The predictive capacity of the Glasgow-Blatchford score for the risk stratification of upper gastrointestinal bleeding in an emergency department

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ABSTRACT

Objectives: To assess the ability of the Glasgow Blatchford Score (GBS) system to identify the need for urgent upper gastrointestinal endoscopy (UGIE) in patients with upper gastrointestinal bleeding (UGIB).

Methods: An observational, retrospective study was carried out in all patients attended at the ER for suspected UGIB in one year. Patients were split into two categories – high-risk (>2) and low-risk (≤2) – by means of the GBS system.

Results: A total of 60 patients were included. Of these, 46 were classified as “high-risk” (> 2) and 14 as “low-risk” (≤2) subjects. The characteristics of patients in the low-risk group included: Mean age: 46.6 ± 13.7 (18-88) years. Males/females: 7/7. Urgent endoscopy revealed: normal (50%; n = 7); esophagitis (21.4%; n = 3); gastritis (14.2%; n = 2); Mallory-Weiss syndrome (7.1%; n = 1); non-bleeding varices (7.1%; n = 1). The characteristics of patients in the high-risk group included: Mean age: 68.7 ± 19.8 (31-91) years. Males/females: 30/16. Digestive endoscopy revealed: Gastric/duodenal ulcer (56.52%; n = 26); normal (17.39%; n = 8); esophagitis (8.69%; n = 4); gastritis (8.69%; n = 4); angioectasia (4.34%; n = 2); bleeding varices (4.34%; n = 2). Low-risk patients exhibited no lesions requiring urgent management during endoscopy, and the sensitivity of the GBS scale for high-risk UGIB detection was found to be 100% (95% CI: 86.27%, 99.71%), with a specificity of 48.28% (95% CI: 29.89, 67.1%).

Conclusions: The GBS scale seems to accurately identify patients with low-risk UGIB, who may be managed on an outpatient basis and undergo delayed upper GI endoscopy at the outpatient clinic.

Key words: Upper gastrointestinal hemorrhage. Clinical decision rules. Emergency department. Endoscopy. Glasgow-Blatchford score.

INTRODUCTION

Acute upper gastrointestinal (GI) bleeding is the most common medical emergency in gastroenterology with an incidence of 50-150 per 100,000 population per year and a mortality rate of approximately 11-14% (1,2). The prevalence of Helicobacter pylori infection, the uncontrolled use of anti-inflammatory medications (NSAIDs), and liver disease represent the most significant factors in its pathogenesis. Peptic ulcer is the most common cause of life-threatening upper GI bleeding (3).

Presentation form and severity range from mild complaints such as coffee ground vomiting with no hemodynamic compromise to frank hematemesis with exsanguination. The mortality rate among inpatients with UGIB ranges from 4.5% to 8.2% (4,5).

Upper GI bleeding is managed on an inpatient basis, with emergency departments usually diagnosing the condition and initiating treatment. The fact is well known that bleeding usually stops spontaneously in over 80% of cases with no need to intervene, hence low-risk patients may be more efficiently managed in the community and do not require hospital admission (6).

However, in Spain, all of these patients usually undergo an urgent upper digestive endoscopy procedure, since this method not only provides a diagnosis but also hemostatic therapy for active bleeding lesions. The American Gastroenterology Association recommends that urgent upper GI endoscopy be carried out within 12 hours of admission (7). However, it is advisable that UGIE be performed at the emergency room, which is not always feasible as the ability to perform such a procedure hinges upon trained staff availability around the clock (8).

It is for this reason that multiple scales or scoring systems have been devised to stratify patients with suspected UGIB. The two most widely used systems are the Rockall score and the Glasgow Blatchford score (GBS) (5,9). The Rockall score is mainly aimed at predicting mortality for patients with UGIB, and requires a prior UGIE proce-
The Glasgow-Blatchford score has proven superior in predicting the need for endoscopic therapy and patient mortality, and in identifying patients with low-risk UGIB requiring no intervention (10-13). This scale allows a risk assessment of patients with UGIB according to a number of clinical and laboratory variables, requiring no prior upper GI endoscopy procedure (Table I). It is aimed at helping emergency room doctors in the identification of high-risk patients in need of urgent UGIE, transfusion, or even surgery for UGIB control. This scale has been previously validated in multiple articles (1,11,14,18).

Observational admission for patients with suspected UGIB, even in the absence of clinical hemodynamic compromise in individuals who could possibly be discharged from the ER, is common practice in emergency departments. Doctors usually rely on clinical judgement and experience when assessing these patients (15,16).

The GBS (with a series of objective parameters) may help us identify patients with UGIB and low risk for adverse events amenable to outpatient care. Any ideal scale to identify high-risk patients must be highly sensitive and specific. Sensitivity is most important from a safety perspective, as it is crucial that high-risk individuals are not mistaken for low-risk individuals (5). Specificity translates into unnecessary admissions for low-risk patients mistaken for high-risk individuals.

Several studies demonstrate that patients with a GBS ≤ 2 (16-18) are in no need for urgent UGIE, and may be managed on an outpatient basis (sensitivity: 100-99.2%; specificity: 13-42.9%). Another study reaches this same conclusion in patients with a GBS of 0 (sensitivity: 100-99.5%; specificity: 4.3-16%) (19). Specificity varies according to cutoffs (0-2), being higher with a GBS ≤ 2. It is advised that, when followed up in the outpatient setting, patients with low-risk UGIB should not be left alone at home, should take no anticoagulants, and should have a telephone and transportation available. They should be prescribed a proton-pump inhibitor, and be scheduled for an outpatient upper GI endoscopic procedure as soon as possible.

Our goal is checking in our setting whether the GBS system is valid for the detection of patients with low-risk UGIB. Then, in a second stage, a prospective study would be undertaken aimed at the future management of patients in the outpatient setting, without hospital admissions (1).

METHODS

A retrospective, observational study was carried out at Hospital Comarcal de Montilla (Córdoba, Spain), which cares for a population of about 63,000 people. Patients were collected from the endoscopy database at the gastroenterology department (including all endoscopies, whether urgent or scheduled, performed within the hospital) during a 12-month period (January to December, 2012). A total of 825 upper GI endoscopic procedures had been carried out, of which 9.45% (n = 78 patients) were urgent.

### Table I. The Glasgow-Blatchford score. Clinical and laboratory variables considered, and score for each range of values

<table>
<thead>
<tr>
<th>Risk markers on admission</th>
<th>Scale core</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma urea (mg/dl)</td>
<td></td>
</tr>
<tr>
<td>≥ 38 &lt; 47</td>
<td>2</td>
</tr>
<tr>
<td>≥ 47 &lt; 58</td>
<td>3</td>
</tr>
<tr>
<td>≥ 58 &lt; 147</td>
<td>4</td>
</tr>
<tr>
<td>≥ 147</td>
<td>6</td>
</tr>
<tr>
<td>Hemoglobin (g/dl). Males</td>
<td></td>
</tr>
<tr>
<td>≥ 12.0 &lt; 13.0</td>
<td>1</td>
</tr>
<tr>
<td>≥ 10.0 &lt; 12.0</td>
<td>3</td>
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<tr>
<td>&lt; 10.0</td>
<td>6</td>
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<tr>
<td>Hemoglobin (g/dl). Females</td>
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<tr>
<td>≥ 10.0 &lt; 12.0</td>
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</tr>
<tr>
<td>&lt; 10.0</td>
<td>6</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td></td>
</tr>
<tr>
<td>100-109</td>
<td>1</td>
</tr>
<tr>
<td>90-99</td>
<td>2</td>
</tr>
<tr>
<td>&lt; 90</td>
<td>3</td>
</tr>
<tr>
<td>Other markers</td>
<td></td>
</tr>
<tr>
<td>Pulse ≥ 100 bpm</td>
<td>1</td>
</tr>
<tr>
<td>Presentation with melena</td>
<td>1</td>
</tr>
<tr>
<td>Presentation with syncope</td>
<td>2</td>
</tr>
<tr>
<td>Prior liver disease*</td>
<td>2</td>
</tr>
<tr>
<td>Heart failure**</td>
<td>2</td>
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</tbody>
</table>

*Known history or clinical/laboratory evidence of acute or chronic disease. **Known history or clinical/echocardiographic evidence of heart failure.

The medical records of patients with urgent procedures were reviewed, and all adult patients (> 18 yrs) admitted to the ER for suspected UGIB within 24 hours (counting from arrival in the ER) of their urgent endoscopy were included in the study. All medical records were reviewed by one examiner, who identified variables and extracted data. Urgent endoscopies were performed either in the waiting area (chairs) or in the observation room (beds). Patients under 18 years of age were excluded, as were those on anticoagulants, those admitted for a different disease who also had UGIB, and those who were agonizing (pre-death, with limitation of therapeutic effort at II-IV). Of these 78 patients 18 (23%) were not included in the study because of incomplete records (n = 16; vital signs not reviewed, and all adult patients (> 18 yrs) admitted to the ER for suspected UGIB within 24 hours (counting from arrival in the ER) of their urgent endoscopy were included in the study. All medical records were reviewed by one examiner, who identified variables and extracted data. Urgent endoscopies were performed either in the waiting area (chairs) or in the observation room (beds). Patients under 18 years of age were excluded, as were those on anticoagulants, those admitted for a different disease who also had UGIB, and those who were agonizing (pre-death, with limitation of therapeutic effort at II-IV). Of these 78 patients 18 (23%) were not included in the study because of incomplete records (n = 16; vital signs not measured on admission) or of their failing to meet inclusion criteria (n = 2; UGIE timing after 24 hours from admission).

UGIB was defined according to the International Classification of Diseases, 9th edition (CIE9MC), as hematemesis (CIE9M: 578.0, including coffee ground vomiting), melena (CIE9M: 578.1), or blood in the aspirate from a nasogastric tube (NGT).

The information regarding patient characteristics was obtained from admission records: a) Demographic characteristics (age, sex); b) clinical presentation (hematemesis, melena, blood in aspirate from NGT, syncope); c) hemodynamic signs (pulse, blood pressure); d) laboratory tests (plasma urea in mg/dl, hemoglobin in g/dl); and e) comorbidity (prior liver disease, history of heart failure).

All patients included in the study were administered the GBS scale and split up into two groups -high risk for GBS ≥ 3, and low risk for GBS < 3.
risk for GBS ≤ 2. Once patients were so distributed endoscopic findings were analyzed [normal endoscopy, esophageal varices (CIE9M: 456), peptic ulcer, CIE9M: 533 [gastric, CIE9M: 531/duodenal, CIE9M: 532], angioectasia (CIE9M: 537.82, Mallory-Weiss syndrome (CIE9M: 530.7), gastritis (CIE9M: 535), peptic esophagitis (CIE9M: 530.1), and lesions suspicious for malignancy], as well as –when needed– treatment during endoscopy and whether the procedure had to be repeated. Need for blood transfusion was included. Using this information, patients were clustered in high or low clinical/therapeutic risk groups: a) clinical: Advanced age, severe comorbidity, hypovolemic shock; and b) endoscopic: Cause of bleeding (peptic ulcer entails a poorer prognosis as compared to gastroduodenal erosions or Mallory-Weiss syndrome), ulcers greater than 2 cm, active bleeding at the time of endoscopy, particularly pulsating bleeding, and location at the bulb on its posterior aspect or at the upper part of the gastric lesser curvature.

Length of hospital stay was also factored in, as was new re-bleeding, indication for blood transfusion, and mortality (UGIB-related).

The statistical analysis was performed using the SPSS 16.0 software. Sensitivity and specificity were determined. For the comparison of parameters in the low-risk and high-risk groups the Mann-Whitney test was used. p values < 0.05 were considered significant.

Bibliography was searched from year 2000 to present day, as the GBS was first reported in 2000 by Blatchford (9). Search engines included Medline/PubMed, Gerion, Cchrone Plus, IME, Elsevier Doyma, Dialnet, and Scielo. Descriptors included upper gastrointestinal hemorrhage, clinical decision rules, emergency department, endoscopy, and Glasgow-Blatchford score.

RESULTS

The study population included 60 patients with a mean age of 64.76 ± 21.00 (18-91). There were 37 males (61.6%) and 23 females (38.4%).

Patients were initially distributed in groups with high and low risk of relapse and/or UGIB-related mortality according to clinical and endoscopic criteria –low-risk group: 29 (48.3%); high-risk group: 31 (51.7%).

On the other hand patients were also classified according to their GBS scores in low-risk (GBS ≤ 2; 14 patients) and high-risk (GBS ≥ 3; 46 patients) groups. Their characteristics are listed in table II. Endoscopic findings are shown in table III.

In all, 68% (n = 41) of patients had melena on admission, and in most cases endoscopy later revealed duodenal/gastric ulcer (56%; n = 23). Most such patients were males (82%; n = 19).

A total of 25% of patients required blood transfusions. This procedure was associated with advanced age, male sex, high plasma urea levels (mean: 138.32 ± 53.7) and decreased hemoglobin (mean: 7.82 ± 3.5), with significant differences between these variables (p < 0.05).

Patient characteristics in the low-risk group following GBS administration included: Mean age: 46.6 ± 13.7 (18-88) years. Males/females: 7/7. These patients required neither treatment during endoscopy nor blood transfusions. They only required 1 day in hospital, and many of them only spent a few hours there until UGIE completion, being discharged thereafter. Urgent endoscopy findings included: Normal (50%; n = 7), peptic esophagitis (21.4%; n = 3), gastritis (14.2%; n = 2), Mallory-Weiss syndrome (7.1%; n = 1), and varices with no evidence of bleeding (7.1%; n = 1). Mortality was nil in this group.

Patient characteristics in the high-risk group following GBS administration included: Mean age: 68.7 ± 19.8 (31-91) years. Males/females: 30/16. These patients required either treatment during endoscopy nor blood transfusions. They only required 1 day in hospital, and many of them only spent a few hours there until UGIE completion, being discharged thereafter. Urgent endoscopy findings included: Normal (50%; n = 7), peptic esophagitis (21.4%; n = 3), gastritis (14.2%; n = 2), Mallory-Weiss syndrome (7.1%; n = 1), and varices with no evidence of bleeding (7.1%; n = 1). Mortality was nil in this group.

Patient characteristics in the high-risk group following GBS administration included: Mean age: 68.7 ± 19.8 (31-91) years. Males/females: 30/16. These patients required treatment during endoscopy (adrenaline administration or click placement) in 54% of cases, and blood transfusion in 32% of cases. Endoscopy findings included: Gastric/duodenal ulcer (56.52%; n = 26), normal (17.39%; n = 8), peptic esophagitis (8.69%; n = 4), gastritis (8.69%; n = 4), angioectasia (4.34%; n = 2), and varices with evidence of active bleeding (4.34%; n = 2). In this group...
mortality was 5% in association with advanced age and comorbidity.

Statistical significance is reached between presence of melena and high plasma urea levels (p < 0.0001), hemoglobin (p < 0.001), and length of stay (p < 0.0001). There is also significance between need for transfusion and plasma urea levels (p < 0.001), hemoglobin (p < 0.001), GBS (p < 0.003), and length of stay (p < 0.0015).

Correlation analyses between quantitative variables were performed, and an association was revealed between age/plasma urea (R: 0.51), age/GBS (R: 0.49), urea/hemoglobin (R: 0.53), urea/score (R: 0.77), and hemoglobin/score (R: 0.76).

The fact that 85% of UGIE procedures with no lesions found correspond to female patients is to be highlighted.

Patients were admitted for a mean 2.96 ± 1.6 days, with less than 1 day for patients in the low-risk group and 3.56 ± 2.2 days for patients in the high-risk group.

GBS sensitivity to identify high-risk UGIB (UGIB requiring endoscopic management, transfusion or surgery) was found to be 100% (95% CI: 86.27%, 99.71%), with a specificity of 48.28% (95% CI: 29.89, 67.11%). Positive predictive value was 67.39% (95% CI: 51.87%, 80.03%), and negative predictive value (probability that a subject with GBS ≤ 2 will have no complications) was 100% (95% CI: 73.24%, 99.34%) (Table IV).

The ROC curve indicated 0.822, hence the GBS scale was deemed to be good (0.75-0.9) for the diagnosis of patients with high-risk UGIB from a clinical/endoscopic perspective (Fig. 1).

DISCUSSION

Risk stratification systems for patients with UGIB are not commonly used in clinical practice in the emergency setting, even though they are easy to use, particularly the GBS system, which only relies on simple clinical and laboratory variables, and requires no urgent endoscopic procedures. Most of these patients are still assessed based on the ER doctor’s experience.

This research shows that the GBS scale, with a cutoff > 2, has a sensitivity of 100% to detect a high-risk UGIB, with a specificity of 48.28%. In other words, a GBS cutoff ≤ 2 allows the identification of low-risk UGIB (NPV: 100%). These results are similar to those of prior studies in the literature.

Our definition of low risk for patients with GBS of 2 or lower is consistent with the reports by Masaoka, Srira...
jaskanthan, and Stephens (6,16,17). However, Blatchford, Chen, Stanley, and Pang (9,13,19,20) claim that only a GBS value of 0 to define low risk would be safe.

In our analysis, 23% (14/60) of patients presenting at the ER for UGIB had a GBS ≤ 2. All of them underwent an urgent UGIE procedure, which confirmed the presence of mild or absent lesions.

Our research has many similarities with that of Masaoka et al. (17) or Srirajaskanthan et al. (16), in both cases studies that confirm the high sensitivity of GBS for the identification of patients with high-risk UGIB. However, we do observe a highly variable specificity oscillating between 13% and 68%, which is 48% in our case.

We also agree with most studies in our finding a higher percentage of males with UGIB, with peptic ulcer (whether gastric or duodenal) being the most common endoscopic finding.

In the low-risk group most endoscopic findings involved gastritis, esophagitis, and normal results. The low number of Mallory-Weiss syndrome cases is outstanding, and seems to be related to the usual management of these patients, usually discharged from emergency departments with no urgent UGIE procedure performed. It is also confirmed that these patients remain admitted to hospital for no longer than 24 hours.

Other authors (6,21) confirm the safe use of the GBS instrument for the classification of patients with UGIB; however, they suggest that patient age should be taken into account, and that the GBS should only be administered to those younger than 70 years, since 10% of the low-risk group in their study developed complications.

Other studies (19) suggest that the score should be reduced (GBS = 0) in order to categorize low-risk individuals. However, based on our results as well as other studies, we think that using a GBS = 0 cutoff would be senseless, as benefitted patients would be only a few (10-15% of all UGIB patients), and a large number of patients would undergo an unwarranted urgent UGIE. In our study, 23% of patients could have skipped urgent endoscopy. This, we believe, not only has a personal impact for patients but also a financial impact. In our case 14 admissions/year (1-2 days admissions) could be avoided regarding a reference population of 70,000 inhabitants, which –after extrapolation to the Spanish population (46 million inhabitants)– represents a total of 9,200 admissions/year (15,000 days in hospital). If we consider that the mean daily cost of an admission is € 227 (2), savings might well amount to € 4 million per year.

McLaughlin et al. (21) asked patients with low-risk UGIB -Would you rather be admitted to hospital or receive outpatient care? A robust 93% of patients answered they would rather have outpatient care.

The primary limitations of our study include analysis type (retrospective) and reduced sample size. However, the fact must be borne in mind that our study was carried out at a county hospital where endoscopists are available on call rather than present at the facility. Therefore, further studies in our setting would be necessary to confirm this scale’s validity for use in emergency departments within our National Health System –prospective studies to corroborate that the GBS system is safe and advisable for hospital ERs.

CONCLUSIONS

From our experience, and based on the current literature on the use of the GBS scale for the pre-endoscopic classification of patients with UGIB into low-risk and high-risk groups, we think that this instrument may be safely used in the emergency departments in our setting. It will avert non-indicated UGIE procedures, and allow the outpatient management of low-risk individuals (GBS ≤ 2), thus reducing hospital costs and patient exposure to hospitalization hazards. Being an easy-to-use tool, we recommend using the GBS scale in the risk stratification of patients with UGIB similarly to scales intended for other conditions such as deep venous thrombosis and chest pain.

REFERENCES


