Editorial

Safe hospital discharge based on lower GI bleeding scores: a long way to go

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Gastrointestinal bleeding (GIB): an overall view

GIB is common and usually classified as upper GI bleeding when the source is located above the ligament of Treitz, and lower GI bleeding when the bleeding originates below this point. Today, it is not uncommon to see the term "midgut bleeding" that, although classified as lower GI bleeding, points out the small bowel as the source of bleeding (1).

Upper and lower colonic GIB are easily diagnosed since either upper or lower GI endoscopy are accessible in most hospitals and Emergency Room Units. However, the diagnosis of lesions inducing small bowel GIB is more difficult. Often, the cause or source of this type of bleeding is not found. As opposed to hematemesis, which points out the source of the bleeding in the upper GI tract, and bright red blood per rectum as one of the key signs of colonic lower GI bleeding, melena can be seen in patients with either upper or midgut GIB, which complicates matters further.

Several studies have shown that the most frequent cause of lower GIB is of colonic diverticular origin and represent between 20-65% of all cases of lower GIB (1,2). Other causes of lower GI bleeding include angiodysplasia and ischemic colitis in approximately 1% to 19%, which are more common in older patients with cardiovascular risk factors. Inflammatory bowel disease, ulcers, polyps and colorectal cancer are less often involved as cause of hospitalization due to lower GI bleeding (2). Among the factors associated with lower GI bleeding, age, the presence of comorbidities, the use non-steroidal anti-inflammatory drugs, aspirin or other non-aspirin antiplatelet agents have been commonly associated with increased risk. Nowadays, the number of patients admitted to hospital with lower GI bleeding associated with the use of anticoagulants is increasing, which is changing the face of hospitalizations due to GI bleeding (2-4).

Several studies have shown a progressive decreasing trend in upper GIB events with a parallel increase in lower GIB events. An European population-based study from Spain (5) reported that upper GI complications fell from 87/100,000 persons in 1996 to 47/100,000 persons in 2005, whereas lower GI complications increased from 20/100,000 to 33/100,000. However, the case fatality rate remained constant over time and lower GI events had a higher mortality rate (8.8% *vs.* 5.5%), a longer hospitalization (11.6±13.9 *vs.* 7.9±8.8 days), and higher resource utilization than did upper GI events, which somehow is different to some of the outcomes reported very recently by Oakland *et al.* (6). A further analysis of the Spanish study showed that hospitalizations due to peptic ulcer bleeding have decreased significantly, whereas the number of cases of colonic diverticular and angiodysplasia bleeding have increased. Recorded drug intake showed an increased frequency of anticoagulants with colonic diverticular and angiodysplasia bleeding, whereas NSAID and low-dose aspirin use were more prevalent in peptic ulcer bleeding and colonic diverticular bleeding respectively (2). These data were confirmed in other studies from the USA, where a decrease in hospitalizations due to upper GI complications were decreasing owing to a decrease in upper GI bleeding and a relatively stable rate of lower GI complications. Case

fatality was low overall but increased with age, especially in those over 75 years with bleeding or obstruction (7).

In summary, the clinical picture of patients hospitalized due to GIB has changed over the last decades, and today hospitalizations due to lower GIB is as common as upper GIB, with a clear impact on our clinical burden and resource utilization. Patients with lower GIB are older with more co-morbidities than patients with upper GIB. They often use oral antiplatelets and/or anticoagulants, which are equally associated with increased risk of both upper and lower GIB (8).

Scores to predict outcomes of GIB

Risk scores in GIB are an important tool to identify patients at the highest risk to have a poor outcome, increase our chances to improve our care and prevent or reduce outcomes such as mortality, rebleeding, need of surgery, etc. Also, risk scores should identify patients who are at low-risk of developing serious outcomes and be either discharged early or treated as outpatients reducing costs, hospital-related morbidity and burden to our GI units (6,9). Several risk scores have already been developed to predict "poor" or "good" outcomes in patients with upper GIB, which means that no one is good enough or pleases all the requirements. In clear contrast with upper GIB, very few reports have been focused on the prediction of outcomes in patients with lower GIB. We have already commented that today hospitalizations due to lower GIB events are as common as those due to upper GI bleeding. Therefore, it seems clear that we need also risk scores to predict outcomes in lower GI bleeding.

According to recent guidelines (10), all patients admitted to any emergency room with an episode of upper GIB should undergo urgent clinical evaluation based on any validated risk score. Risk scores for upper GI bleeding include the Rockall, Glasgow-Blatchford, AIMS65, and PNED scores. Some of them include both pre- and post-endoscopy variables (10). The most recent report (11) is an International multicentre prospective study with hospitals from Europe, North America, Asia, and Oceania which compared the predictive accuracy of five risk scoring systems in patients with upper GIB. Comparisons included pre-endoscopy scores (admission Rockall, AIMS65, and Glasgow-Blatchford) and post-endoscopy scores (full Rockall and PNED). The main endpoint was a composite endpoint including transfusion, endoscopic treatment, interventional radiology, surgery, or 30-day mortality. All these outcomes were also tested separately together with length of hospital stay. The Glasgow-Blatchford score was best at predicting intervention or death. However, the PNED and AIMS65 scores were best at predicting mortality. No score was helpful at predicting rebleeding or length of stay. A Glasgow-Blatchford score of ≤1 was the optimum threshold to predict survival without intervention with good sensitivity (98.6%) and low specificity (34.6%). A Glasgow-Blatchford score of ≥7 was the optimum threshold to predict endoscopic treatment. Other studies had already reported similar conclusions (12-14). However, the threshold of 0 or 1 with the Glasgow-Blatchford score is rarely seen at Emergency rooms and guidelines relay on the endoscopic finding of absence of high-risk stigmata and absence of comorbidities and severe drop of hemoglobin to recommend early discharge (10). The truth is that in clinical practice these risk scores are not often utilized, which may reflect that they are not robust enough to be trusted by the clinician.

Lower GI bleeding scores (*Table 1*)

Currently, very few scores are available to predict specifically outcomes in lower GI bleeding. Investigation on this topic is scarce. Nevertheless, the recent ACG guidelines on lower GIB recommend *that "Risk assessment and stratification should be performed to help distinguish patients at high and low-risk of adverse outcomes and assist in patient triage including timing of colonoscopy and level of care"* although this is a conditional recommendation with low-quality evidence (9).

In a small study, Strate *et al.* (15) identified heart rate ≥100/min, systolic blood pressure ≤115 mmHg, syncope, non-tender abdominal examination, bleeding per rectum during the first 4 h of evaluation, aspirin use and more than 2 active comorbid conditions as independent variables associated with severe lower GI bleeding. With these variables, they could stratify the risk to present a severe bleeding into high risk group, when at least 3 variables were present; mild risk group with 1 to 3 variables, and low risk group when none of these variables could be identified. In another small study, Velayos *et al.* (16) found that a hematocrit <35%, a systolic blood pressure <100 mmHg, a heart rate >100 bpm and the presence of gross blood on rectal examination were independent risk factors of severe lower GIB. A BLEED model was developed by Kollef *et al.* (17) which can be used both in upper and lower GIB cases. The variables included ongoing bleeding, low systolic blood pressure, elevated prothrombin time, erratic mental

Table 1 Summary of the main risk scores reported to predict poor outcomes in patients with lower gastrointestinal bleeding

Risk score	Score variables	Cut off	Outcome
Oakland	Age	≤8	Safe discharge
	Sex		
	Previous lower GIB admission		
	Digital rectal examination findings		
	Heart rate		
	Sistolic blood presure		
	Haemoglobin		
Glasgow-Blatchford	Haemoglobin	0 low risk	Safe discharge
	Blood urea		
	Blood presure		
	Heart rate		
	Sex		
	Melena present		
	Recent syncope		
	Hepatic disease		
	Heart failure		
AIMS 65	Albumin	≥2 high risk	Mortality
	INR		
	Mental status		
	Blood presure		
	Age		
Rockall post-endoscopy	Age	≤2 low risk; 3-4 intermediate risk; ≥5 high risk	Mortality; rebleeding
	Comorbidities		
	Shock (heart rate and blood pressure)		
	Diagnosis		
	Endoscopic stigmata		
Strate	Heart rate	0 low risk; 1-3 intermediate risk; >3 high risk	Bleeding severity
	Blood presure		
	Syncope		
	Nontender abdominal examination		
	Bleeding per rectum (first 4 h)		
	Aspirin use		
	Charlson comorbidity index score		

Table 1 (*continued*)

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Risk score	Score variables	Cut off	Outcome
PNED	American Society of Anesthesiologists (ASA) physical status	≤4 low risk; 5-8 intermediate risk; ≥9 high risk	Mortality
	Time since admission <8 h		
	Haemoglobin		
	Renal failure		
	Age		
	Rebleeding		
	Cirrhosis		
	Cancer		
	Failure of endoscopic treatment		
BLEED	Ongoing bleeding	0 low risk; ≥1 high risk	In-hospital outcomes
	Blood preasure		
	Prothrombin time		
	Mental status		
	Unstable comorbid disease		
NOBLADS	Nonsteroidal anti-inflammatory drugs	≥2 high risk; <2 low risk	Intervention; safe discharge
	Diarrhea		
	Abdominal tenderness		
	Blood pressure		
	Antiplatelet drugs		
	Albumin level disease		
	Disease scores		
	Syncope		

GIB, gastrointestinal bleeding.

status and unstable comorbid disease. This score also classifies patients into high-risk group patients who present more in-hospital complications, red blood transfusions and longer hospital stays compared to low-risk group patients. However, its applicability is limited by absence of validation and by being developed with intensive-care patients.

NOBLADS is another and recent risk score designed specifically for lower GIB patients (18). Authors of this study performed a retrospective analysis of 439 patients that was further validated in a cohort of 161 patients. It determined severity of bleeding with an AUC value of 0.77. The 8 variables included in the model were nonsteroidal anti-inflammatory drugs use, diarrhea, abdominal tenderness, blood pressure of 100 mmHg or lower, antiplatelet drugs use, albumin level less than 3.0 g/dL, disease scores of 2 or higher and syncope, which were all independently correlated with severe GIB. Higher NOBLADS scores were associated with a requirement for blood transfusion, longer hospital stay, and intervention. The score seems to perform better than those previously described above.

Sengupta *et al.* (19) created a tool to predict 30-day mortality in patients with lower GIB. They managed a huge derivation cohort of 4,044 and a validation cohort of 2,060 patients. They found 8 variables related with 30-day mortality: age, dementia, metastatic cancer, chronic kidney disease, chronic pulmonary disease, anticoagulant use,

admission hematocrit, and albumin. After dividing the score into 4 quartiles of risk, 30-day mortality in the derivation and validation sets was similar in the two cohorts of patients with strong differences between quartiles (3.6–4.4% in quartile 1; 4.9–7.3% in quartile 2; 9.9–9.1% in quartile 3; and 24–26% in quartile 4). Obviously, this score, if confirmed and validated in other populations, may be very useful to predict mortality in patients with lower GIB.

Finally, some scores designed to predict outcomes in patients with upper GIB have been studied and validated in patients with lower GIB (6,19). Among them, the best one to predict blood transfusion, hospital stay and 30-day mortality was the Glasgow-Blatchford score. Authors in the article advise and recommend the use of the Glasgow-Blatchford score when the origin of bleeding is unclear (6).

The Oakland score

Oakland *et al.* (6) have recently published a new risk score (the Oakland score) to predict safe discharge in patients with lower GI bleeding. The study was based on a cohort of 2,336 prospectively identified admissions from 143 UK hospitals that was later on validated in another two UK hospitals. Safely discharge was defined as the absence of the following events: rebleeding, red blood transfusion, therapeutic intervention to control bleeding (endoscopic, radiological or surgical haemostasis), in-hospital death, and readmission with further lower gastrointestinal bleeding within 28 days. The predictive score was eventually based on 7 clinical variables which included age, sex, history of lower GIB, digital rectal examination, heart rate, blood pressure and haemoglobin concentration. Each score component had a value depending on the range of the variable, and the total score was the summary of all these values. A score of 8 or less predicts a 95% probability of safe discharge. The study also compares the Oakland score with other previously described scores such as the Glasgow-Blatchford, Rockall, AIMS65, BLEED and NOBLADS. The Oakland score was better than the others to predict safe discharge. Rebleeding was best predicted by the Glasgow-Blatchford and Oakland scores. Furthermore, the Oakland score was the most discriminative score for readmission for ongoing bleeding, but in-hospital 30 days mortality was better predicted by the AIMS65, which seems to be also true for upper GI bleeding (9).

A strong point of the Oakland score is that all variables are commonly used in Emergency Units, and therefore easily applied without the need of endoscopy data or other data that would require hospitalization. This should facilitate an early clinical decision and probable discharge without hospitalization most patients attended at the Emergency Room due to lower GI bleeding. This should eventually have clear implications under a cost-effective perspective. Another strength pointed out by the investigators is that this risk score has been externally validated in 288 patients admitted in two different London hospitals. However, despite being acceptable, still the number of patients and hospitals seems short, and need further validation in other countries in order to confirm the exceptional findings reported by these UK investigators.

There are also other aspects that deserve to be put into the appropriate perspective before the Oakland score can be recommended in clinical practice. First, the score was constructed without taking into account coagulation data, since a significant proportion of patients (895/2,336=38.3%) did not have INR data. Today, as commented above, anticoagulation treatment is often seen in patients admitted to hospitals taking either old or new anticoagulants. The score should be revised taking this aspect into account. Another point that deserves attention is the lack of confirmation of the source of bleeding. Apparently only 21–23% of the patients underwent confirmatory endoscopy (sigmoidoscopy in the development cohort and colonoscopy in the validation cohort respectively) with upper GI endoscopy in only 11% of cases. This means that most cases of lower GI diagnosis were based on just clinical symptoms. Although it is clear that the positive predictive values of some symptoms may be high, these have been much more studied for upper than for lower GI bleeding (20). Furthermore, this aspect prevents further analyses to determine its predictive value for either midgut or colonic bleeding. It must be pointed out that as commented above, when the source of bleeding is unknown, the Glasgow-Blatchford score seems to be the best one to classify patients (6). A direct comparison of the Oakland, AIMS65 and Glasgow-Blatchford with the score reported for Sengupta *et al.* (19) for in-hospital mortality is also warranted.

Conclusions

The Oakland score seems to be very useful for discrimination of early discharge or no hospital admission. However, before being implemented in routine clinical practice further validation in other countries and populations needs to be conducted. Also, some of the commented potential deficiencies of the study (lack of validation of

actual cause of bleeding being from a lower GI source, coagulation data, etc.) must be re-examined. We agree that having a score based on just clinical variables should be better accepted than other scores that include invasive test requiring prolongation of hospital stay. However, this advantage should not be based at the expense of having a lower predictive capacity. Today, colonoscopy can be performed within 24 h and hospital admission may not be necessary. Although the best timing to perform a colonoscopy is another controversial aspect in this area, its beneficial effect may have an impact on reducing the risk of rebleeding, confirmation of etiology, reduction of need of surgery or transfusion requirements. In upper GI bleeding, nobody questions the need of performing an early upper GI endoscopy since it provides diagnosis, therapy and prognosis value. None of these parameters have been tested or proved in lower GIB events, but data are scarce and more studies are needed. Scores based on clinical variables could determine not only safe patient discharge but also those patients who may benefit with early endoscopy or early intervention.

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