%), syncope (44%), hematemesis (28.6%), poor appetite (24.8%), and coffee ground vomitus (23.9%) were common symptoms. However, dyspnea (14.5%), chest tightness (7.7%), and cold sweating (5.6%) were less common. 133 patients (56.8%) needed blood transfusion during ED or hospital stay. 101 patients (43.2 %) needed endoscopic treatment to control bleeding and 3 patients (1.3%) needed surgical treatment to control bleeding. 166 pa-

Table 2. Pre-endoscopic Rockall score

Variable	Score			
	0	1	2	3
Age	< 60 y	60-79	80 y	
Shock		HR > 100	SBP < 100 mmHg	
Comorbidity			IHD, CHF, any major comorbidity	Renal failure, liver failure, metastatic malignancy

HR, Heart rate; SBP, systolic blood pressure; IHD, ischemic heart disease; CHF, congestive heart failure; UGI, upper GI.
The pre-endoscopic Rockall score which is calculated without endoscopic finding, for each case based on points assigned for 3 clinical variables: patient age at presentation, shock status based on initial heart rate and systolic pressure, and presence of comorbid disease.
Patients with pre-endoscopic Rockall score > 0 are considered to be at high-risk for developing adverse outcomes (recurrent bleeding, death).

tients (70.9%) comprised the high risk group (needed blood transfusion, endoscopic treatment, and surgical treatment). The mean time elapsed from ED triage to endoscopy was 12.5 ± 12.3 hours. The sensitivity and specificity of GBS > 0 and PRS > 0 in detecting

need for endoscopic therapy, rebleeding, and 30-day mortality rate were demonstrated in Tables 3, 4, and 5, respectively.

For prediction of therapeutic endoscopy, the area under the curve (AUC) was obtained for GBS (0.629;

Table 3. Sensitivity and specificity of Blatchford score > 0, Blatchford score > 4, pre-endoscopic Rockall score > 0, pre-endoscopic Rockall score > 2 in detecting patients need therapeutic endoscopy (101 patients, total 234 non variceal UGI bleeding patients)

	Sensitivity (95% Confidence interval, CI)	Specificity (95% Confidence interval, CI)	Positive Predictive Value (95% Confidence interval, CI)	Negative Predictive Value (95% Confidence interval, CI)
Blatchford score > 0	100 (96.4-100)	1.50 (0.23-5.34)	43.5 (37.1-50.2)	100 (19.3-100)
Blatchford score > 4	93.1 (86.2-97.2)	21.8 (15.1-29.8)	47.5 (40.4-54.7)	80.6 (64.0-91.8)
Pre-endoscopic Rockall score > 0	98.0 (93.0-99.7)	1.50 (0.23-5.34)	43.0 (36.6-49.7)	50 (8.4-91.7)
Pre-endoscopic Rockall score> 2	86.1 (77.8-92.2)	26.3(19.1-34.7)	47.0 (39.7-54.5)	71.4 (56.7-83.4)

Table 4. Sensitivity and specificity of Blatchford score > 0, Blatchford score > 4, pre-endoscopic Rockall score > 0, pre-endoscopic Rockall score > 2 in detecting rebleeding (29 patients, total 234 non variceal UGI bleeding patients)

	Sensitivity (95% Confidence interval, CI)	Specificity (95% Confidence interval, CI)	Positive Predictive Value (95% Confidence interval, CI)	Negative Predictive Value (95% Confidence interval, CI)
Blatchford score > 0	100 (87.9-100)	0.98 (0.15-3.49)	12.5 (8.5-17.5)	100 (19.3-100)
Blatchford score > 4	100 (87.9-100)	17.6 (12.6-23.5)	14.7 (10.0-20.4)	100 (90.2-100)
Pre-endoscopic Rockall score > 0	100 (87.9-100)	1.95 (0.55-4.93)	12.6 (8.6-17.6)	100 (40.2-100)
Pre-endoscopic Rockall score > 2	89.7 (72.6-97.7)	22.4 (16.9-28.8)	14.1 (9.39-19.9)	93.9 (83.1-98.7)

Table 5. Sensitivity and specificity of Blatchford score > 0, Blatchford score > 4, pre-endoscopic Rockall score > 0, pre-endoscopic Rockall score > 2 in detecting 30-day mortality (18 patients, total 234 non variceal UGI bleeding patients)

	Sensitivity (95% Confidence interval, CI)	Specificity (95% Confidence interval, CI)	Positive Predictive Value (95% Confidence interval, CI)	Negative Predictive Value (95% Confidence interval, CI)
Blatchford score > 0	100 (81.3-100)	0.93 (0.14-3.31)	7.76 (4.66-11.9)	100 (19.3-100)
Blatchford score > 4	91.6 (77.5-98.2)	7.58 (4.30-12.2)	15.3 (11.1-20.7)	83.4 (58.6-96.2)
Pre-endoscopic Rockall score > 0	100 (81.3-100)	1.85 (0.52-4.68)	7.83 (4.71-12.1)	100 (40.2-100)
Pre-endoscopic Rockall score > 2	97.9 (89.1-99.7)	9.19 (5.45-14.3)	22.2 (16.9-28.4)	94.4 (72.6-99.1)

95% CI, 0.557-0.70,) and PRS (0.599; 95% CI, 0.526-0.672).The GBS was similar to PRS (*p* = 0.69) in prediction of therapeutic endoscopy.

For prediction of rebleeding, the area under the curve (AUC) was obtainedfor GBS (0.687; 95% CI, 0.593-0.781) and PRS (0.581; 95% CI,0.477-0.686). The GBSwas similar to PRS (*p* = 0.39) in prediction of rebleeding.

For prediction of 30-day mortality, the area under thecurve (AUC) was obtainedfor GBS (0.505; 95% CI, 0.362-0.648) and PRS (0.734; 95% CI,0.622-0.845). In contrast, the PRSwas similar to GBS (*p* = 0.13) in prediction of 30-day mortality.

Discussion

Marmo et al. found that several factors of nonvariceal UGIB patients included the Rockall score and GBS were independent predictors of mortality, specificallyadvanced age, low hemoglobin level at presentation, and significant comorbidities.[20] Some studies had validated the Blatchford score, predictingthe need for clinical intervention.[14,21] The pre-endoscopic Rockall score has been studied to predict adverse outcomes.[22] It seems to be inferior to theBlatchford score in predicting the need for intervention,[14,21] suggesting that hemodynamics and mode of presentationplay a larger role in predicting the need for intervention. Therefore, emergency physicians hadto examine the potential benefits of risk scoring systems in themanagement of patients with nonvariceal UGIB patients.

Glasgow-Blatchford Score and Pre-endoscopy Rockall Score in Identification of the Need for Endoscopic therapy

The decision on when endoscopy should be performed in the patient who has nonvariceal UGIB often is determined by numerous factors.Performing endoscopy as soon as it is safe and technically feasiblemay allow the doctor to identify more high-risk lesions requiring endoscopictherapy, and thus decrease risk of rebleeding and mortality.[23] The results of a prospective, randomizedcontrolled trial of Bjorkman et al. showed that when comparing patients presentingto the emergency department who underwenteither emergent endoscopy (within 6 hours) or elective endoscopy (within 48 hours), there was no effect on patient outcomes (mortality, needfor surgery, blood transfusion, length of stay). In the study, Bjorkman et al. also found thatmost patientsclassified as high risk

were skewed toward the urgent endoscopy group.[24] In our study, the sensitivity of GBS greater than 0 and PRS greater than 0 in predicting the need for endoscopictherapywas high (100% and 98%, respectively) but poorly specific (1.5% and 1.5%, respectively). The more severe groups of GBS greater than 4 and PRS greater than 2 had the same result of highly sensitive (93.1% and 86.1%) but moderately specific (21.8% and 26.3%, respectively). According to our study high risk nonvariceal UGIB patients such as GBS greaterthan 0 or PRS greater than 0 might need to receive early endoscopic interventions. In one recent study, Cheng et al. confirmed that the GBS was more effective than the clinical Rockall score in predicting the need for bloodtransfusions, as well as for endoscopic or surgical interventions.[25] According to the study of Spiegel et al. patients with nonvariceal UGIB should undergo early endoscopy examination, followed by triage by validated scoring systems (the Rockall score appeared to be the best).[26] Another study of Pang et al. confirmed that the GBSwas usefulin safely discriminating low-risk UGIB patients who wouldnot likely require endoscopic therapy but GBS used in high-risk UGIB patients for endoscopic therapy was doubtful.[15] A prospective study of Wang et al. demonstrated that detecting high-risk patients (need for blood transfusion, endoscopic or surgical intervention) with acute UGIB, GBS may be a useful risk stratification tool.[27]

Glasgow-Blatchford Score and Pre-endoscopy Rockall Score in Identification of 30-Day Mortality and Rebleeding of Nonvariceal UGIB

Rockall score accurately predicted the risk of rebleeding in low-risk patients;[28,29] when high-risk patients were examined the accuracy was variable in the past studies.[30,31] The results of our study did not find any difference between the performance of the GBS, and PRS in the prediction of rebleeding. GBS and PRS both had a high sensitivity in predicting rebleeding in patient with GBS greater than 0 and PRS greater than 0, but because of the very low specificity of both systems, routine use in predicting rebleeding should be considered (Table 4). In our study, both scoring systems (GBS and PRS) performed poorly in predicting 30-day mortality due to low specificities, and positive predictive values (Table 5). The application of GBS and PRS in predicting 30-day mortality should be made with caution.

Limitation

There were several limitations of this study. First, our study included only a single institution. However, many critical cases of nonvariceal UGIB from neighboring cities and counties were sent to our ED, in which 24-hour emergent endoscopy and 24-hour surgeon were available. Moreover, most patients discharged from our institution would return to their gastroenterologists or our ED if the UGIB episode recurred; thus more accurate records could be documented. Second, our study did not enroll nonvariceal UGIB patients managed as outpatient. Patients who were discharged from the emergency department or transferred to the other hospitals for further care may have been missed, creating a bias. Third, the necessity for gastroendoscopic interventions is a subjective decision. Variations between individual gastroenterologist in the perception of high-risk stigmata may exist.

Conclusion

In detecting patients need therapeutic endoscopy, GBS and PRS were both highly sensitive and poorly specific in predicting the need for endoscopic therapy. These two score systems should be used to discharge these low risk patients (score = 0) earlier as their high sensitivity and high negative predictive value. Therefore GBS and PRS might help physicians to determine those nonvariceal UGIB patients who need to receive earlier endoscopic intervention. However, none of the two score systems had good performance in predicting rebleeding and 30-day mortality due to low specificity and low positive predictive value.

Conflict of Interest Statements

There is no conflict of interest in this study.

Funding

References

1. Atkinson RJ, Hurlstone DP. Usefulness of prognostic indices in upper gastrointestinal bleeding. *Best Pract Res Clin Gastroenterol*. 2008;22:233-242.

2. Longstreth GF. Epidemiology of hospitalization for acute upper gastrointestinal hemorrhage: a population-based study. *Am J Gastroenterol*. 1995;90:206-210.

3. Blatchford O, Davidson LA, Murray WR, Blatchford M, Pell J. Acute upper gastrointestinal haemorrhage in west of Scotland: case ascertainment study. *BMJ*. 1997;315:510-514.

4. Adam V, Barkun AN. Estimates of costs of hospital stay for variceal and nonvariceal upper gastrointestinal bleeding in the United States. *Value Health*. 2008;11:1-3.

5. Barkun A, Bardou M, Marshall JK, Nonvariceal Upper GI Bleeding Consensus Conference Group. Consensus recommendations for managing patients with nonvariceal upper gastrointestinal bleeding. *Ann Intern Med*. 2003;139:843-857.

6. Stanley AJ, Dalton HR, Blatchford O, et al. Multicentre comparison of the Glasgow Blatchford and Rockall scores in the prediction of clinical end-points after upper gastrointestinal haemorrhage. *Aliment Pharmacol Ther*. 2011;34:470-475.

7. Laine L, Peterson WL. Bleeding peptic ulcer. N Engl J Med. 1994;331:717-727.

8. Terdiman JP. Update on upper gastrointestinal bleeding. Basing treatment decisions on patients' risk level. *Postgrad Med*. 1998;103:43-47, 51-52, 8-9 passim.

9. Vreeburg EM, Terwee CB, Snel P, et al. Validation of the Rockall risk scoring system in upper gastrointestinal bleeding. *Gut* 1999;44:331-335.

10. van Leerdam ME, Vreeburg EM, Rauws EA, et al. Acute upper GI bleeding: did anything change? time trend analysis of incidence and outcome of acute upper GI bleeding between 1993/1994 and 2000. *Am J Gastroenterol*. 2003;98:1494-1499.

11. Burroughs AK. General management of the cirrhotic patient with acute variceal bleeding. In: de Franchis R, ed. Portal Hypertension III. *Proceedings of the Third Baveno International Consensus Workshop on definitions, Methodology and Therapeutic Strategies*. Oxford: Blackwell Science; 2001:135-142.

12. Gralnek IM, Dulai GS. Incremental value of upper endoscopy for triage of patients with acute non-variceal upper-GI hemorrhage. *GIE*. 2004;60:9-14.

13. Tham TC, James C, Kelly M. Predicting outcome of acute non-variceal upper gastrointestinal haemorrhage without endoscopy using the clinical Rockall score. *Postgrad Med J*. 2006;82:757-759.

14. Chen IC, Hung MS, Chiu TF, Chen JC, Hsiao CT. Risk scoring systems to predict need for clinical intervention for patients with nonvariceal upper gastrointestinal tract bleeding. *Am J Emerg Med*. 2007;25:774-779.

15. Pang SH, Ching JY, Lau JY, Sung JJ, Graham DY, Chan FK. Comparing the Glasgow-Blatchford and pre-endoscopic Rockall score in predicting the need for endoscopic therapy in patients with upper GI hemorrhage. *Gastroin-*

test Endosc. 2010;71:1134-1140.

16. Glasgow-Blatchford O, Murray WR, Glasgow-Blatchford M. A risk score to predict need for treatment for upper-gastrointestinal haemorrhage. *Lancet* 2000;356:1318-1321.

17. Rockall TA, Logan RF, Devlin HB, Northfield TC. Risk assessment after acute upper gastrointestinal haemorrhage. *Gut* 1996;38:316-321.

18. Stanley AJ, Ashley D, Dalton HR, et al. Outpatient management of patients with low-risk upper-gastrointestinal haemorrhage: multicentre validation and prospective evaluation. *Lancet* 2009;373:42-47.

19. Rockall TA, Logan RF, Devlin HB, Northfield TC. Selection of patients for early discharge or outpatient care after acute upper gastrointestinal haemorrhage. National Audit of Acute Upper Gastrointestinal Haemorrhage. *Lancet* 1996;347:1138-1140.

20. Marmo R, Koch M, Cipolletta L, et al. Predictive factors of mortalityfrom nonvariceal upper gastrointestinal hemorrhage: a multicenterstudy. *Am J Gastroenterol*. 2008;103:1639-1647.

21. Stanley AJ, Ashley D, Dalton HR, et al. Outpatient management of patientswith low-risk upper-gastrointestinal haemorrhage: multicentrevalidation and prospective evaluation. *Lancet*. 2009;373:42-47.

22. Tham TCK, James C, Kelly M. Predicting outcome of acute non-varicealupper gastrointestinal hemorrhage without endoscopy using the clinicalRockall score. *Postgrad Med J*. 2006;82:757-759.

23. DiMaio CJ, Stevens PD. Nonvariceal upper gastro-intestinal bleeding. *Gastrointest Endosc Clin N Am*. 2007;17:253-272.

24. Bjorkman DJ, Zaman A, Fennerty MB, et al. Urgent vs. elective endoscopy for acute nonvariceal upper GI bleeding: an effectiveness study. *Gastrointest Endosc*. 2004;60:1-8.

25. Cheng DW, Lu YW, Teller T, Sekhon HK, Wu BU. A modified Glasgow Glasgow-Blatchford score improves risk stratification in upper gastrointestinal bleed: a prospective comparison of scoring systems. *AP&T*. 2012;36:782-789.

26. Spiegel B, Vakil NB, Ofman JJ. Endoscopy for acute non-variceal upper gastrointestinal tract hemorrhage: is sooner better? *Arch Intern Med* 2001;161:1393-1404.

27. Wang CH, Chen YW, Young YR, Yang CJ, Chen IC. A prospective comparison of 3 scoring systems in upper gastrointestinal bleeding. *Am J Emerg Med*. 2013;31:775-778.

28. de Franchis R. Predicting the outcome of nonvariceal upper GI bleeding: can we guess right? *Dig Liver Dis*. 2004;36:248-250.

29. Camellini L, Merighi A, Pagnini C, et al. Comparison of three different risk scoring systems innonvariceal upper gastrointestinal bleeding. *Dig Liver Dis*. 2004;36:271-277.

30. Sanders DS, Carter MJ, Goodchap RJ, et al. Prospective validation of the Rockall risk scoring systemfor upper GI hemorrhage in subgroups of patients with varices and-peptic ulcers. *Am J Gastroenterol*. 2002;97:630-635.

31. Camellini L, Merighi A, Pagnini C, et al. Comparison of three different risk scoring systemsin non-variceal upper gastrointestinal bleeding. *Dig Liver Dis*. 2004;36:271-277.