

Role of Complete (Full) Rockall Scoring in Management of Upper Gastrointestinal Tract Bleeding

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ABSTRACT

Background: Risk stratification in patients with upper gastrointestinal bleeding is very important for proper management. Rockall score is the most used scoring systems in this regards.

Aims: to evaluate the Rockall scoring system as predictor of prognosis and mortality and accordingly management done in patients with upper gastrointestinal tract bleeding.

Patients and Methods: This prospective study included 150 adult patients with upper gastrointestinal tract bleeding and underwent endoscopy. Demographic data- age, sex, presentation with hematochezia, and history of upper gastrointestinal tract bleeding, and comorbidities were recorded in a predesigned proforma. The Rockall Score was calculated according to standard protocol. The outcomes were measured in terms of need for medical ward, need for surgery and mortality were recorded 4 weeks after procedure. Receiver operating characteristic was used to evaluate the predicative value of Rockall score in predicting different outcomes (sensitivity and specificity of score).

Results: Most patients (92, 61.13%) required medical ward admission, while the minority of patients (10, 6.67%) required surgical ward admission, 25 patients (16.67%) discharged home well, and 23 patients (13.33%) died. For predicting medical ward admission, the area under the curve was 0.803, 95%CI= 0.714-0.892. The sensitivity and specificity of the test at cut off value of Rockall score= 2 was 77% and 56%, respectively. For predicting surgical admission, the area under the curve was 0.927, 95%CI= 0.855-0.999. The sensitivity and specificity of the test at cut off value of Rockall score= 4 was 83% and 84%, respectively. For predicting mortality, the area under the curve was 0.982, 95%CI= 0.947-1.0. The sensitivity and specificity of the test at cut off value of Rockall score= 5 was 90% and 96%, respectively.

Conclusions: The Rockall Score system is an appropriate predictor of mortality in patients with upper gastrointestinal tract bleeding. The cut-off point for predicting surgical admission and mortality was 4 and 5, respectively. However, it is not appropriate predictor for medical admission.

KEYWORDS: upper gastrointestinal tract bleeding, Rockall score, receiver operating characteristic curve.

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INTRODUCTION

Upper gastrointestinal bleeding (UGIB) is a common medical condition with various etiologies and presentations. It is defined as blood loss originating proximal to the ligament of Treitz, in the esophagus, stomach, or duodenum. The most common manifestation of UGIB is melena or hematemesis. However, UGIB should also be suspected in hemodynamically unstable patients who present with

hematochezia. The severity of UGIB is defined by the patient's hemodynamic status and packed red blood cell transfusion requirements. Although patients who remain hemodynamically stable may be managed appropriately in the outpatient setting, severe UGIB requires close monitoring in the intensive care unit with early upper endoscopy.¹

The causes of UGIB in the United Kingdom are peptic ulcers/erosions (45%), idiopathic (24%), esophagitis (10%),

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gastro-esophageal cancer (5%), varices (5%), Mallory Weiss (M-W) tear (5%), angiodysplasia, or Dieulafoy ulcer (5%).² Nonvariceal UGIH is the most common complication of peptic ulcers occurring in 15% of ulcer patients and accounts for the commonest cause of ulcer related deaths. It tends to be more common in patients aged 60 and older.³

Esophagitis is a form of peptic ulcer disease, but usually only causes minor acute bleeding. Occasionally, a significant vessel may be involved with consequent massive arterial hemorrhage which must be distinguished from variceal bleeding. Carcinoma and lymphoma of the stomach, when at an advanced ulcerated stage, commonly bleed. This usually results in occult blood loss, but will occasionally present with acute hemorrhage.⁴

The Dieulafoy's lesion is a ruptured, thick-walled artery with little or no associated ulceration. It occurs in the fundus as a round mucosal defect with a protruding artery at the base.⁵ The percentage of variceal bleeders increases in inner-city areas most probably because of alcoholic liver disease.³ Upper GI hemorrhage frequently occurs in hospital patients being treated for unrelated conditions. Of these, 25% bleed from acute erosive gastritis and 50% from peptic ulcers.⁶

In ulcers in the posterior wall of the duodenum or the lesser curve of the stomach the gastroduodenal or left gastric arteries can be involved, and these lesions are particularly prone to massive hemorrhage and rebleeding after initial stabilization. In addition, the atherosclerotic arteries of the aged will not favor vasospasm/constriction.

Peptic ulcers have unquestionably been a disease of the twentieth century. Epidemiological data for this disease and its complications have shown striking variation in incidence and prevalence. Various drugs have been used to treat peptic ulcer disease like proton-pump inhibitors, histamine (H₂) receptor antagonists, prostaglandin analogues and sucralfate. Because these drugs are complex, expensive and toxic, efforts have been constantly made to find a suitable, palliative and curative agent for the treatment of peptic ulcer disease from natural products of plant and animal origin. Recently, antioxidants are being used to treat peptic ulcer disease.

Antioxidants help in scavenging the free radicals and controlling the oxidative stress responsible for the progression of peptic ulcer.⁷

The incidence of upper gastrointestinal bleeding in the United Kingdom in the 1990s was 103-172/100 000 adults per year.⁵ More recent reports from the United States using nationwide administrative databases indicate that the incidence of hospital admission for the condition was 61-78 per 100000 persons. Peptic ulcers are the most common cause of hospital admission for upper gastrointestinal bleeding, accounting for just over half of all cases.^{8,9}

The incidence of hospital admission for the condition has decreased 21-23% during the past 10 years. This decrease is largely accounted for by decreases in peptic ulcer bleeding (and bleeding ascribed to "gastritis") probably because of the decreasing prevalence of H pylori and increasing use of antisecretory drugs. Case fatality rates from these database studies were low, in the range of 1.9-2.5%.¹⁰ By contrast, large observational cohort studies from Europe suggest higher fatality rates of around 10%.^{2,11} The reason for these differences is unknown but might be partly related to reliance on coding in database studies and differences in practice, such as low risk patients being more often managed in outpatient settings in Europe.⁴

Many risk assessment scores have been developed for patients with upper gastrointestinal bleeding, including those that can be calculated early after presentation (pre-endoscopy) and those that include endoscopic findings.^{12,13} It is believed that pre-endoscopy scores are of greater practical use because it is probably most important to predict risk soon after presentation to help direct management. The use of risk scores has been recommended to stratify patients into those at higher or lower risk of poor outcome.¹⁴ This enables patients predicted to be high risk to be managed in high dependency or intensive care units and receive urgent endoscopy, whereas those at very low risk can be managed as outpatients.⁴

The most well established and commonly used pre-endoscopic scores are the Glasgow Blatchford score (GBS), the pre-endoscopic or "admission" Rockall score, and the AIMS65 score (Albumin 1.5, altered Mental status, Systolic blood pressure 65 years).¹³ The GBS was developed to predict a composite of clinical intervention or death, whereas the other two were designed to predict death. Many studies have compared these and other scores, and GBS seems to be superior at predicting a combined endpoint of intervention or death (figure 1).¹⁵

These risk assessment scores have limited clinical utility for predicting which patients are at higher risk. However, risk scores do seem to have a clinical role in identifying patients who are at low risk.¹⁶ When aiming to identify a cohort of patients who are at low risk and could be managed as outpatients, it is important to achieve a very high sensitivity so that almost no patients who may come to harm are sent home.⁴

Rockall scores are designed to combine information such as the patients' age, occurrence of shock assessed from systolic blood pressure records and pulse rate, presence and severity of comorbid conditions, and stigmata of hemorrhage.¹⁷

Table 1: Rockall Scoring System.

Component score	0	1	2	3
Age (years)	<60	60-79	≥ 80	
hemodynamics	No shock	Pulse >100bpm	Sys.BP <100 mmHg	

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Comorbidities	Non	Non	HF, IHD, Any major Comorbidities	Renal or liver failure, disseminated malignancy
Diagnosis post-endoscopy	MW or no lesion and no stigmata of hemorrhage	All other diagnosis	Malignancy of upper GIT	
Stigmata of recent hemorrhage	No stigmata or dark spot ulcer		Blood in UGIT, adherent clot, visible/spurting vessel	

UGIT upper gastrointestinal tract, IHD ischemic heart disease, MW M-Weiss tear, GI gastrointestinal, BP blood pressure.¹⁸

An initial Rockall scoring system is an appropriate tool for assessment before endoscopy, and is predictive of death and rebleeding in patients with ulcers or varices.¹⁹ If the initial (pre-endoscopic) score is 0 (age below 60 y, no shock, no comorbidity), there is an extremely low risk of death or rebleeding and non-admission or early discharge with appropriate outpatient follow-up is considered. If initial (pre-endoscopic) Rockall score is above 0, there is significant mortality. Score 1 has predicted mortality of 2.4%; score 2 has predicted mortality of 5.6% and a score > 8 has a high risk of death. Upper GI endoscopy is indicated for a full assessment of bleeding risk. If full (post endoscopic) Rockall score is < 3, there is low risk of rebleeding or death and early discharge and outpatient follow-up is considered.¹⁰

Dicu et al.²¹ showed that Rockall score can successfully stratify patients with UGIB into high- and low-risk categories for mortality and is the most useful tool in identifying patients who need intensive care to improve their outcome.

Aims of the Study

The present study aimed to evaluate the Rockall scoring system as predictor of prognosis and mortality and accordingly management done.

Patients and Methods

This prospective study was done at Baghdad teaching hospital and data collected in 2 years interval including 150 adult patients with UGIB and underwent endoscopy at the ER department during the period from 1st of June 2019 to 31st of May 2021 were enrolled in the study. The study was approved by Arab Council for Medical Specializations.

All patients with upper GI bleeding undergoing endoscopy were included in our study.

A written consent from each participant was obtained prior to data collection after explaining the aim of study. Each patient was given the complete unconditioned choice to withdraw anytime. The confidentiality of data throughout the study was guaranteed and the patients were assured that data will be used for research purpose only.

All patients were seen at ER department and initially stabilized with prompt intravenous access (central line or

large bore intravenous cannula), volume resuscitation with crystalloids, blood transfusion, intravenous proton pump inhibitor and intravenous terlipressin 1mg (in suspected variceal bleeding) every 6 hours. The demographic data- age, sex, presentation with hematochezia, and history of upper GI bleeding, and comorbidities, and vital signs were recorded in a predesigned proforma.

Endoscopy was performed within 24 hour of admission at ER department. Then the patients followed up at medical and surgical wards.

The endoscopic practice for patients with high risk stigmata of bleeding was by injection of dilute adrenaline (epinephrine) into and around the bleeding point, thermal contact or clips, or both, but not adrenaline alone. Band ligation was performed in cases of esophageal or gastric variceal bleeding. In line with recent evidence and guidelines, the policy was to administer red blood cells at a hemoglobin threshold of 70-80 g/L (7-8 g/dL), or as guided by the clinician in patients with severe hemorrhage.

The outcomes were measured in terms of need for medical ward, need for surgery and mortality were recorded at 48 hours following endoscopy. Patients were contacted 4 weeks after procedure either through telephone or through outpatient services to determine the outcome in terms of surgery and mortality.

All data were analyzed with SPSS for windows, v.25.0; IBM Corp, Armonk, New York, USA. Descriptive statistics were used, and continuous variable was expressed as mean, standard deviation and range, while categorical variables were expressed as frequency and percentage. To validate the Rockall Score, Receiver Operating Characteristic (ROC) based on non-parametric technique was constructed. The area under the curve (AUC) was calculated and used to determine the usefulness of the scoring system to distinguish between individuals who experience an event versus that they do not do it. A p-value of < 0.05 was considered significant.

Results

The mean age of the patients was 49.75± 17.66 years (range 15-86 years). The majority of patients were males (60%), and the male: female ratio was 1.78:1. The mean pulse rate, SBP and DBP was 104.18± 17.52 beats/min, 114.88± 24.1 mmHg, and 68.63± 15.77 mmHg, respectively.

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Table 2: Patients' characteristics and demographic data (n=150).

Variables		Values
Age (years)	Mean $\pm$ SD	49.75 $\pm$ 17.66
	Range	15-86
Gender No. (%)	Male	96 (60%)
	Female	54 (40%)
Pulse Rate (BPM)	Mean $\pm$ SD	104.18 $\pm$ 17.52
	Range	56-150
Systolic BP mmHg	Mean $\pm$ SD	114.88 $\pm$ 24.1
	Range	60-180
Diastolic BP mmHg	Mean $\pm$ SD	68.63 $\pm$ 15.77
	Range	40-100
Comorbidities No.(%)	Nil	41 (27.33%)
	Hypertension	66 (44%)
	DM type II	60 (40%)
	IHD	21 (14%)
	Liver Dis.	18 (12%)
	CVA	9 (6%)
	HF	9 (6%)
	others	30 (20%)

More than one-fourth (27.33%) of the patients had no comorbidity. Hypertension and diabetes were the most common comorbidities accounting for 44% and 40% of the patients, respectively. Other less common comorbidities including lung cancer, obstructive jaundice, osteosarcoma, COVID-19, hepatocellular carcinoma and chronic kidney disease collectively accounting for 20% of the patients (Table 2).

14 patients (9.33%) had normal endoscopic finding. The most common endoscopic finding was duodenal ulcer accounting for 32% of the patients, followed by gastropathy (23.33%),

esophageal varices (12.67%), duodenopathy (8%) and gastric ulcer (8%). Less common findings including GERD, duodenal erosion and EV, collectively accounting for 12% of the patients.

More than two-third of the patients (104, 69.33%) had no stigmata for recent hemorrhage, while 10.67% of the patients had clean base ulcer, 8% had blood in stomach and 4.67% had visible or spurting vessels. Other stigmata including adherent clot, active bleeding and blood in upper GIT collectively accounting for 7.33% of the patients (Table 3).

Table 3: Endoscopic findings and stigmata of recent hemorrhage.

Variables		No. (percent)
Endoscopic findings	Nil	14 (9.33%)
	Duodenal ulcer	48 (32%)
	Gastropathy	35 (23.33%)
	Esophageal varices	19 (12.67%)
	Duodenopathy	12 (8%)
	Gastric ulcer	12 (8%)
	Others(GERD, Duodenal erosion, (EV)	18 (12%)
Stigmata of recent hemorrhage	Nil	104 (69.33%)
	Clean base ulcer	16 (10.67%)
	Blood in stomach	12 (8%)
	Visible or spurting vessel	7 (4.67%)
	Others (adherent clot ,active bleeding, blood in upper GIT)	11 (7.33%)

Most patients (92, 61.13%) required medical ward admission, while the minority of patients (10, 6.67%) required surgical ward admission and surgery. In between, 25 patients (16.67%) discharged home well from ER department , and 23

patients (13.33%) unfortunately died,7 patients at ER department ,12 patients at medical ward and 4 patients at surgical ward (Figure 1)

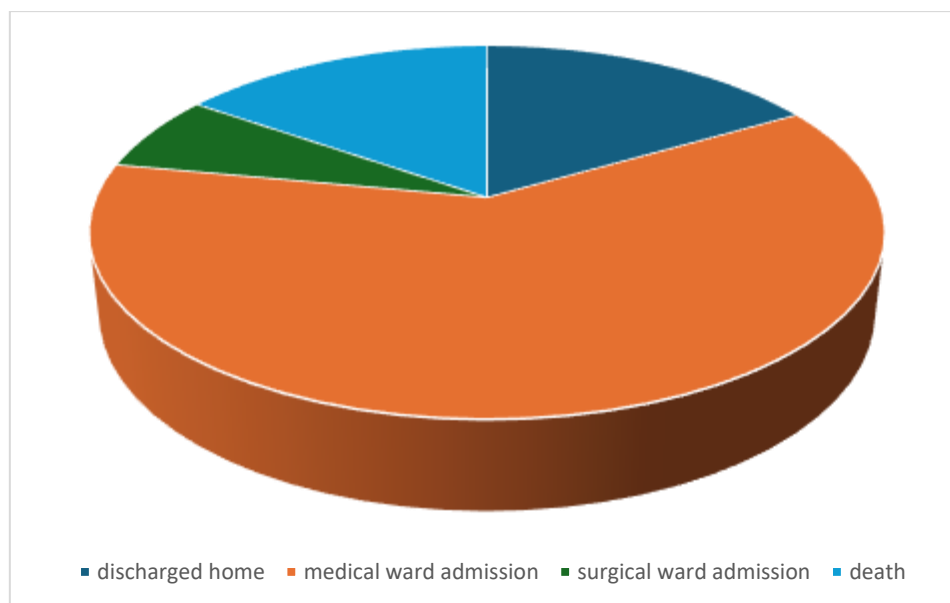


Figure 1: Outcome of patients with upper GIT bleeding.

The least Rockall score was recorded for discharged patients (2.12 ± 1.16) which was significantly lower than those required medical ward admission (3.92 ± 1.69), surgical ward

admission (6.43 ± 2.31) or died patients (7.2 ± 1.2). Of note, there was no significant difference between patients required surgical ward admission and died patients (Table 4)

Table 4: Association of Rockall Score with the outcome.

Outcome	Mean $\pm$ SD	Range
Discharged home	2.12 ± 1.16	1-4
Medical ward admission	3.92 ± 1.69	1-8
Surgical ward admission	6.43 ± 2.31	2-9
Death	7.2 ± 1.2	6-9
p-Value	<0.001	

Receiver operating characteristic (ROC) curve was used to evaluate the predictive value of Rockall score in predicating different outcomes of patients with upper GIT bleeding. For predicting medical ward admission, the area under the curve

(AUC) was 0.803, 95%CI= 0.714-0.892, $p < 0.001$. The sensitivity and specificity of the test at cut off value of Rockall score= 2 was 77% and 56%, respectively (Figure 2)

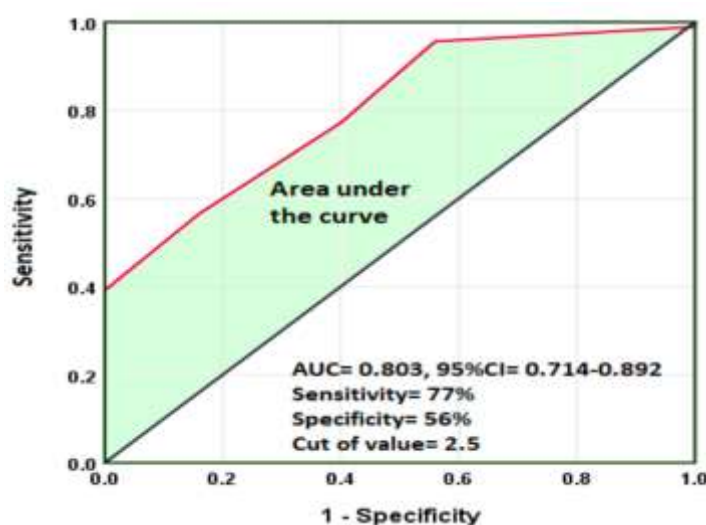


Figure 2: Receiver operating characteristic curve for Rockall score in predicting medical ward admission patients with upper GIT bleeding.

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For predicting surgical ward admission, the AUC was 0.927, 95%CI= 0.855-0.999, $p < 0.001$. The sensitivity and

specificity of the test at cut off value of Rockall score= 4 was 83% and 84%, respectively (Figure 3)

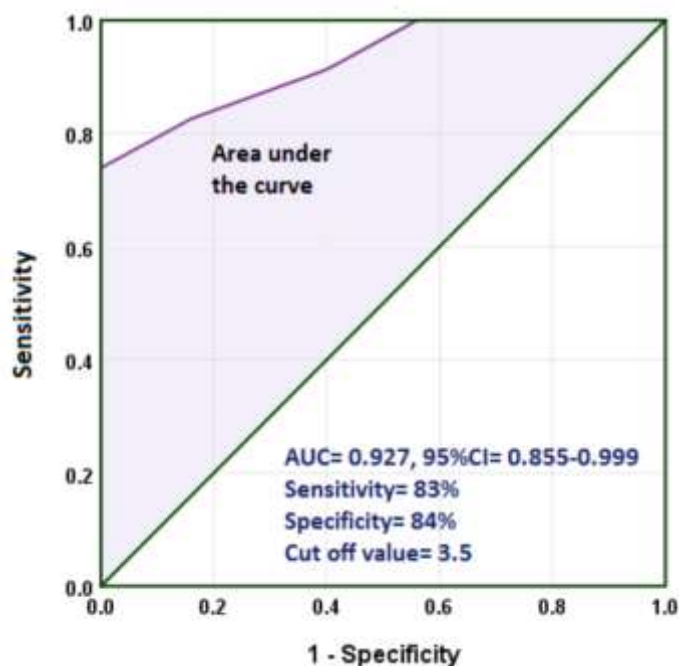


Figure 3: Receiver operating characteristic curve for Rockall score in predicting surgical ward admission patients with upper GIT bleeding.

For predicting mortality, the AUC was 0.982, 95%CI= 0.947-1.0, $p < 0.001$. The sensitivity and specificity of the test at cut off value of Rockall score= 5 was 90% and 96%, respectively (Figure 4).

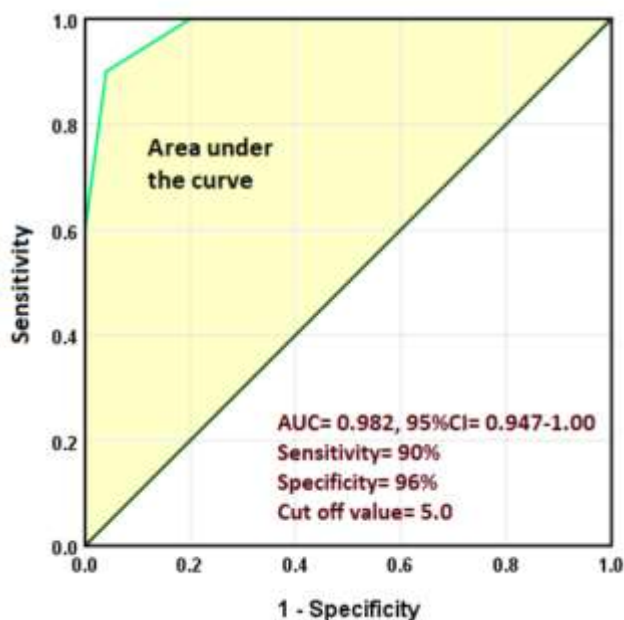


Figure 4: Receiver operating characteristic curve for Rockall score in predicting mortality in patients with upper GIT bleeding.

DISCUSSION

In the present study, Rockall score had low predictive value for medical ward admission, but demonstrated a very good or excellent predictive value for surgical ward admission or mortality, respectively. These results are consistent with many previously published data showing that the complete

Rockall score is useful for the prediction of mortality but not medical admission.^{17,21,22} Others studies have found the complete Rockall score to be predictive for medical admission and mortality and to be able to identify a group of patients at low-risk for re-bleeding and mortality.^{22,23}

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Enns et al.²¹ investigated 1869 patients with UGIB in Canada. The reported that Rockall score was an adequate to predict mortality in those patients. However, it was weak predictor for re-bleeding or surgery ward admission. Almost similar result was obtained by another prospective study in the UK where the score was found to adequately predict mortality but again was not good at predicting rebleeding. However when Sanders et al.²⁴ validate the score for peptic ulcer and variceal bleeding, they found that the score is useful to predict rebleeding and mortality. In the present study, the cut off value of Rockall score in the context of predicting mortality was 5, and in the context of predicting surgical admission was 4.

Rios et al.²⁵ observed that the score has a very good discrimination value to group patients at high risk of mortality, having an area under the ROC curve of 0.8037 and the cut-off point being (5). However, this score did not discriminate the group of patients who had rebleeding or in need for transfusion since they present a low area the ROC curve of 0.6528 and 0.6435 respectively. It is observed that the value of 5 in the Rockall Score is the one with the best combination of sensitivity and specificity for mortality. In a study at the Princess Royal University Hospital in Farnborough Common, England, was established as a point cut-off of the Rockall Score 5, to differentiate between severe cases (score greater than or equal to 5) and non-severe (score less than 5).²⁶

In the Enns et al study²¹, the optimal cutoff Rockall scores were 6 for surgical procedures and death and 7 for rebleeding. Also oi Portuguese study, Maia et al reported 7 cut off value for predicting mortality in patients with UGIB.²⁷ On the other hand, in a study of School of Medicine in Los Angeles, it was found that patients with Rockall scores less than or equal to 2 belonged to the group with a low risk of death.²⁸

Inconsistency in cutoff values amongst different studies is difficult to explain. However, this might be due to different characteristics in each study, including demographic data of patients, bleeding causes, time of endoscopy, and adherence to guidelines regarding endoscopic therapy. There are also differences between outcomes' definitions compared to other studies, which makes comparison of results difficult.

Thus, the present study suggests that Rockall scoring system developed by Rockall et al is a useful tool for stratifying patients with UGIB into high and low risk categories for mortality and surgical admission, but not for medical admission. The disappointing performance of the risk scoring system in the prediction of re-bleeding and surgery in our study and several similar studies might be partly explained by the fact that the risk scoring system was originally developed for the prediction of mortality.

The variations in the results between different studies may be attributed to variation in the management of UGIB (use of high-dose proton pump, better intensive care unit (ICU) management, more alternatives in therapeutic endoscopy). Therefore, it is recommended to carry out the validation of

the score in each country or in specific situations and at the current moment.

Mortality rate in the present study was 13.33%, which was is close to the 10% average mortality from upper gastrointestinal bleeding worldwide according to the majority of studies on this topic.^{19,24,28} In an English study a mortality of 9.8%.²⁶ In the study of England by the mortality that was found was 14%¹⁹, while in Peru, it was found to be 9.1%.²⁹ However, some other studies reported as low as 0.48%, 2.8% and 1.69%.³⁰⁻³² Interestingly, the latter three studies based on retrospective data of endoscopy reports which not accurate as that of prospective studies.

Higher mortality rates in patients with GI bleeding are attributed to associated comorbidities.³⁰ One study reported an overall mortality rate of 14%, with these deaths occurring almost exclusively in older patients or those with serious comorbidity.³³

According to the results of the present study, only 6.67% of the patients required surgical admission. This in consistent with Maia et al.²⁷ who found that 5.7% of their patients (420 patients) had surgery. The role of surgery in UGIB has been decreasing due to advances in endoscopy and endovascular therapies. As a result, surgical intervention is reserved when these have failed or when concurrent indications are present.³⁴

CONCLUSIONS

- The Rockall Score system is an appropriate predictor of mortality in patients with UGI bleeding. And the score is equal or greater than 5
- The cut-off point being greater than or equal to score 4 can discriminates the group of patients who need surgical admission.
- However, it is not appropriate predictor for medical admission.

RECOMMENDATIONS

- Rockall score is appropriate system to classify patient into risk groups, mild risk can be discharged home, moderate risk admitted to medical ward and high risk should be admitted into surgical ward or intensive care unit.
- Further studies comparing the utility of this score with other scoring system are required in order to select the better scoring system to predict different outcomes of UGIB.

REFERENCES

- I. Kamboj AK, Hoversten P, Leggett CL. Upper Gastrointestinal Bleeding: Etiologies and Management. *Mayo Clin Proc* 2019;94(4):697-703.
- II. Hearnshaw SA, Logan RF, Lowe D, et al. Acute upper gastrointestinal bleeding in the UK: patient characteristics, diagnoses and outcomes in the 2007 UK audit. *Gut* 2011;60:1327-35.

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- III. Van Leerdam ME. Epidemiology of acute upper gastrointestinal bleeding. *Best Pract Res Clin Gastroenterol* 2008;22:209–24.
- IV. Stanley A, Laine L. Management of acute upper gastrointestinal bleeding. *BMJ* 2019;364:1536.
- V. Rockall TA, Logan RFA, Devlin HB, et al. 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. *Br Med J* 1995;311:222–6.
- VI. Schiller KFR, Truelove SC, Williams DG. Haemetemesis and melaena, with special reference to factors influencing the outcome. *Br Med J* 1970; ii:7–14.
- VII. Pharmacotherapy of Peptic Ulcer Disease and Latest Research Balaji Ommurugan and Vanishree Rao Submitted: November 28th, 2018Reviewed: April 17th, 2019Published: August 19th, 2019.
- VIII. 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;98:1494–9.
- IX. Laine L, Yang H, Chang SC, Datto C. Trends for incidence of hospitalization and death due to GI complications in the United States from 2001 to 2009. *Am J Gastroenterol* 2012;107:1190-0085.
- X. Wuerth BA, Rockey DC. Changing epidemiology of upper gastrointestinal hemorrhage in the last decade: a nationwide analysis. *Dig Dis Sci* 2018;63:1286-93.
- XI. Abougergi MS, Travis AC, Saltzman JR. The in-hospital mortality rate for upper GI hemorrhage has decreased over 2 decades in the United States: a nationwide analysis. *Gastrointest Endosc* 2015;81:882-778.e1.
- XII. Nahon S, Hagège H, Latrive JP, et al. Groupe des Hémorragies Digestives Hautes de l'ANGH. Epidemiological and prognostic factors involved in upper gastrointestinal bleeding: results of a French prospective multicenter study. *Endoscopy* 2012;44:998-1008.
- XIII. Marmo R, Koch M, Cipolletta L, et al. Italian registry on upper gastrointestinal bleeding (Progetto Nazionale Emorragie Digestive--PNED 2). Predicting mortality in non-variceal upper gastrointestinal bleeders: validation of the Italian PNED Score and Prospective Comparison with the Rockall Score. *Am J Gastroenterol* 2010;105:1284-91.
- XIV. Saltzman JR, Tabak YP, Hyett BH, et al. A simple risk score accurately predicts in-hospital mortality, length of stay, and cost in acute upper GI bleeding. *Gastrointest Endosc* 2011;74:1215-24.
- XV. Laursen SB, Hansen JM, Schaffalitzky de Muckadell OB. The Glasgow Blatchford score is the most accurate assessment of patients with upper gastrointestinal hemorrhage. *Clin Gastroenterol Hepatol* 2012;10:1130- 1135.
- XVI. Yang HM, Jeon SW, Jung JT, et al. Daegu-Gyeongbuk Gastrointestinal Study Group (DGSG). Comparison of scoring systems for nonvariceal upper gastrointestinal bleeding: a multicenter prospective cohort study. *J Gastroenterol Hepatol* 2016;31:119-25.
- XVII. 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;373:42-7.
- XVIII. Vreeburg EM, Terwee CB, Snel P, et al. Validation of the Rockall risk scoring system in upper gastrointestinal bleeding. *Gut*. 1999;44:331–335.
- XIX. Bozkurt MA, Peker KD, Unsal MG, et al. The Importance of Rockall Scoring System for Upper Gastrointestinal Bleeding in Long-Term Follow-Up. *Indian J Surg*. 2017;79(3):188-191.
- XX. Rockall TA, Logan RF, Devlin HB, et al. Risk assessment after acute upper gastrointestinal haemorrhage. *Gut* 1996;38:316–21.
- XXI. Dicu D, Pop F, Ionescu D, Dicu T. Comparison of risk scoring systems in predicting clinical outcome at upper gastrointestinal bleeding patients in an emergency unit. *Am J Emerg Med*. 2013;31(1):94–9.
- XXII. Enns RA, Gagnon YM, Barkun AN, et al. Validation of the Rockall scoring system for outcomes from non-variceal upper gastrointestinal bleeding in a Canadian setting. *World J Gastroenterol* 2006; 12: 7779–85.
- XXIII. Custodio Lima J, Garcia Montes C, Kibune Nagasako C, et al. Performance of the Rockall scoring system in predicting the need for intervention and outcomes in patients with nonvariceal upper gastrointestinal bleeding in a Brazilian setting: a prospective study. *Digestion*. 2013;88:252-7.
- XXIV. Giese A, Grunwald C, Zieren J, et al. Use of the Complete Rockall Score and the Forrest Classification to Assess Outcome in Patients with Non-variceal Upper Gastrointestinal Bleeding Subject to After-hours Endoscopy: A Retrospective Cohort Study. *West Indian Med J*. 2014 Jan;63(1):29-33.
- XXV. Sanders DS, Carter MJ, Goodchap RJ, et al. Prospective validation of the Rockall risk scoring system for upper GI hemorrhage in subgroups of patients with varices and peptic ulcers. *Am J Gastroenterol* 2002; 97: 630-5.

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- XXVI. Rios E, Mercado Tenorio JH, et al. Validation of Score de Rockall en pacientes con hemorragia digestiva alta en un hospital de Lima - Perú. *Rev. gastroenterol. Perú* 2009;29(2):111-117.
- XXVII. Kasem AM, Kamal T, Chandra NN, et al, Management of acute upper gastrointestinal bleeding in a district hospital; *Gastrointest Endosc* 2006; 63:606-12.
- XXVIII. Maia S, Falcão D, Silva J, et al. The Clinical Impact of Rockall and Glasgow-Blatchford Scores in Nonvariceal Upper Gastrointestinal Bleeding. *GE Port J Gastroenterol* 2021;28:243-252.
- XXIX. Dulai GS, Gralnek IM, Oei TT, et al. Utilization of health care resources for low-risk patients with acute, nonvariceal upper gastrointestinal hemorrhage: an historical cohort study; *Eur. J. Gastroenterol. Hepatol.*; Oct 2001; 13: 1149-1152.
- XXX. Soto-Tarazona A, Gutierrez de aranguren C, Cueva K, et al. New scoring system for predicting complicated upper gastrointestinal bleeding compared to the Rockall scoring system. *RevSoc. Peru. Med. Interna* 2007; 20; 5-9.
- XXXI. Basto M, Vargas G, Angeles P. Risk factors that increase morbidity and mortality in patients with upper gastrointestinal bleeding at the National Hospital "Arzobispo Loayza" 1980-2003. *Rev Gastroenterol. Peru* 2005; 25:259-267.
- XXXII. Ichiyanagui C. Epidemiology of gastrointestinal bleeding. *Acta Med Per* 2006 23 (3): 152-155.
- XXXIII. Salas O, Vilchez H, Ñahuin R, et al. Upper Digestive Hemorrhage at the Cayetano Heredia National Hospital. XX Peruvian Congress of Digestive Diseases; 2006 Nov 28-30- Dec 01-02; Lima Peru. *Rev Gastroenterol Perú* 2006; 26: 414.
- XXXIV. Rockall TA, Logan RF, Devlin HB, et al. Incidence of and mortality from acute upper gastrointestinal haemorrhage in the United Kingdom. *BMJ* 1995;311:222–226.
- XXXV. Samuel R, Bilal M, Tayyem O, et al. Evaluation and management of Non-variceal upper gastrointestinal bleeding. *Dis Mon.* 2018 Jul;64(7):333–43.