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Original Research Article

Comparison of prediction of outcomes in upper GI bleed using non-endoscopic scoring systems

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ABSTRACT

Background: Several scoring systems have been designed for risk stratification and prediction of outcomes in upper GI bleed. Endoscopy plays a major role in the diagnostic and therapeutic management of UGIB patients. However not all patients with UGIB need endoscopy. The objective of the present study was compared the prediction of mortality using different scoring systems in patients with upper GI bleed. A decision tool with a high sensitivity would be able to identify high and low risk patients and for judicious utilization of available resources.
Methods: 100 patients were assessed with respect to their clinical parameters, organ dysfunction, pertinent laboratory parameters and five risk assessment scores i.e. clinical Rockall, Glasgow Blatchford, ALBI, PALBI and AIMS65 were calculated.
Results: For prediction of outcomes, AIMS65 was superior to the others (AUROC of 0.889), followed by the GBS (AUROC of 0.869), followed by clinical Rockall score (AUROC 0.815), followed by ALBI score (AUROC of 0.765), followed by PALBI score (AUROC of 0.714) all values being statistically significant.
Conclusions: The AIMS65 score is best in predicting the mortality in patients with upper GI bleed. The optimum cut off being >2. Though GBS may be better in predicting the need for intervention, it is inferior in predicting the mortality. The newer scores like ALBI and PALBI are inferior to AIMS65 and GBS in predicting mortality.

Keywords: AIMS65, ALBI, Clinical Rockall score, Glasgow Blatchford, Non-endoscopic scoring systems, PALBI, Upper GI bleed

INTRODUCTION

Upper gastrointestinal bleed (UGIB) refers to bleeding into the GIT proximal to the ligament of Treitz. It is a potentially life-threatening condition presenting with hematemesis, coffee ground vomitus, melena causing significant mortality and morbidity.

The incidence of UGIB varies from each country: from 144/100,000 in Sweden, 111 in Aberdeen and 100 in the USA, to 47 in the UK.[1] Overall incidence is 48-165 /100,000 per year [2]. Upper GI bleed is more common in men than women (ratio 3:2) and the frequency increases with age a 20-30-fold increase has been witnessed from the 3rd to the 9th decade

Etiology can be varied - broadly classified into variceal and non-variceal. Sources of Bleeding in Patients Hospitalized for Upper Gastrointestinal Bleeding include Ulcers 31-67%, Varices 6-39 %, Mallory-Weiss tears 2-8%, Gastroduodenal erosions 2-18%, Erosive esophagitis 1-13%, neoplasm 2-8%, Vascular ectasias 0-6%, no source identified 5-14%.[3]

Lesions in the upper GIT which can be missed include Cameron's erosions, peptic ulcerations, angiectasis,

Dieulafoy's lesions, hemosuccus pancreaticus, and gastric antral vascular ectasias (GAVEs).

The clinical severities of upper gastrointestinal bleeding (UGIB) are of a wide variety, ranging from insignificant bleeds to fatal outcomes likewise with varying symptoms. Few of the most common clinical presentations in patients with an UGIB are: Hematemesis (40-50%), Melena (70-80%), Hematochezia (15-20%), either hematochezia or melena (90-98%).[4] Mortality rates from UGIB are 6-10% overall.[5]

Several scoring systems have been designed for risk stratification and prediction of outcomes in UGIB. They may be endoscopic like complete Rockall score, non-endoscopic like Pre-endoscopy (clinical) Rockall, Glasgow-Blatchford score (GBS), AIMS65, ALBI score, PALBI score.

Rockall scoring system was developed in 1996 as a simple numerical score to categorize patients presenting with acute upper gastrointestinal haemorrhage by risk of death.[6] The score uses both clinical criteria like increasing age, co-morbidity, shock; and endoscopic findings.

Score ranges from 0 to 11. A score of <3 indicates good prognosis and a score of >8 indicates bad prognosis. Patients' stigmata of recent haemorrhage (blood in upper gastrointestinal tract, adherent clot, visible or spurting vessel) are recognized risk factors for rebleeding, surgery and death and are indications for endoscopic therapy.

Preendoscopy Rockall score only includes 3 clinical variables: The patient's age, the haemodynamic status, and the occurrence of a comorbid disease. A maximum score of 7 is possible.

The Glasgow Blatchford score is a non-endoscopic score designed by Blatchford et.al in University of Glasgow, UK for ascertaining the need for treatment and also to determine outcome in patients with UGIB.

It was published in the Lancet in the year 2000 and has been increasingly used simple tool since then.[7]

The GBS ranges from 0 to 23, with higher scores indicating higher likelihood of a need for an endoscopic intervention. It has been shown that reliance on clinical parameters alone as is the case with Blatchford score does not affect its predictive value in determining the need for urgent therapeutic intervention.[8]

The GBS has been shown to be superior than the clinical Rockall score in identifying patients with suspected UGIB who have a low likelihood of an adverse clinical outcome.[8] With a high sensitivity and a high negative predictive value, the GBS indicates that almost all patients with a score equal to 0 can be safely discharged.

Table 1: Glasgow Blatchford Score.

Admission parameter	Score value
Urea (mg/dL)	
≥ 6.5to < 8.0	2
≥ 8 to < 10.0	3
≥ 10.0 to < 25.0	4
≥ 25.0	6
Haemoglobin (mg/dL)	
Men	
≥ 12.0 to < 13.0	1
≥ 10.0 to < 12.0	3
< 10.0	6
Women	
≥ 10.0 to < 12.0	1
< 10.0	6
Systolic BP (mmHg)	
100 to 109	1
90 to 99	2
<90	3
Other parameters	
Pulse >100 bpm	1
Melena at presentation	1
Syncope	2
Hepatic disease	2
Cardiac failure	2

Recently, the albumin-bilirubin (ALBI) score has been established as a more convenient and evidence-based model to assess the severity of liver dysfunction. The albumin-bilirubin (ALBI) grade is an indicator of liver functional reserve and has been validated as a prognostic indicator for patients with HCC.[9] Recent studies have also validated its effectiveness and simplicity in predicting outcome in UGIB in liver cirrhosis.

ALBI score = (log10 bilirubin×0.66) + (albumin×−0.085). In this equation, the unit of bilirubin is umol/L and that of albumin is g/L

AIMS65 score is scoring system that does not include endoscopic criteria and has been put forth as a good predictor of length of stay, cost of hospitalization, and mortality.[10] The score comprises of 5 variables

- albumin (1 point for value less than 3.0 g/dL (30 g/L));
- INR (1 point for value greater than 1.5);
- altered mental status (1 point given if Glasgow comascore was less than 14 or if disorientation, lethargy, stupor, or coma was seen);
- systolic blood pressure (1 point for value less than 90 mmHg);
- age (1 point for value greater than 65 years).

Out of the two common scoring systems not including endoscopic criteria AIMS65 outscored Blatchford score in predicting inpatient mortality from UGIB.[11]

Platelet-albumin-bilirubin score incorporates platelet count in addition to the parameters of ALBI score. Its prognostic importance has been validated in HCC.PALBI score was calculated as = (2.02*Log 10bilirubin) + (-0.37*(Log10 bilirubin) 2) + (-0.04*albumin) +(-3.48*Log10platelets) +(1.01*(Log10 platelets) 2).

The optimal approach to identify UGIB patients who will benefit most from in-hospital management is unclear. Clinical guidelines on the management of non-variceal UGIB, created by 34 experts from 15 countries, recommended using prognostic scales for risk stratification of UGIB patients.[12] NICE guidelines on both variceal and non-variceal UGIB also recommend the use of scores for risk assessment of UGIB patients; however, they acknowledge that these risk scores might be insufficient to use as standard clinical practice.[13] Early identification of UGIB patients who are at high risk for adverse outcomes can result in timely treatment with resultant decreased morbidity and mortality. In addition, identifying UGIB patients who are at low risk for adverse outcomes could result in safe and early discharge of these patients leading to reduction in health care resource utilization.[12] A decision tool with a high sensitivity would be able to identify these low-risk patients if they have a score below the cut-off point. Accurately identifying low-risk patients might be more important for ED physicians, making a risk score with a high sensitivity favourable over a risk score with a high specificity.

Endoscopy plays a significant role in the diagnostic and therapeutic management of UGIB patients. Due to limited availability of healthcare resources and the risks involved, not all patients with UGIB need endoscopy to be performed. Additionally, not all healthcare facilities have access to after-hours endoscopy.

In this study we have compared five risk assessment scores for their ability to predict clinically relevant endpoints. We have also assessed the clinical utility of these scores, by determining optimal thresholds for risk stratification with patients at very low risk who could be managed as outpatients, and high-risk patients who might require specific management strategies for improving outcome.

Aim

- to compare the prediction of mortality using different scoring systems in patients with upper GI bleed.

METHODS

Patients of all age group presenting to the emergency department of Victoria and Bowring and Lady Curzon hospitals, BMRCI with upper GI bleed were included in the study.

Patients were assessed with respect to their clinical parameters, organ dysfunction, certain laboratory parameters like haemoglobin, total leucocyte count, platelet count, INR, total bilirubin, direct bilirubin, albumin, electrolytes, liver enzymes, BUN, serum creatinine. Endoscopy was performed wherever possible and working diagnosis regarding the cause of UGIB was made. Different prognostic scores were calculated using the above data. Patients were followed up for outcomes and the outcomes were compared to respective scores using relevant statistical methods.

It was prospective cohort study. Sample size was 100. Study was carried out for 1 year from February 2017 to February 2018.

Inclusion criteria

Patients with UGIB of both variceal and non-variceal causes were included.

Exclusion criteria

Outcome assessment

Measured in terms of death or improvement in clinical and lab parameters within 30 days of the current episode.

Statistical analysis

All qualitative variables like gender, age, use of vasopressors, presence of symptoms was analysed using chi-square test and quantitative variables like pulse, blood pressure and lab parameters were analysed using student-t test. A P value of <0.05 was taken to be statistically significant. The outcomes were assessed in terms of sensitivity, specificity, accuracy of scores, likelihood ratios, the overall performance of the score in predicting mortality and comparison of mortality predicted by different scoring systems were analysed using Receiver Operating Characteristic (ROC) curves and area under ROC (AUROC).[14] The optimum cut-off for each scoring system was determined using maximum Youden index. All data was analysed using SPSS software.

RESULTS

A total of 100 patients with UGIB were included in the study of which 92% were male and 8%.the mean age of patients was 46.16 years.

72 patients improved of which 69(95.8%) were males and 3(4.2%) females with a mean age of 42.93±10.81years (20-67 yrs). 28 patients died of which 23(82.1%) were males and 5 (17.9%) were females with a mean age of 49.5±7.44 years (30-62 yrs) (t value =5.134, p value = 0.023)

Most patients were in the age group of 40-49 yrs however most number of deaths occurred in the age group of 50-59 yrs (x^2= 10.636, p =0.031).

A greater proportion of patients of younger age group (20-39 years) improved and the mortality increased proportionately with increased age (40-69 years) (t value = 10.636, p value = 0.031).

31 patients had both hematemesis and malaena, 35 patients had only hematemesis and 34 had only malaena. Of the patients who died, 12 (42%) had both hematemesis and malena, 9 (32%) had only hematemesis and 7 (25%) had only melena on presentation.

The mean pulse in patients who improved was 94.97±12.86 bpm and in patients who died was 109.89±17.04 bpm. The mean SBP on admission in patients who improved was 110.47±11.53mmHg and in patients who died was 92.5±12.1 mmHg. The mean DBP in patients who improved was 71.42±10.18 mmHg and in those who died was 61.29±10.14 mmHg. All the above variables showed a statistically significant relationships with the outcome (p value <0.001)

Table 2: The mean scores of patients.

		N	Mean	SD	Min.	Max.	't' value	'p' value
cRockall Score	Improved	72	2.64	1.427	0	5	30.388	<0.001
	Death	28	4.29	1.084	2	6		
GBS	Improved	72	8.86	3.589	2	19	47.881	<0.001
	Death	28	14.18	3.056	8	18		
Aims65	Improved	72	1.64	0.954	0	4	62.069	<0.001
	Death	28	3.29	0.897	1	4		
ALBI	Improved	72	-1.13	0.814	-2.88	0.69	15.950	<0.001
	Death	28	-0.41	0.820	-2.21	0.67		
PALBI	Improved	72	10.14	1.596	6.54	13.24	15.770	<0.001
	Death	28	8.52	2.364	2.05	12.55		

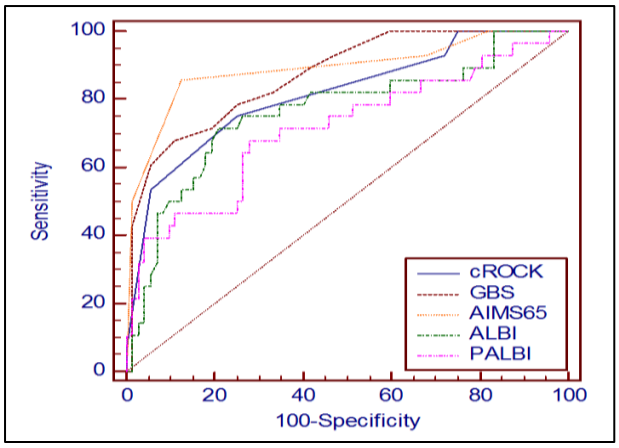

Figure 1: AUROC of different scores for mortality.

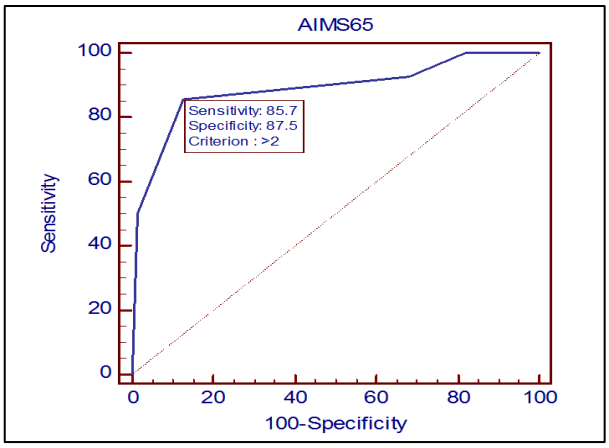

Figure 2: AUROC of AIMS65 for mortality.

Among the patients who improved, the mean haemoglobin value was 10.67±2.34 g/dL (p<0.001), mean total bilirubin was 6.49±5.92 mg/dL (p<0.001), direct bilirubin was 3.29±3.26 mg/dL (p<0.001), serum albumin was 2.74±0.81 mg/dL (p=0.002), SGOT was 112.25±51.43 IU (p=0.008), SGPT was 61.81±43.91 IU (p=0.168), INR was 2.04±0.764 (p<0.001), BUN was 32.99±16.91 mg/dL(p<0.001), serum creatinine was 0.93±0.318 mg/dL(p<0.001).

Among patients who died, the mean haemoglobin was 7.82±2.42 mg/dL, total bilirubin was 13.71±9.56 mg/dL, direct bilirubin was 7.05±5.48 mg/dL, serum albumin was 2.15±0.87 mg/dL, SGOT was 114.79±61.43 IU, SGPT was 74.82±36.73 IU, INR was 3.1±1.06, Na+ was, K+ was 3.75±0.85 mEq/L, BUN was 71.93±66.51 mg/dL, serum creatinine was 2.64±2.79 mg/dL. Thus, all the above variables showed a statistically significant relationships with the outcome.

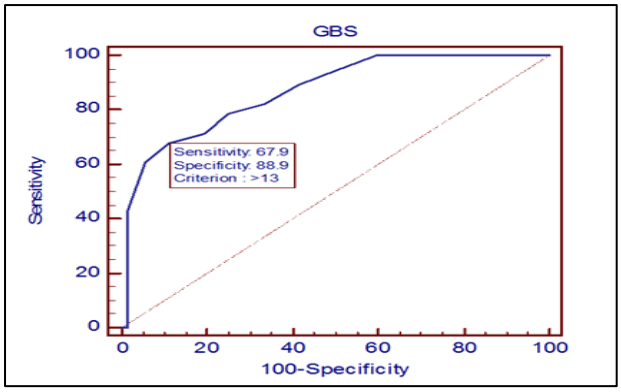

Figure 3: AUROC of GBS for mortality.

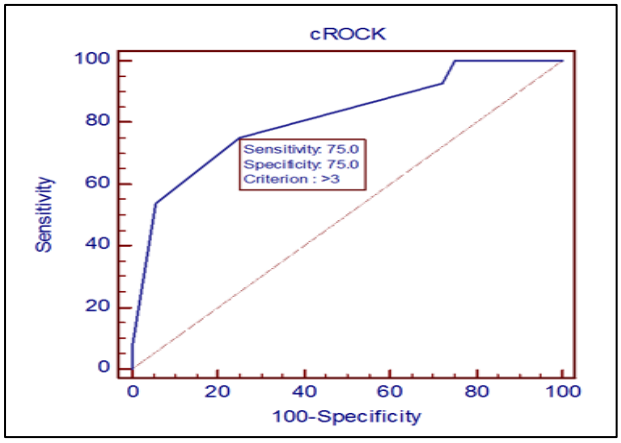

Figure 4: AUROC of clinical Rockall score for mortality.

For prediction of outcomes, AIMS65 was superior to the others with AUROC of 0.889 (CI 0.811-0.493) p<0.0001, followed by the GBS score with AUROC of 0.869 (0.787-0.928) p<0.0001, followed by clinical Rockall score with AUROC0.815 (0.725-0.886) P<0.0001, followed by ALBI score with AUROC of 0.765 (0.67-0.844) p<0.0001, followed by PALBI score with AUROC of 0.714 (0.615-0.8) p<0.0001.

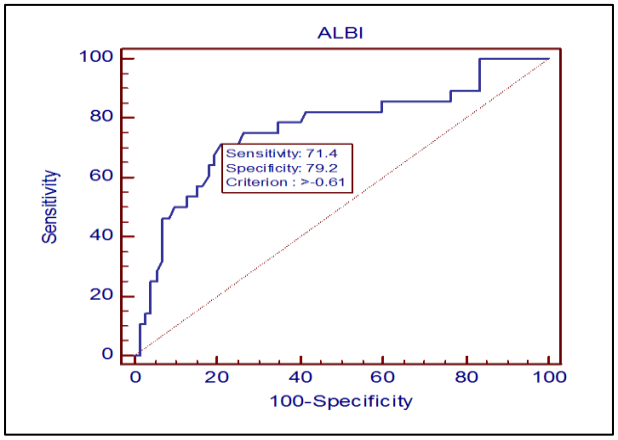

Figure 5: AUROC of ALBI for mortality.

The AIMS65 score had a sensitivity of 85.71%, specificity of 87.5%, youden index of 0.7321 and cutoff of>2 signifying poor outcome.

The GBS score had a sensitivity of 67.86%, specificity of 88.89%, youden index of 0.5675 and a cutoff of >13 signifying poor outcome and a positive likelihood ratio of 6.11.

The clinical Rockall score had a sensitivity of 75%, specificity of 75%, youden index of 0.5 and a cutoff of >3 and a positive likelihood ratio of 3.

ALBI score had a sensitivity of 71.43%, specificity of 79.17%, youden index of 0.5060 and a cutoff of >-0.61 and a positive likelihood ratio of 3.43.

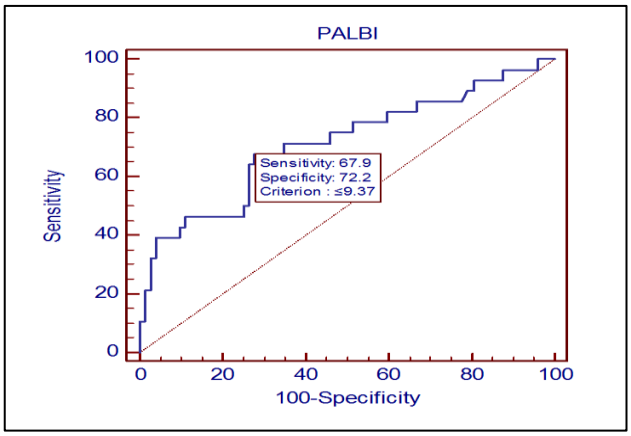

Figure 6: AUROC of PALBI score for mortality.

PALBI score had a sensitivity of 67.9%, specificity of 72.2%, youden index of 0.4008 and a cutoff of ≤ 9.37 and a positive likelihood ratio of 2.44.

DISCUSSION

Acute upper gastrointestinal haemorrhage is a medical emergency and in-patient care has been regarded as essential, until the risk of further bleeding has been ruled out.

Table 3: The scores and outcomes.

Scoring system	Outcome
Clinical rockall	Mortality
GBS	Need for intervention
AIMS65	Mortality/ length of hospital stay
ALBI	Severity of liver dysfunction
PALBI	Severity of liver dysfunction

Despite methodological and demographic differences, the outcomes evaluated in the different studies are relatively similar. However, when attempting to implement different scoring systems in clinical practice it is important to know the primary outcome variable that was

measured in each developed study. A summary of the main outcomes of each score is listed in Table 3.

The clinical Rockall score, without endoscopy, can be used to improve the quality of patients' care by identifying those patients less likely to require intensive health care services and selecting them for endoscopic evaluation as outpatients, allowing substantial resource savings. In present study, the mean cRockall score in the 72% patients who improved was 2.64±1.427 and in the 28% who died was 4.29±1.084 (p<0.001) which conforms to the predetermined cutoff of the score for both low risk and high risk patients. Tham et al reported that patients classified as low risk, i.e., clinical Rockall score of 0, can be managed in the outpatient setting because these patients had no adverse outcomes and did not require transfusion.[15] In a study conducted by Phang et al out of 60.5% of patients classified as low risk (cRockall <4) 3.2% died while out of 39.5% of patients classified as high risk (cRockall ≥4) 22.4% died which was similar to results of present study.[16] For prediction of mortality, AUROC was 0.815 (0.725-0.886) p<0.0001 in present study. In a study done by Wang CH et al for prediction of mortality by cRockall, AUROC was 0.703.[17]

In present study, the mean GBS score in patients who survived was 8.86±3.589 and in the 28% who died was 14.18±3.056 (p<0.0001) with an optimum cutoff for poor prognosis of >13 with a sensitivity and specificity of 67.86% and 88.89% respectively. In a study conducted by Koksa et al the mean Glasgow Blatchford Scoring scores were 7.1 ± 3.8 for 71 low-risk subjects and 11.7 ± 2.9 for 89 high-risk subjects (p<0.001) and a sensitivity and specificity of 86.52% and 69.01% for a cut-off value of >8.[18] In present study, AUROC for prediction of mortality of 0.869 (p<0.001).In a study done by Stanley et al, for the prediction of mortality, the GBS was similar to both the admission Rockall score: area under the curve 0.804 (CI 0.763–0.844) vs. 0.801 (0.751–0.850) P = 0.91, however this was not found in present study.[19] In a study done by Wang CH et al, The AUROC for prediction of mortality obtained for GBS was 0.513.[17] In a study done by Pang et al, the mean Blatchford score for those who needed therapeutic endoscopy was significantly higher: 10.3±3.5 (P <0.001).[20] In a study done by Aquarius et al, ROC analysis showed that the GBS had a good discriminative ability to determine the need for treatment in patients with acute UGIB (AUROC: 0.88; 95% confidence interval: 0.85-0.91).[21] Thus the GBS is not an efficient tool in predicting mortality but is useful in predicting the need for intervention.

In present study, the mean AIMS65 score in 72% patients who improved was 1.64±0.95 and in 28% patients who died was 3.24±0.89 (p<0.0001) with a cutoff of >2 for poor prognosis, a sensitivity and specificity of 85.71% and 87.5% respectively. The AUROC was 0.889 (0.811 to 0.943).in the original study done by Saltzmann et al, AIMS65 model had a high predictive accuracy (AUROC = 0.80; 95% CI, 0.78-0.81), which was confirmed in the validation cohort (AUROC = 0.77, 95% CI, 0.75-0.79).[22] Longer LOS and increased costs were seen with higher scores (P < .001). In a prospective multicenter study by Stanley et al the AUROC for mortality of AIMS65 was 0.78 (0.75 to 0.81).[23] Furthermore, the AIMS65 score had a near statistically significantly higher AUROC compared with the full Rockall score (P=0.06). The best score thresholds at predicting 30 days mortality was 2 or more for AIMS65 in comparison with present study. In a study by Yaka et al. GBS and AIMS65 scores were similar with respect to predicting in-hospital mortality (AUCs of 0.85 vs. 0.81; p = 0.342).[24]

In present study, the mean ALBI score in 72% patients who improved was -1.13±0.814 and in 28% patients who died was -0.41±0.82 with an AUROC of 0.765 (0.67-0.844) p<0.0001. There have been no studies till date regarding the utility of ALBI score in predicting mortality in patients with UGIB.

In present study, the mean PALBI score in 72% patients who improved was 10.14± 1.59 and in 28% patients who died was 8.52±2.36 with an AUROC of 0.714 (0.615-0.8). There are no studies comparing the prediction of mortality by PALBI score with the above scores. However, in a recent study by Elshaarawy et al PALBI was found to be a better predictor than Child Turcotte Pugh score (AUROC 0.847 vs 0.672).[25]

CONCLUSION

The AIMS65 score is best in predicting the mortality in patients with upper GI bleed. The optimum cut off being >2. Though GBS may be better in predicting the need for intervention, it is inferior in predicting the mortality. The newer scores like ALBI and PALBI are inferior to AIMS65 and GBS in predicting mortality.

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REFERENCES

1. Bashir S, Roy P. Upper Gastrointestinal Bleeding – A Review of the Literature (Part 1). Indian J Pract Doc. 2005;5(2):2008-05, 2008-06.
2. Ramaekers R, Mukarram M, Smith CA, Thiruganasambandamoorthy V. The Predictive Value of Preendoscopic Risk Scores to Predict Adverse Outcomes in Emergency Department Patients with Upper Gastrointestinal Bleeding: A

Systematic Review. Acad Emerg Med. 2016;23(11):1218-27.
3. D.L.Kasper, A.S.Fauci, S.L.Hauser, D.L.Longo, J.L.Jameson, J.Loscalzo. Harrison's principles of internal medicine. 19th ed. New York: McGrawHill; 2015.
4. Al-Assi NM, Genta RM, Karttunen TJ, Graham DY. Ulcer site and complications: relation to Helicobacter pylori infection and NSAID use. Endoscopy. 1996;28(02):229-33.
5. Fallah MA, Prakash C, Edmundowicz S. Acute gastrointestinal bleeding. Med Clin North Am. 2000;84(5):1183-208
6. Rockall TA, Logan RF, Devlin HB, Northfield TC.Risk assessment after acute upper gastrointestinal haemorrhage. Gut. 1996;38(3):316-21.
7. Blatchford O, Murray WR, Blatchford M. A risk score to predict need for treatment for upper gastrointestinal haemorrhage. Lancet. 2000;356(9238):1318-21.
8. Srygley FD, Gerardo CJ, Tran T, Fisher DA. Does this patient have a severe upper gastrointestinal bleed?. J Am Med Assoc. 2012;307(10):1072-9.
9. Johnson PJ, Berhane S, Kagebayashi C, Satomura S, Teng M, Reeves HL, O'Beirne J, Fox R, Skowronska A, Palmer D, Yeo W. Assessment of liver function in patients with hepatocellular carcinoma: a new evidence-based approach: the ALBI grade. J Clin Oncol. 2015;33(6):550.
10. Saltzman JR, Tabak YP, Hyett BH, Sun X, Travis AC, Johannes RS. A simple risk score accurately predicts in-hospital mortality, length of stay, and cost in acute upper GI bleeding. Gastrointestinal Endosc. 2011;74(6):1215-24.
11. Hyett BH, Abougergi MS, Charpentier JP, Kumar NL, Brozovic S, Claggett BL, Travis AC, Saltzman JR. The AIMS65 score compared with the Glasgow-Blatchford score in predicting outcomes in upper GI bleeding. Gastrointest Endosc. 2013;77(4):551-7.
12. Barkun AN, Bardou M, Kuipers EJ, Sung J, Hunt RH, Martel M, Sinclair P. International consensus recommendations on the management of patients with nonvariceal upper gastrointestinal bleeding. Ann Intern Med. 2010;152(2):101-13.
13. Acute Upper Gastrointestinal Bleeding: Evidence Update August 2015. Manchester: National Institute for Health and Clinical Excellence, 2014.
14. DeLong ER, DeLong DM, Clarke-Pearson DL. Comparing the areas under two or more correlated receiver operating characteristic curves: a nonparametric approach. Biometrics. 1988;837-45
15. Tham TC, James C, Kelly M. Predicting outcome of acute non-variceal upper gastrointestinal haemorrhage without endoscopy using the clinical Rockall Score. Postgraduate Med J. 2006;82(973):757-9.
16. Phang TS, Vornik V, Stubbs R. Risk assessment in upper gastrointestinal haemorrhage: implications for resource utilisation. N Z Med J. 2000; 113(1115):331.
17. Wang CH, Chen YW, Young YR, Yang CJ, Chen IC. A prospective comparison of 3 scoring systems in upper gastrointestinal bleeding. Am J Emerg Med. 2013;31(5):775-8.
18. Köksal Ö1, Özeren G, Özdemır F, Armağan E, Aydin Ş, Ayyildiz T. Prospective validation of the Glasgow Blatchford scoring system in patients with upper gastrointestinal bleeding in the emergency department. Turk J Gastroenterol. 2012;23(5):448-55.
19. Stanley AJ, Dalton HR, Blatchford O, Ashley D, Mowat C, Cahill A et al. Multicentre comparison of the Glasgow Blatchford and Rockall Scores in the prediction of clinical end-points after upper gastrointestinal haemorrhage. Aliment Pharmacol Ther. 2011;34:470-5.
20. Pang SH, Ching JY, Lau JY, Sung JJ, Graham DY, Chan FK. Comparing the Blatchford and pre-endoscopic Rockall score in predicting the need for endoscopic therapy in patients with upper GI hemorrhage. Gastrointest Endosc. 2010;71(7):1134-40.
21. Aquarius M, Smeets FG, Konijn HW, Stassen PM, Keulen ET, Van Deursen CT et al. Prospective multicenter validation of the Glasgow Blatchford bleeding score in the management of patients with upper gastrointestinal hemorrhage presenting at an emergency department. Eur J Gastroenterol Hepatol. 2015;27(9):1011-6.
22. Saltzman JR, Tabak YP, Hyett BH, Sun X, Travis AC, Johannes RS. A simple risk score accurately predicts in-hospital mortality, length of stay, and cost in acute upper GI bleeding. Gastrointestinal endoscopy. 2011;74(6):1215-24.
23. Stanley AJ, Laine L, Dalton HR, Ngu JH, Schultz M, Abazi R et al. Comparison of risk scoring systems for patients presenting with upper gastrointestinal bleeding: international multicentre prospective study. BMJ. 2017;356:i6432.
24. Yaka E, Yılmaz S, Özgür Doğan N, Pekdemir M. Comparison of the Glasgow-Blatchford and AIMS65 scoring systems for risk stratification in upper gastrointestinal bleeding in the emergency department. Acad Emerg Med. 2015;22(1):22-30.
25. Elshaarawy O, Samea EA, Gomaa A, Allam N, Saad M, Waked I. PALBI-the platelet-albumin-bilirubin score: a better predictor of outcome of acute variceal bleeding. J Hepatol. 2017;66(1):S564.

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