Identification of patients with upper gastrointestinal bleeding who do not need immediate treatment

Netherlands
The Journal of Medicine

ORIGINAL ARTICLE

Identification of patients with upper gastrointestinal bleeding who do not need immediate treatment

L. Jansen[1], P. Leffers[2], M. Hermans[3], P. Stassen[3], A. Masclee[1], Y. Keulemans[1]*

Departments of [1]Gastroenterology, [2]Epidemiology, [3]Internal Medicine, Maastricht University Medical Centre, Maastricht, the Netherlands, *corresponding author: e-mail: yolande.keulemans@mumc.nl

KEYWORDS

Upper gastrointestinal bleeding, acute gastrointestinal bleeding, Glasgow Blatchford Bleeding Score

INTRODUCTION

Background

With estimates of the population-based incidence of between 48 and 134 per 100,000 adults per year, acute upper gastrointestinal bleeding can be considered a common reason to visit emergency departments (ED).[1-4] Reported mortality rates for such patients range from 5% to 14% in different studies.[3-7] The presentation of patients with upper gastrointestinal bleeding varies from clinically insignificant bleeding to hypovolaemic shock. Depending on the nature of the bleeding, some of these patients do not need immediate treatment because the bleeding will stop spontaneously with little risk of clinical complications or rebleeding. These patients could be further treated as outpatients. However, because the cause of the bleeding cannot be determined from the clinical presentation and emergency endoscopy is not readily available in the ED, it is common practice to admit patients for observation and endoscopy.

Clinical characteristics and the cause of the bleeding as diagnosed with endoscopy are highly predictive of adverse outcomes such as rebleeding and mortality.[8] Quantification of clinical severity with a dedicated score could be a useful tool toward a more objective determination of the need for immediate intervention. Several scoring systems have been developed to stratify patients with acute upper gastrointestinal bleeding according to prognosis.[9-12] The Rockall score is such a risk stratification tool that is based on clinical and endoscopic findings.[12]

In 2000 the Glasgow Blatchford bleeding Scale (GBS) was developed. The GBS is a screening tool to assess the likelihood that a patient with acute upper gastrointestinal bleeding will need medical intervention (e.g. blood transfusion, endoscopic or surgical treatment) only based on patient history, clinical examination and laboratory tests. Advantages of the GBS include absence of highly subjective variables (e.g. severity of systemic diseases) and the fact that there is no need for endoscopy.[9]

The Haemoglobin-Urea-Pulse-Systolic blood pressure (HUPS) score is a simplified fast-track risk screening tool that only uses the clinical and laboratory data of the GBS.[8] According to the original article it should only be used when patients have no major comorbidity. GBS and HUPS scores are unique because they can easily be determined in the ED.

Several studies have shown that the GBS score can identify patients who can be safely sent home without any endoscopic intervention.[12-14] In the initial study, patients with a GBS score of 0 were classified as low risk for the need of clinical intervention. Later studies showed that a cut-off value of 2 still reliably identified patients with no need for immediate intervention.[1,9,10,13-15] The GBS has not yet been evaluated for use in the Netherlands. The aim of the present study was to validate the GBS scale in the Netherlands and to determine the cut-off value for safely treating patients as outpatients. A further aim was to compare the GBS scale system with the HUPS score and the Rockall score as to their ability to predict absence of the need for immediate treatment.

MATERIALS AND METHODS

Study design and setting

This historical cohort study was performed in the Maastricht University Medical Centre (MUMC). Each year about 22,750 patients visit the ED of whom 5075 patients present to internal medicine or gastroenterology. About

200 of these patients are investigated under the diagnosis of acute upper gastrointestinal bleeding. Endoscopy, mainly performed in the endoscopy department, was available 24 hours a day, seven days a week. The study was conducted with the approval of the medical ethical committee of MUMC.

Study population

We retrospectively reviewed the charts of all patients admitted to the ED for suspected acute upper gastrointestinal bleeding in the following period: 1 July 2009 and 31 January 2010. Patients had to fulfil all of the following inclusion criteria: 1) presentation at ED with haematemesis, melaena, tarry stool or syncope with anaemia; 2) diagnosis of acute upper gastrointestinal bleeding was included in the working differential diagnosis formulated by the internist or gastroenterologist; and 3) age over 18 years. Patients with signs of chronic bleeding (microcytic anaemia) were excluded. In contrast to other studies we did not include patients who developed acute upper gastrointestinal bleeding while hospitalised for other reasons.

Table 1. *The Glasgow Blatchford bleeding scale*

Admission risk markers	Score value
Serum urea (mmol/l)	
6.5 - 7.9	2
8.0 - 9.9	3
10.0 - 24.9	4
>24.9	6
Haemoglobulin for men (mmol/l)	
7.5 - 8.1	1
6.2 - 7.4	3
<6.2	6
Haemoglobulin for women (mmol/l)	
6.2 - 7.5	1
<6.2	6
Systolic blood pressure (mmHg)	
100 - 109	1
90 - 99	2
<90	3
Other markers	
Pulse ≥ 100/min	1
Presentation with melaena	1
Presentation with syncope	2
Hepatic disease	2
Cardiac failure	2

Data collection/methods of measurement

Data were collected using the ED files and the electronic database of the hospital. To check completeness of obtained data, the reports of all gastroduodenal endoscopies performed in the research period were screened as well. The abstraction of the charts was performed by a research student, who was not blinded for the study hypothesis. All patients were discussed with a gastroenterologist (YK).

The following data were collected: date of admission to the ED, symptoms and signs of the gastrointestinal bleeding, haemodynamic variables (pulse and systolic blood pressure), laboratory results (serum haemoglobin and urea concentrations), demographic information, current medication, comorbidity, length of in-hospital stay, moment (inpatient or outpatient) and findings of endoscopy.

As comorbidities we recorded hepatic disease/failure, kidney disease/failure, cardiac failure, and disseminated malignancy. Used medication was retrieved from the ED chart with special attention for the following medication: proton pump inhibitors, carbasalate calcium, anticoagulants, H2 antagonists, non-steroidal anti-inflammatory medication or corticosteroids. If items were not mentioned in either the ED chart or the electronic database we considered them to be negative.

We calculated the Glasgow Blatchford (*table 1*), HUPS and Rockall scores of the patients based on the collected data.

Need for treatment during the period of 28 days following presentation was considered to be present when, in this period, treatment (e.g. blood transfusion, surgical, radiological or endoscopic intervention) was actually performed, when rebleeding requiring readmission occurred, or when the patient died. Information about readmission, rebleeding or death was gathered from the charts and/or general practitioner.

Data processing and sensitivity analysis

Statistical analysis was performed using SPSS 15.0. Data are presented as means with standard deviation (SD) and proportions where appropriate with exact 95% confidence intervals (CI). We calculated areas under the receiver-operating curves with 95% CI as estimates of the discriminatory ability of the scoring tool. Sensitivity and specificity of dichotomised scores at usual cut-off levels were calculated to guide the choice for a proper cut-off level. Likelihood ratios for individual scores were calculated to estimate the diagnostic information associated with each score. We refrained from statistical testing because of the exploratory nature of the study.

RESULTS

Characteristics and management of patients with acute upper gastrointestinal bleeding

A total of 103 patients with acute upper gastrointestinal bleeding were enrolled in this study. *Table 2* outlines the demographic characteristics and outcomes for these patients. Eighty-one (79%) underwent endoscopy. A total of 11 patients (10.7%) suffered from rebleeding in the

Table 2. *Characteristics and management of the study population*

Characteristics of patients		Total of patients (n=103)
Sex, n. *(%)*	Men	51 (49.5)
Age *(years)*, mean *(SD)*		65.7 (18.2)
Medication, n. *(%)*	Proton pump inhibitors	26 (25.2)
	Carbasalate calcium	27 (26.2)
	Non-steroidal anti-inflammatory drugs	11 (10.7)
	Corticosteroids	5 (4.9)
	Vitamin K antagonists	24 (23.7)
	Clopidogrel	7 (6.9)
	Low-molecular-weight heparin	2 (2.0)
	H2 Blockers	4 (3.9)
Comorbidity, n. *(%)*	Cardiac failure	19 (18.4)
	Cardiac ischaemia	22 (21.4)
	Renal disease	9 (8.7)
	Hepatic disease	15 (14.6%)
	Disseminated malignancy	9 (8.7%)
Management		
Admission, n. *(%)*	Yes	85 (82.5)
Hospital stay *(days)*, median *(range)*		4.0 (1-50)
Endoscopy	Inpatient	68 (60.0)
	Outpatient	13 (12.6)
Time to endoscopy *(hours)*, mean *(SD)*		17:22 (26:08)
Time between admission and endoscopy *(hours)*, mean *(SD)*		14:08 (27:42)
Rebleeding, n *(%)*		11 (10.7)
Mortality, n *(%)*		11 (10.7)

follow-up period; also 11 patients (10.7%) died during the follow-up period.

Table 3 shows the endoscopic findings of these patients. For 11 patients (11%) it was not possible to calculate the GBS and HUPS scores because some of the haemodynamic or laboratory variables were missing. In 24 patients (23%) the Rockall score could not be calculated because endoscopy had not been performed. *Table 4* shows the likelihood ratios for the different values of the GBS in the validation group of the original study population (Blatchford validation group) and in our patient group. Receiver-operating characteristic analysis showed very good discriminative ability with an area under the curve (AUC) of 0.94 (95% CI 0.90 - 0.98) *(figure 1)*.

Four patients (4%) had a GBS score of 0, while 17 (18%) of patients had a score below 2. In the 28-day follow-up period, none of these patients needed treatment. For a cut-off value of 0, sensitivity and specificity for the need of treatment were 100% (95% CI 95 to 100%) and 12% (95% CI 4 to 26%) respectively. With a cut-off value of 2 the sensitivity was still 100% (95% CI 95 to 100%), while the specificity increased to 51% (95% CI 35 to 67%).

Table 3. *Endoscopic findings**

	No need for intervention (n=27)	Need for intervention (n=54)
Normal, n. *(%)*	16 (61.5)	17 (30.9)
Oesophagitis, n. *(%)*	5 (19.2)	8 (14.5)
Gastric ulcer, n. (%)	4 (15.4)	8 (14.5)
Mallory-Weiss tear, n. *(%)*	4 (15.4)	1 (1.8)
Duodenal ulcer, n. *(%)*	1 (2.7)	6 (10.9)
Varices, n. *(%)*	0	12 (22.2)
Malignancy, n. *(%)*	0	3 (5.5)
Angiodysplastic lesion, n. *(%)*	0	3 (5.5)
Bulbitis/duodenitis, n. (%)	0	2 (3.7)
Watermelon stomach, n. *(%)*	0	1 (1.8)
Dieulafoye lesion, n. *(%)*	0	1 (1.8)
Portal gastropathy, n. *(%)*	0	1 (1.8)
Other, n. *(%)*	0	1 (1.8)

***Some patients had more than one endoscopic finding.**

Table 4. *Validation of the GBS score*

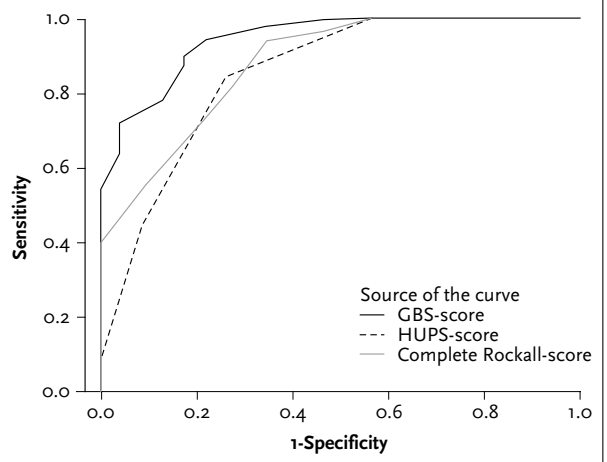
Risk score	Blatchford validation group (n=197)[5]			Our validation group (n=92)		
	Total of patients, n.	Intervention needed, n *(%)*	LR	Total of patients, n.	Intervention needed, n. *(%)*	LR
0	36	1 (2.8)	0.03	4	0	0.00
1	32	3 (9.4)	0.13	9	0	0.00
2	12	1 (8.3)	0.11	4	0	0.00
3	13	3 (23.1)	0.36	4	1 (25.0)	0.19
4	9	4 (44.4)	0.97	5	2 (20.0)	0.37
5	11	4 (36.4)	0.69	4	2 (50.0)	0.56
6	14	11 (78.6)	4.45	1	1 (100.0)	∞
7	13	10 (76.9)	4.04	8	5 (62.5)	0.93
8	13	10 (76.9)	4.04	8	4 (50.0)	0.56
9	4	4 (100.0)	∞	4	4 (100.0)	∞
10	6	5 (83.3)	6.07	7	6 (85.7)	3.36
11	13	12 (92.3)	14.56	7	7 (100.0)	∞
12	9	9 (100.0)	∞	8	8 (100.0)	∞
13	6	6 (100.0)	∞	5	5 (100.0)	∞
≥14	6	6 (100.0)	∞	14	14 (100.0)	∞
Total	197	89 (45.2)		92	59 (64.1)	

LR = likelihood ratio.

Comparison of the three different risk scoring systems

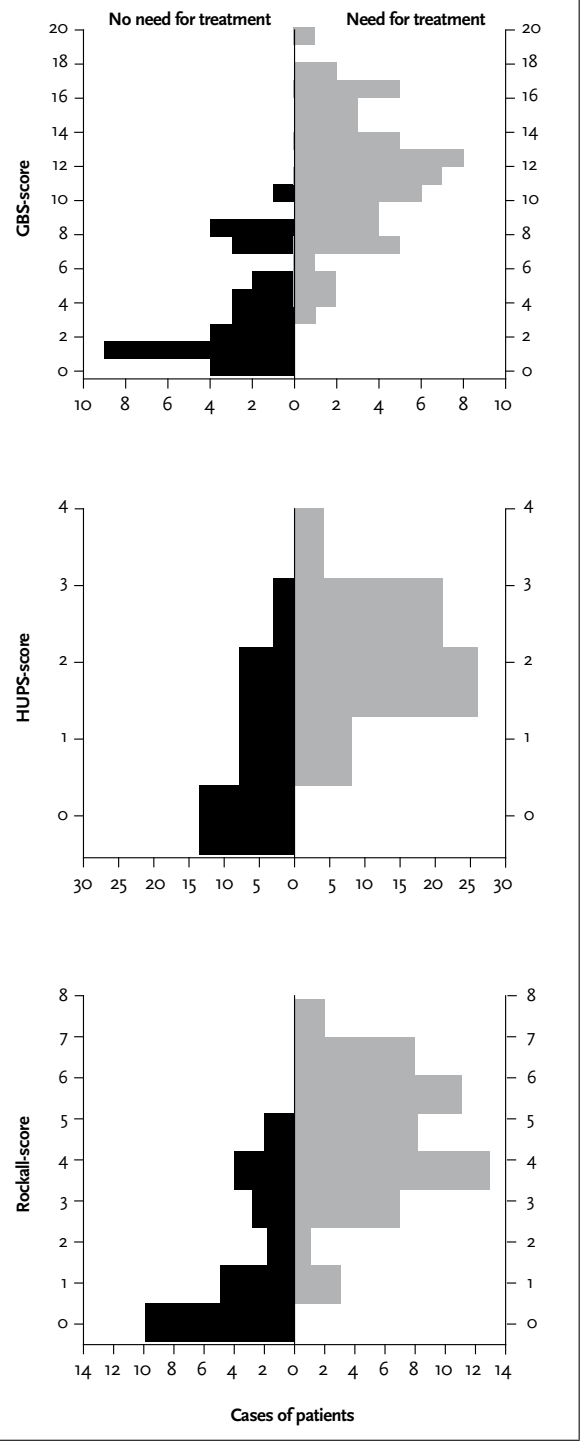
Using the cut-off value of ≤2 points as suggested in the original study, the Rockall score classified 21 patients (26.6%) at low risk of needing treatment (*figure 2*). However, of these 21, four patients met the study definition of needing clinical intervention: three patients received blood transfusion and one patient needed an endoscopic

Figure 1. *ROC curves of the three different scoring systems*



	AUC	95% CI Lower	Upper
GBS-score	0.943	0.891	0.995
HUPS-score	0.849	0.746	0.951
Rockall-score	0.878	0.795	0.962

Figure 2. *Distribution of scores for the different scoring systems*



intervention. The HUPS score identified 14 patients (15.2%) with score 0. None of these patients needed intervention (*figure 2*). We compared the ROC curves of the three scoring systems for the patient group in which all three scores could be calculated. With an AUC of 0.94 (CI 0.89 to 0.99), the GBS proved to be superior to the HUPS score and the complete Rockall score with AUCs of 0.85 (CI 0.75 to 0.95) and 0.88 (CI 0.79 to 0.96)

DISCUSSION

In this study we validated the Glasgow Blatchford bleeding scale in the setting of a Dutch university hospital. The GBS showed to have good discriminative ability to distinguish acute upper gastrointestinal bleeding patients who do and who do not need intervention in the ED. The area under the ROC curve was 0.94 (95% CI 0.90 - 0.98) which is similar to the AUC in the original validation group of Blatchford *et al.*: 0.92 (95% CI 0.88 to 0.95). Diagnostic information per individual GBS expressed as likelihood ratios showed roughly the same trend in the original validation group and in our study. However, it is evident that a much larger study will be needed to reliably estimate the likelihood ratios and make valid comparisons between groups.

The cut-off value between low or high risk of needing treatment was set at 0 in the original study.[9] In this way a sensitivity of 98.9% was reached. In our group, 4% of patients had a score of zero with a sensitivity of 100%. Previous studies found a higher percentage of patients with a score of 0, ranging from 8 to 17%.[15-17] Stanley *et al.* used the cut-off value of 0 and identified 123 patients (22%) as low risk and managed 84 (17%) of them as outpatients.[15]

In our study a higher cut-off value of 2 still had a sensitivity of 100%. Therefore, the 18% of the patients with this score could have been safely managed as outpatients. Previous studies also indicated that a cut-off value of 2 should be safe. Stephens *et al.* used the combination GBS <2 and age younger than 70 years as a criterion, because they believed that it was not safe to treat the elderly as

outpatients. They found that this way 10% of their patients with acute upper gastrointestinal bleeding could be safely managed without hospital admittance.[17] Srirajaskanthan *et al.* identified 64 patients (38.6%) who had a GBS score of <2, all of whom could be safely managed as outpatients.[1]

The Rockall score was originally developed to predict the risk of death and rebleeding.[12] To prevent such events it is clear that one should be able to identify those patients who need treatment. Therefore, in practical terms the Rockall score has the same purpose as the other two scoring instruments. Until now the HUPS score has not been externally validated.

Our study shows that in our population, the discriminative ability of the GBS score was superior to the complete Rockall score and the HUPS score. Earlier reports also indicated that the GBS is better than the complete Rockall score.[9,10,15,16] The inferior performance of the HUPS score can possibly be attributed to the fact that it is only considered to be useful in the absence of other major pathology.

There were several differences between our study and earlier studies in this field. Unlike other studies we did not exclude patients with bleeding varicose veins and patients without endoscopy in the follow-up. We did that because the purpose of the risk scoring tools is to support clinical decision making in the absence of endoscopic findings. We did not include patients who developed acute upper gastrointestinal bleeding while admitted to the hospital because they are not seen in the ED and are not representative of the acute upper gastrointestinal bleeding patients who come to the ED. Also, we used the 28-day mortality and rebleeding and not only in-hospital events because we also included patients who were primarily treated as outpatients.

A limitation of our study is the use of retrospective data collection from hospital files. We were therefore dependent on the completeness of the medical chart. It is possible that we missed some relevant information. For 11% of the patients we were not able to collect all the data that were needed to calculate the GBS and HUPS scores. However, the main limitation of the study is its small size. Before introduction of the GBS score for clinical purposes the study should be repeated in a much larger population and preferably with prospective data collection.

The GBS and HUPS scoring systems are unique because they do not require endoscopy, and therefore they can easily be used at the ED. With a cut-off value of 2, an appreciable number of patients can be identified for whom treatment as outpatients is preferable. This would result in a reduction of hospital days, more adequate and efficient patient care and lower healthcare costs. It is reassuring that, despite differences in the composition of patient populations, the GBS seems to perform equally well in the Netherlands as in its original validation study and other studies.

In conclusion, the GBS score appears to be a good predictor of the need for treatment in a Dutch ED population of patients with acute upper gastrointestinal bleeding. It was superior to the often used complete Rockall and HUPS scores. Larger studies are needed to substantiate the conclusions.

REFERENCES

1. Srirajaskanthan R, Conn R, Bulwer C, Irving P. The Glasgow Blatchford scoring system enables accurate risk stratification of patients with upper gastrointestinal haemorrhage. Int J Clin Pract. 2010 Jun;64(7):868-74.
2. van Leerdam ME, Tytgat GN. Acute gastrointestinal bleeding. Best Pract Res Clin Gastroenterol. 2008;22(2):207-8.
3. van Leerdam ME, Vreeburg EM, Rauws EA, Geraedts AA, Tijssen JG, Reitsma JB, 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 Jul;98(7):1494-9.
4. Vreeburg EM, Snel P, de Bruijne JW, Bartelsman JF, Rauws EA, Tytgat GN. Acute upper gastrointestinal bleeding in the Amsterdam area: incidence, diagnosis, and clinical outcome. Am J Gastroenterol. 1997 Feb;92(2):236-43.
5. Blatchford O, Davidson LA, Murray WR, Blatchford M, Pell J. Acute upper gastrointestinal haemorrhage in west of Scotland: case ascertainment study. BMJ. 1997 Aug 30;315(7107):510-4.
6. Longstreth GF. Epidemiology of hospitalization for acute upper gastrointestinal hemorrhage: a population-based study. Am J Gastroenterol. 1995 Feb;90(2):206-10.
7. Rockall TA, Logan RF, Devlin HB, Northfield TC. Incidence of and mortality from acute upper gastrointestinal haemorrhage in the United Kingdom. Steering Committee and members of the National Audit of Acute Upper Gastrointestinal Haemorrhage. BMJ. 1995 Jul 22;311(6999):222-6.
8. Atkinson RJ, Hurlstone DP. Usefulness of prognostic indices in upper gastrointestinal bleeding. Best Pract Res Clin Gastroenterol. 2008;22(2):233-42.
9. Blatchford O, Murray WR, Blatchford M. A risk score to predict need for treatment for upper-gastrointestinal haemorrhage. Lancet. 2000 Oct 14;356(9238):1318-21.
10. 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 Sep;25(7):774-9.
11. Ch'ng CL, Kingham JG. Scoring systems and risk assessment for upper gastrointestinal bleeding. Eur J Gastroenterol Hepatol. 2001 Oct;13(10):1137-9.
12. Rockall TA, Logan RF, Devlin HB, Northfield TC. Risk assessment after acute upper gastrointestinal haemorrhage. Gut. 1996 Mar;38(3):316-21.
13. Kim BJ, Park MK, Kim SJ, Kim ER, Min BH, Son HJ, et al. Comparison of scoring systems for the prediction of outcomes in patients with nonvariceal upper gastrointestinal bleeding: a prospective study. Dig Dis Sci. 2009 Nov;54(11):2523-9.
14. Romagnuolo J, Barkun AN, Enns R, Armstrong D, Gregor J. Simple clinical predictors may obviate urgent endoscopy in selected patients with nonvariceal upper gastrointestinal tract bleeding. Arch Intern Med. 2007 Feb 12;167(3):265-70.
15. Stanley AJ, Ashley D, Dalton HR, Mowat C, Gaya DR, Thompson E, et al. Outpatient management of patients with low-risk upper-gastrointestinal haemorrhage: multicentre validation and prospective evaluation. Lancet. 2009 Jan 3;373(9657):42-7.
16. Gralnek IM, Dulai GS. Incremental value of upper endoscopy for triage of patients with acute non-variceal upper-GI hemorrhage. Gastrointest Endosc. 2004 Jul;60(1):9-14.
17. Stephens JR, Hare NC, Warshow U, Hamad N, Fellows HJ, Pritchard C, et al. Management of minor upper gastrointestinal haemorrhage in the community using the Glasgow Blatchford Score. Eur J Gastroenterol Hepatol. 2009 Dec;21(12):1340-6.