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# Predictors of Mortality in Patient with Upper Gastro-Intestinal Tract Bleeding

**Tarek El Sayed Gouda[1], Amir A. Fikry[2], Samar Abd El-hamid Mousa[1], Mahmoud AbdAllah Mohamed Mashal [1]***

[1] Department of Internal Medicine and Critical Care,

[2] Department of General Surgery, Faculty of Medicine, Mansoura University

*** Corresponding author:** Mahmoud AbdAllah Mohamed Mashal, **Mobile:** 01000838410,

**Email:** mahmoudmashal10@gmail.com

## ABSTRACT

**Background:** Acute upper gastrointestinal bleeding (UGIB) is a medical emergency with a significant mortality risk. Accurate prediction of patient outcomes is vital for optimal triage and management.

**Aim:** This research aimed to identify predictors of mortality in cases with UGIB and to assess the predictive performance of the AIMS65 and Glasgow-Blatchford (GBS) scoring systems.

**Patients and methods:** This prospective observational research, 58 cases presenting with UGIB to Mansoura University Emergency Department through the period from May 2023 to May 2024. Demographic data, clinical features, comorbidities, laboratory parameters, and outcomes were analyzed. Patients were assessed using AIMS65 and GBS scores. Primary outcome was mortality; secondary outcomes included re-bleeding, transfusion need, hospital stay, and ICU admission.

**Results:** The mortality rate was 8.6%. Non-survivors had significantly greater frequency of comorbidities like ischemic heart disease, cancer, and neurological disorders. Laboratory parameters such as elevated serum urea, creatinine, lactate, INR, and low albumin were significantly associated with mortality. Also, non-survivors had higher AIMS65 and GBS scores. An AIMS65 score > 3 predicted mortalities with 94.3% specificity and 80% sensitivity (AUC = 0.925), while a GBS > 13 showed 92.5% specificity and 80% sensitivity (AUC = 0.958).

**Conclusion:** Mortality in UGIB was influenced by comorbid conditions and specific laboratory abnormalities. AIMS65 and GBS were valuable tools in predicting in-hospital mortality, with AIMS65 demonstrating slightly better performance. Early risk stratification using these scores can guide clinical decision-making and resource allocation in emergency settings.

**Keywords:** Mortality, UGIB, GBS.

## INTRODUCTION

UGIB is a medical emergency that can be fatal if not treated quickly [(1)]. UGIB is a prevalent and sometimes life-threatening condition seen in emergency departments (EDs). Roughly 90 instances per 100,000 persons are reported globally [(2)]. It is critical to promptly and appropriately treat UGIB. This category of treatments includes medical care, invasive procedures such as esophagogastroduodenoscopy (EGD), and infusions of fluids and blood components [(3)].

Because different institutions may have access to different resources, the patient death rate can vary widely, from 30% to 39%. It may be helpful to identify the characteristics that predict death during acute UGIB so that patients can be stratified based on their risk. Hospitalization, rapid resuscitation, extensive monitoring, and urgent endoscopic intervention are necessary for high-risk patients. In contrast, low-risk cases can be treated as outpatients and discharged early. That way, emergency rooms may make better use of their budgets and save money [(4)]. Death in UGIB patients is associated with several variables, including advanced age, syncope, complications, chronic alcohol use, shock, low hemoglobin and platelet counts, elevated blood urea nitrogen (BUN) levels, and elevated international normalized ratios (INRs) [(5)].

When considering patient care in general, an increase in EDLOS has been associated with mortality. There have been investigations into other potential factors associated with mortality, such as the possibility that the time a patient arrives at the hospital is correlated with the likelihood of fatality [(6)]. We have developed multiple grading systems to predict these patients' outcomes. The most popular score for predicting death in hospitals, the Rockall score (RS) that has many components that make it challenging to employ in real practice [(7)].

Alternative ratings, such as the AIMS65 score and the Glasgow-Blatchford score (GBS) (10), have emerged from the quest for a pre-endoscopic therapeutically applicable score to differentiate among cases at great and low risk [(8)].

The aim of this research was to recognize factors linked to death as well as to evaluate the incidence of short-term mortality in instances involving UGIB.

## PATIENTS AND METHODS

Cases who have been admitted to Mansoura University Emergency Department in Mansoura, Egypt, were the subjects of this prospective observational study. The study ran from May 2023 to May 2024 for a total of one year. The study included 58 cases regarding the following criteria.

**Inclusion criteria:** Patients of both sexes. Patients who were older than 18 years old and exhibited hematemesis, melena, "coffee-ground" vomitus, and/or hematochezia—all indications of acute upper gastrointestinal hemorrhage.



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**Exclusion criteria:** Less than eighteen years old. Transferred patients from another hospital. Various types of bleeding besides upper gastrointestinal hemorrhage. Conditions with increased serum lactate such as sepsis, bacterial peritonitis, acute pancreatitis, rhabdomyolysis, etc.

**Methods: Complete history taking and full clinical examination**

**Laboratory investigations:** CBC to look for sepsis signs involving leukopenia or leukocytosis, anemia, thrombocytopenia. Arterial blood gases (ABG) for lactic acidosis, hypoxia, anion gap, hypercapnia. Serum sodium. Serum potassium. Liver and renal function tests and Lactate level.

**Radiological investigations:** Chest x-ray. Brain to reveal ischemic changes, hemorrhagic changes or any significant lesions. ECG for any type of arrhythmia. Doppler of lower limb veins.

**Patients were assessed for AIMS65 scoring system and Glasgow-Blatchford scoring system.**

**Upper GIT endoscopy:** It was done when indicated (Individuals who experienced ongoing or recurrent hemorrhage) and the findings were recorded.

**OUTCOMES**

**Primary outcome:** Incidence of mortality.

**Secondary outcomes:** Re-bleeding, blood transfusions, hospital stay, and admission site (ward or ICU).

**Ethical consideration: The Institutional Review Board (IRB) of Mansoura University, Faculty of Medicine gave its approval to the entire study design. Informed written consent was obtained from each participant sharing in the study. Confidentiality and personal privacy were respected in all levels of the study. Collected data were not used for any other purpose. The Helsinki Declaration was followed throughout the study's duration.**

***Statistical analysis***

Data were tested and evaluated using SPSS (Microsoft Excel software. Inc., Chicago, Illinois, USA), version 23 for data processing. The collected data were coded, processed and analyzed using SPSS program (Version 21) for windows. Descriptive statistics were calculating to include means, standard deviations, medians, ranges, and percentages. For continuous variables.

A p value below 0.05 considered statistically significant. Analytical statistics: Student T Test was used to assess the statistical significance of the difference of parametric variable between two study group means. Mann Whitney Test (U test) was used to assess the statistical significance of the difference of a non-parametric variable between two study groups. Chi-Square test was used to examine the relationship between two qualitative variables. ROC analysis was used to study the cutoff values of Blatchford score and AIMS65 score in prediction of mortality among the cases.

**RESULTS**

The current study included 58 cases with mean age of 63.09 ± 9.76 years with age range between 43 and 83 years. Regarding the gender, there were 43 males (74.1%) and 15 females (25.9%) (Table 1).

**Table (1):** Study case demographics

| Variables | | Study cases (N = 58) | |
|---|---|---|---|
| Age (years) | Mean ± SD | 63.09 ± 9.76 | |
| | Median (Range) | 62 (43 – 83) | |
| | | Number | Percent |
| Gender | | | |
| Male | | Forty- three | 74.1 |
| Female | | fifteen | 25.9 |

Continuous data were expressed as mean ± SD and median (range). Categorical data were expressed as number (%).

In the non-survivors, the prevalence of cancer, neurological problems, diabetes mellitus, hypertension, and IHD was statistically considerably greater (Table 2).

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**Table (2):** Comparison between associated comorbidities in survivors and non-survivors

| Variables | Group I (Survivors) n= 53 | | Group II (Non-survivors) (n= 5) | | P value |
|---|---|---|---|---|---|
| Hypertension | 18 | 34% | 4 | 80% | 0.043* |
| DM | 11 | 20.8% | 3 | 60% | 0.050* |
| CLD | 42 | 79.2% | 5 | 100% | 0.258 |
| CKD | 2 | 3.8% | 1 | 20% | 0.117 |
| IHD | 0 | 0% | 3 | 100% | < 0.001* |
| Neurological | 1 | 1.9 % | 2 | 40 % | < 0.001* |
| Cancer | 13 | 24.5 % | 4 | 80 % | 0.009* |

P: probability

Blatchford score and AIMS65 score were significantly higher in non-survivors (Group II) as compared to group I (Survivors) (Table 3).

**Table (3):** Analysis of Blatchford score and AIMS65 score in survivors and non-survivors

| Variables | Group I (Survivors) n= 53 | Group II (Non-survivors) (n= 5) | P value |
|---|---|---|---|
| Blatchford score | 5 (0 – 15) | 15 (10 – 15) | 0.002* |
| AIMS65 score | 0 (0 – 3) | 3 (1– 4) | 0.001* |

Continuous data expressed as median (min-max), *: statistically significant (p below 0.05)
In the two research groups, laboratory parameters, platelets count, serum urea, serum creatinine, serum lactate and INR were statistically significantly greater in the non-survivors, while the albumin level was statistically significantly lower in the non-survivors (Table 4).

**Table (4):** Analysis of laboratory parameters in in survivors and non-survivors.

| Variables | Group I (Survivors) n= 53 | Group II (Non-survivors) (n= 5) | P value |
|---|---|---|---|
| Haemoglobin (gm/dl) | 9.61 ± 2.06 | 8.99 ± 1.62 | 0.055 |
| PLTs($10^6$/ml) | 259 (145-442) | 418 (382-452) | < 0.001* |
| WBCs ($10^6$/ml) | 12.24 ± 2.07 | 11.14 ± 2.98 | 0.142 |
| Serum urea (mg/dl) | 23.66 ± 6.74 | 74.06 ± 23.29 | < 0.001* |
| Serum creatinine (mg/dl) | 0.73 ± 0.20 | 1.96 ± 0.65 | < 0.001* |
| ALT (Iu/l) | 35 (8 – 68) | 42 (14 – 71) | 0.070 |
| AST (Iu/l) | 66 (10 – 118) | 73 (14– 125) | 0.237 |
| Serum lactate (mmol/L) | 3.11 ± 0.57 | 7.66 ± 0.86 | 0.001* |
| Albumin | 3.61 ± 0.98 | 3.04 ± 0.45 | < 0.001* |
| INR | 1.09 ± 0.13 | 1.45 ± 0.28 | < 0.001* |

The non-survivors' hospital stays were statistically significantly longer (p<0.001). The non-survivor group had a statistically substantially greater percentage of cases requiring blood transfusions and mechanical ventilation (p below 0.001) (Table 5).

**Table (5):** Analysis of outcome variables in survivors and non-survivors.

| Variables | Group I (Survivors) (n= 53) | Group II (Non- survivors) (n= 5) | P value |
|---|---|---|---|
| Length of ICU stay | 9 (5 - 16) | 13 (8 - 20) | < 0.001* |
| Requirement for mechanical ventilation | 19 (35.8%) | 5 (100%) | < 0.001* |
| Requirement of blood transfusion | 27 (50.9%) | 5 (100%) | < 0.001* |

Survivors and non-survivors were best distinguished by Blatchford scores > 13 with 80% sensitivity and 92.5% specificity. The significant AUC=0.958 (p=0.001). An AIMS65 score > 3 with 80% sensitivity and 94.3% specificity was best for non-survivors. 0.925 AUC was statistically significant. (**Table 6).**

**Table (6):** Predictive ability of Blatchford score and AIMS65 score in prediction of mortality among the cases

| Diagnostic parameters | Blatchford score | AIMS65 score |
|---|---|---|
| AUC | 0.958 | 0.925 |
| Cut off point | > 13 | > 3 |
| Sensitivity | 80 % | 80 % |
| Specificity | 92.5 % | 94.3 % |
| Accuracy | 85.8 % | 92.8 % |
| PPV | 84.2 % | 88.8 % |
| NPV | 88.4 % | 86.2 % |
| P | 0.001* | 0.002* |

**NPV:** Negative predictive value, **AUC:** Area under curve, **PPV:** positive predictive value, **CI:** confidence interval, **P:** Probability value.

## DISCUSSION

Concerning demographic data analysis of this research, male cases were more susceptible to UGIB than women (74.1% vs 25.9%). This finding comes in agreement with, **Morsy *et al.*** [9] where they found no significant gender differences in survivors and non-survivors, but men are more likely than women to develop upper gastrointestinal hemorrhage. There was no obvious explanation for this male to female ratio, however it might be connected to certain behaviors like smoking cigarettes, which is a major risk factor for various UGIB lesions like peptic ulcers. Additionally, the distinct lifestyle of men, particularly in rural regions, may be linked to their increased susceptibility to hepatic disorders caused by viruses and bilharzia.

In the present study, AIMS65 and Blatchford scores were statistically significantly greater for non-survival patients than for survivors. This comes in agreement with **Hajavi *et al.*** [10] who found that the AIMS65and GBS scores were significantly greater in patients with mortality. Also, **Tang *et al.*** [1] discovered that when scores increased, a notable rise in death has been observed.

Regarding associated comorbidities in survivors and non-survivors in the current study, liver disease, diabetes mellitus, IHD, hypertension, neurological sequelae, and cancer were statistically significantly more common in the non-survivors. It is evident that those who suffer from liver disease, heart disease, GIT cancer, and re-bleeding are at a higher risk of suffering negative consequences. This comes in agreement with **Fouad and El Saied** [11]**,** who discovered no chronic liver disease in low-risk people.

In the present research, concerning laboratory parameters in non-survivors and survivors, the non-survivors had statistically significant lower albumin levels, although they had statistically significant greater platelet counts, serum urea, serum creatinine, serum lactate, and INR. **Bae *et al.*** [12] found increased potassium, PT (INR), AST, ALT, and total bilirubin in the mortality group.

The non-survivors' hospital stays were statistically significantly longer ($p<0.001$). The non-survivor group had a statistically substantially greater percentage of cases requiring blood transfusions and mechanical ventilation ($p<0.001$). This is in agreement with **Tang *et al.*** [1] who found that high-risk patients may be prioritised for blood transfusion. In contrast with our research, **Horibe *et al.*** [13] discovered that just 13 cases (4.2%) out of 311 who required blood transfusion passed away from all causes. The reason for this discrepancy could be because, in our analysis, variceal hemorrhage, the most frequent cause of acute UGIB, occurred with more severe bleeding than other UGIB causes.

Survivors and non-survivors were best distinguished by Blatchford scores > 13 with 92.5% specificity and 80% sensitivity with the significant AUC=0.958 ($p=0.001$). An AIMS65 score > 3 with 80% sensitivity and 94.3% specificity was best for non-survivors. 0.925 AUC was statistically significant. This comes in agreement with **Tang *et al.*** [1] who discovered that 2.5 was the AIMS65 score cutoff for mortality prediction. The specificity was 95.76% and the sensitivity was 70.73% at this value. It was found that 11.5 was the cutoff for the Blatchford score used to predict death. The sensitivity was 87.80% and the specificity was 76.27% of this value. Also, **Hajavi *et al.*** [10] showed that AIMS65 and GBS predicted in-hospital mortality respectively with 0.947 and 0.80 AUCs. GBS >12 predicted in-hospital mortality with 62.50% and 92.41%, while AIMS65 > 2 showed 87.5% sensitivity and 100% specificity. More sensitive and specific with AIMS65. While, in disagreement with our research**, Shafaghi *et al.*** [14] discovered GBS's terrible behaviour. The AIMS65 cutoff points (Specificity of 79.5% and sensitivity of 47.1%) and the GBS cutoff point (Specificity of 39.7% and sensitivity of 76.5%) were 2 and 8, respectively, which maximised sensitivity and specificity. Unlike our work, **Stanley *et al.*** [15] comparing to the AIMS65 score, they discovered that GBS is highly accurate in predicting individuals with upper gastrointestinal haemorrhage who will require intervention or die.

## CONCLUSION

Acute upper gastrointestinal hemorrhage kills 8.6% of patients. In-hospital mortality was predicted by age, failure to control bleeding, hemodynamic instability at presentation, GIT cancer, co-morbidities (Particularly liver cirrhosis associated with other co-morbidities), re-bleeding, and increased INR in emergency room cases with acute UGIB. Acute upper gastrointestinal hemorrhage was predicted by serum bilirubin, albumin, creatinine, white blood cell count, alanine aminotransferase, and platelet count. The AIMS65 score predicted death in ER cases with acute UGIB better than the Blatchford score.

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