Original Article

T-score Assessment in Patients with Upper Gastrointestinal Bleeding

Ali Naji Musa[1], Mahmoud Alchlaihawi[2], Manal F. Al-Khakani[3], Sadiq Jabbar Al Mohanna[4]

[1]Najaf GIT Hospital, Najaf, Iraq, [2]Department of Internal Medicine, Faculty of Medicine, University of Kufa and Najaf GIT Hosptial, Najaf, Iraq, [3]Department of Chemistry, Faculty of Science, University of Kufa, Najaf, Iraq, [4]Department of Internal Medicine, Faculty of Medicine, University of Kufa and Al Sadder Teaching Hospital, Najaf, Iraq

Abstract

Backgrounds: Upper gastrointestinal hemorrhage, a major cause of morbidity and mortality, particularly in the elderly, presents with diverse causes such as peptic ulcers, varices, and rare conditions. Urgent upper gastrointestinal endoscopy within the first 24 h is crucial for diagnosis and treatment but is not universally feasible. The total (T-score) clinical score is being evaluated as a triaging tool to identify patients requiring urgent endoscopy. **Objectives:** This study aims to assess the utility of the simplified clinical score (T-score) in categorizing patients needing urgent endoscopy for upper gastrointestinal bleeding. **Materials and Methods:** In a prospective study involving 53 patients, the T-score was calculated based on systolic blood pressure, hemoglobin, pulse, and co-morbidity. Patients were categorized into severity groups, and urgent upper endoscopy within 24 h correlated T-score groups with the presence of stigmata of recent hemorrhage, considering various factors. **Results:** Statistical analysis revealed significant correlations between T-score groups and the presence of stigmata of recent hemorrhage, systolic blood pressure, co-morbidity, hemoglobin level, and pulse rate. High-risk patients were mainly aged >65 years, with peptic ulcers, gastric ulcers, and other causes identified as common culprits. **Conclusion:** Pre-endoscopy clinical classification using the T-score system is beneficial for predicting patient groups likely to benefit from urgent endoscopy. This approach facilitates early discharge for patients with mild bleeding.

Keywords: Endoscopy, gastrointestinal, gastrointestinal bleeding, hemorrhage, T-score

Introduction

Upper gastrointestinal hemorrhage, also known as gastrointestinal (GI) bleeding at the ligament of Treitz, causes between 250,000 and 300,000 hospital admissions annually in the United States and costs $2.5 billion.[1-4] while in UK there are 50–170 admissions to hospital per 100,000 of the population each year.[1,2,5-7] Upper GI bleeding occurs largely among people in older age groups.[8-11] Peptic ulcers and esophagogastric varices are the most often occurring causes of upper gastrointestinal hemorrhage. Mallory–Weiss tears, malignant illness, erosive disease, and vascular anomalies are less frequent causes of upper gastrointestinal hemorrhage as in Table 1.[1,12-17]

Hematemesis and, to a lesser extent, malena are the most common symptoms of acute upper gastrointestinal bleeding (UGIB), while rapid bleeding does occur occasionally can present as hematochezia. The preferred diagnostic and treatment method for UGIB continues to be gastrointestinal endoscopy. The fatality rate from severe UGIB necessitating hospitalization remains close to 4% for young people and has been reported to be as high as 15% in the elderly, despite ongoing breakthroughs in diagnosis.[1,2,4,18]

The occurrences of major gastrointestinal bleeding present a significant focus within the medical field, necessitating a thorough evaluation for all patients who have experienced such incidents within the preceding 48 h. This research aims to shed light on the importance of immediate medical

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Address for correspondence: Dr. Mahmoud Alchlaihawi, Faculty of Medicine, University of Kufa and Najaf GIT Hosptial, Najaf, Iraq. E-mail: mahmouda.alkiny@uokufa.edu.iq

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Table 1: Sources of bleeding in patients hospitalized for upper gastrointestinal bleeding[2]

Sources of bleeding	Proportion of patients (%)
Varices	7–20
Ulcers	31–59
Mallory–Weiss tears	4–8
Neoplasm	2–7
Erosive esophagitis	1–13
Gastroduodenal erosions	2–7
Vascular ectasias	0–6
No source identified	8–14

assessment for these cases and to explore instances where urgent medical care may not be immediately required.[1-3]

The collected data indicates that a considerable number of patients do not require urgent medical attention, primarily due to the minimal nature of their blood loss, effectively compensated for by their cardiovascular system. Remarkably, within the initial 48 h, spontaneous cessation of bleeding is observed in approximately 85% of patients. This underscores the crucial need for continuous medical monitoring and assessment.[19-21]

The magnitude of the initial hemorrhage is the most important indication for urgent endoscopy, since a large initial bleed increases the likelihood of ongoing or recurrent bleeding. Patients with resting hypotension, repeated hematemesis, nasogastric aspirate that does not clear with large volume lavage, or orthostatic change in vital signs, or those requiring blood transfusions, should be considered for urgent endoscopy. In addition, patients with cirrhosis, coagulopathy, or respiratory or renal failure and those over 60 years are more likely to have significant rebleeding.[1,2,4]

In addition, the magnitude of bleeding is related to the size of the arterial defect.[18] A patient may be discharged early, saving a lot of money on healthcare, if there are no signs of recent hemorrhage (SRH), such as an adhering clot or a visible vessel that is not bleeding.[19-24] A scoring system that makes use of clinical variables to forecast death and rebleeding has been created and validated. There have also been developed other grading systems. The size of the initial bleeding episode, concomitant diseases, and the lesion's endoscopic appearance seem to be the most reliable indicators.[6,14] It is of advantage that pre-endoscopic assessment (which is done by means of scoring system) can be made by inexperienced medical or nursing staff. Most scoring systems for assessing risk in patients with upper GI bleeding require endoscopic findings and often lead to hospitalization while the patients await the procedure.[17]

Endoscopy is an important diagnostic and therapeutic technique for patients with acute gastrointestinal hemorrhage. Although most gastrointestinal bleeding stops spontaneously, a minority of patients will have persistent or recurrent hemorrhage that may be life-threatening. Clinical predictors of rebleeding help identify patients most likely to benefit from urgent endoscopy and endoscopic surgical hemostasis.[2]

Upper GI endoscopy reduce mortality, rebleeding, requirement for transfusion, hospital stay and health care cost.[20-23]

Adequate resuscitation should always proceed endoscopy as upper endoscopy and sedation can cause circulatory collapse if the patient is not adequately resuscitated.[4]

- Indications for urgent/emergent endoscopy:
  Severe or ongoing bleeding
  Recurrent bleeding
  Bleeding in a patient hospitalized for other illness
  Severe comorbid illness (This decreases the ability of the patient to tolerate recurrent bleeding)
  Possible varices.
- Early (pre-admission) endoscopy may:

  Identify bleeding lesions
  Predict risk of rebleeding by endoscopic appearance of lesions
  Allow early discharge or outpatient care of selected patients
  Reduce costs of care.

The risk of rebleeding according to endoscopic findings (active bleeding, visible vessel, adherent clot, flat spot, and clean base) is 55%, 43%, 22%, 10%, and 5%, respectively.

Aim of study

The study aims to investigate whether a simplified clinical score prior to endoscopy in upper GI bleeding is able to predict the endoscopic findings at urgent endoscopy.

Materials and Methods

In this prospective study, 53 patients enrolled were selected from those admitted to the emergency unit in al-Sadr Medical City with features of upper gastrointestinal tract (GIT) bleeding (Malena and/or hematemesis) from January 2010 to March 2011. Before these patients endoscopised conscious sedation by fentanyl and propofol with local xylocaine, they were subjected to full history, examination and simple basic investigations, then they were stratified according to four easily assessable clinical variables, which can be affected in upper GIT bleeding setting:

1. General condition (poor, intermediate, good)

General conditions were intended as a measure of the risk of the presence of symptomatic co-morbidities (cardiovascular, hepatic, renal, diabetes mellitus, cancer, coagulopathy and others)

In detail, "poor condition" included patients with equal or more than three co-morbidities, "good condition" included patients with no debilitation and equal or less than one comorbidity, and "intermediate condition" those patients with conditions in between.

2. Pulse (>110 beats/min, 90–110 beats/min, <90 beats/min)
3. Systolic blood pressure (<90 mmHg, 90–110 mmHg, >110 mmHg)
4. Hemoglobin level (≤8 g/dL, 9–10 g/dL, >10 g/dL)

As shown in the following Table 2 which shows total (T) score:

This numerical score was created for each of these parameters, the sum of all the parameters resulting in the total score (T-score) for each patient who was thereafter classified according to arbitrarily defined T-score cut-off in three categories. In detail, a sum ≤6 corresponds to T1 (high-risk), a sum of 7–9 to T2 (intermediate-risk), and accumulative value ≥10 to T3 (low-risk).

After that the patients were subjected to upper GI endoscopy as early as possible within the first 24 h of admission in Gastroenterology Center in Najaf and the type of endoscopy used is

1. Olympus GIF 1T 240.
2. Olympus GIF H 260.

According to endoscopy findings the patients were classified depending on the cause of bleeding and according to presence or absence of stigmata of recent hemorrhage.

In detail, SRH was defined as an adherent clot, a bleeding (oozing or spurting) or nonbleeding visible vessel or gastro-esophageal varices with active or recent signs of bleeding, such as a fibrin clot.

After collection and classification of the data, correlation done between the clinical score and presence or absence of stigmata of recent hemorrhage and the cause of bleeding.

Statistical analysis

The Chi-square used for categorical variable, *P* value <0.05 was considered to indicate statistical significance. Calculations was done by interactive Chi-square software.

Ethical approval

The study was conducted in accordance with the ethical principles that have their origin in the Declaration of Helsinki. It was carried out with patients verbal and analytical approval before sample was taken. The study protocol and the subject information and consent form were reviewed and approved by a local ethics committee according to the document number 8011 (including the number and the date in March 25, 2023) to get this approval.

Results

Upon categorizing patients based on T-score groups and establishing correlations with both the etiology of UGIB and T-score parameters, the subsequent results are derived:

Table 3 shows the correlation between the T-score groups and the presence or absence of SRH with significant statistical correlation *P* value T1 vs. T2 = 0.01 T1 vs. T3 = 0.0003, T1 vs. T2, T3 = 0.002.

Table 4 shows the mean age and its distribution according to T-score groups. The mean age is 51.7 ± 17. T1 group mean age is 61.5 ± 6.5, T2 group mean age is 53 ± 15.3, and T3 group mean age is 49 ± 18.7.

Table 2: T-score[25]

	Score		
Clinical parameter	**1**	**2**	**3**
General condition	Poor	Intermediate	Good
Pulse	>110	90–110	<90
Systolic blood pressure	<90	90–110	>110
Hemoglobin level (g/dL)	≤8	9–10	>10

Table 3: Showing correlation between T-score and stigmata of recent hemorrhage

Scoring	SRH +ve	SRH −ve	Total	*P* value	
T1 (≤6 = high risk)	4 (100%)	0 (0.00%)	4 (100%)	T1 vs T2	T1 vs T3
T2 (7–9 = intermediate risk)	6 (31.6%)	13 (68.4%)	19 (100%)	0.01	0.0003
T3 (≥10 = low risk)	5 (16.7%)	25 (83.3%)	30 (100%)		
Total	15 (28.3%)	38 (71.7%)	53 (100%)	T1 vs T2 vs T3	
				0.002	

Table 5 shows the patients distribution according to the sex with T-score group. There is no significant sex distribution between the patients and the T-score groups.

Table 6 shows the correlation between the T-score groups and the presence or absence of co-morbidity with significant statistical correlation *P* value of T1 vs. T2 = 0.03, T1 vs. T2 = 0.002, T1 vs. T2, T3 = 0.0008.

Table 4: Showing the mean age distribution according to T-score

Scoring	Mean age ± SD
T1	61.5 ± 6.5
T2	53 ± 15.3
T2	49.7 ± 18.7
Total	51.7 ± 17

Table 7 shows the correlation between T-score groups and the degree of fall in systolic blood pressure at presentation, with significant statistical correlation. *P* value of T1 vs. T2 = 0.03, T1 vs. T3 = 0.001, T1 vs. T2, T3 = 0.008. Table 8 shows the correlation between T-score groups and the degree of hemoglobin reduction at presentation with no overall correlation (*P* value = 0.07), but still significant correlation between T1 vs. T2 (*P* value = 0.04) and T1 vs. T3 (*P* value = 0.02).

Table 9 shows the correlation between T-score groups and the endoscopic types of SRH, but there is no significant correlation, *P* value of T1 vs. T2 = 0.3, *P* value of T1 vs. T3 = 0.3, *P* value of T1 vs. T2, T3 = 0.4.

Table 10 shows the correlation between T-score groups and pulse rate changes with significant statistical correlation,

Table 5: Showing correlation between T-score and sex distribution

Scoring	Male	Female	Total	*P* value	
T1	2 (50%)	2 (50%)	4 (100%)	T1 vs T2 0.7	T1 vs T3 0.3
T2	11 (57.9%)	8 (42.1%)	19 (100%)		
T3	22 (73.3%)	8 (26.7%)	30 (100%)		
Total	35 (66%)	18 (34%)	53 (100%)	T1 vs T2 vs T3 0.4	

Table 6: Showing correlation between T-score and co morbidity

Scoring	Present	Absent	Total	*P* value	
T1	4 (100%)	0 (0.00%)	4 (100%)	T1 vs T2 0.03	T1 vs T3 0.002
T2	8 (42.1%)	11 (57.9%)	19 (100%)		
T3	7 (23.3%)	23 (76.7%)	30 (100%)		
Total	19 (35.8%)	34 (64.2%)	53 (100%)	T1 vs T2 vs T3 0.008	

Table 7: Showing correlation between T-score and systolic blood pressure

Scoring	>90 mmHg	90–110 mmHg	<110 mmHg	Total	*P* value	
T1	3 (75%)	1 (25%)	0 (0.00%)	4 (100%)	T1 vs T2 0.03	T1 vs T3 0.001
T2	3 (15.8%)	5 (26.3%)	11 (57.9%)	19 (100%)		
T3	2 (6.7%)	10 (33.3%)	18 (60%)	30 (100%)		
Total	8 (15.1%)	16 (30.2%)	29 (54.7%)	53 (100%)	T1 vs T2 vs T3 0.008	

Table 8: Showing correlation between T-score and hemoglobin level

Scoring	≤8 mg/dL	9–10 mg/dL	>10 mg/dL	Total	*P* value	
T1	3 (75%)	1 (25%)	0 (0.00%)	4 (100%)	T1 vs T2 0.04	T1 vsT3 0.02
T2	3 (15.8%)	8 (42.1%)	8 (42.1%)	19 (100%)		
T3	5 (16.7%)	10 (33.3%)	15 (50%)	30 (100%)		
Total	11 (20.8%)	19 (35.8%)	23 (43.4%)	53 (100%)	T1 vs T2 vs T3 0.07	

Table 9: Showing correlation between T-score and individual stigmata of recent hemorrhage

Scoring	Active bleeding	Non bleeding visible vessel	Adherent clot	Bleeding varices	Total	*P* value	
T1	4 (100%)	0 (0%)	0 (0.00%)	0 (0%)	4 (100%)	T1 vs T2	T1 vs T3
T2	5 (83.3%)	1 (16.7%)	0 (0.00%)	0 (0%)	6 (100%)	0.3	0.3
T3	4 (80%)	0 (0%)	1 (6.7%)	0 (0%)	5 (100%)		
Total	13 (86.7%)	1 (6.7%)	1 (6.7%)	0 (0%)	15 (100%)	T1 vs T2 vs T3 0.4	

Table 10: Showing correlation between T-score and pulse rate

Scoring	>110/min	90–110/min	<90/min	Total	*P* value	
T1	3 (75%)	10 (25%)	0 (0.00%)	4 (100%)	T1 vs T2	T1 vs T3
T2	3 (15.8%)	7 (36.8%)	9 (47.4%)	19 (100%)	0.03	0.001
T3	2 (6.7%)	12 (40%)	16 (53.3%)	30 (100%)		
Total	8 (15.1%)	20 (37.7%)	25 (47.2%)	53 (100%)	T1 vs T2 vs T3 0.01	

P value of T1 vs. T2 0.03, T1 vs. T3 0.001, T1 vs. T2 vs. T3 0.01.

Discussion

Upper GIT bleeding remains a significant cause of hospital admission with a mortality rate up to 14% especially in elderly.

In order to standardize and improve care, various scoring systems (e.g., Rockall, Blatchford, etc.) have been developed to identify those individuals at high risk who requiring intervention (e.g., transfusion, endoscopic or surgical intervention), or of rebleeding or death. There is also an increasing interest in using scoring systems to identify individuals at low risk of complications who can be discharged early, possibly with plan to do endoscopy on outpatient basis.[1-9]

In present study, we try to assess a group of parameters in a new scoring system and its benefit in maintaining the role of scoring systems in the management of upper GIT bleeding.

After collecting the data and categorizing the patients according to the T-score and further stratifying them according to the presence or absence of SRH, we found that all the patients classified in T1-group (100%) have SRH and by comparing this group statistically with T2 and T3 groups, we found a significant correlation between the severity of the T-score and presence of SRH (*P* value = 0.002) which is meeting with the results obtained by Leonardo *et al*.[25] (85% positive SRH in T1 group). This minor difference between the two percentages may be caused by the differences in the number of samples taken where Leonardo *et al*.,[25] 636 patients while in our study we take 53 patients.

The mean age of patients in T1 group was 61.5 ± 6.5 years, which older than T2 and T3 groups (53 ± 15.3, 49 ± 18.7 years respectively), indicates that the elderly patients are more likely liable for upper GIT risk, severity, and mortality. This meets Rockall *et al*.[7] where in Rockall scoring system severity of upper GIT bleeding begins with the age >60 years. This is possibly related to elderly patients who tend to be frail and have other comorbidities which necessitate use of polypharmacy like aspirin and other non-steroidal anti-inflammatory drugs.

In addition, the mortality and morbidity are less in patients less than 60 years. There is no significant correlation between the T-score groups and sex distribution of the patients (*P* value = 0.4) which is also shown by other scoring systems. This is also proved by other scoring system like Blatchford scoring system which did not take the sex as one of the variables as a risk factor that depend on them in his scoring system.[1,2,6]

The T-scoring system discloses a significant role for the co-morbidities (renal, cardiac, hepatic, neurological, and hematological diseases)[1,2] as a risk for severe upper GIT bleeding with significant statistical correlation (*P* value = 0.008). All patients in T1 group (100%) have at least a co-morbidity factor, which meet the role of co-morbidity in the other scoring systems like Rockall and Blatchford scores.[1,5-7]

Regarding the other parameters of T-score, present study shows a significant statistical correlation between severity of T-score and the degree of fall in systolic blood pressure at presentation (*P* value = 0.008). This result is similar to Romagnuolo *et al*.[26] finding where he found that a fall in systolic blood pressure is predictor for poor outcome in upper GIT bleeding.

The comprehensive analysis of all results reveals that the correlation between the severity of T-score and the extent of hemoglobin reduction lacks statistical significance (*P* value = 0.07). However, when comparing T1 vs. T2 and T1 vs. T3, significant correlations persist (*P* values of 0.04

and 0.02, respectively). This observed significance may be attributed to preexisting co-morbidities, nutritional factors, or chronic blood loss leading to anemia in the pre bleeding state.[20,27]

The most common SRH found during endoscopy is active bleeding (80%) which is present in all patients with T1 group (100%) but also present frequently in the T1 and T2 (83% and 80%, respectively) and in turn there is no significant correlation between the severity of SRH and T-score groups (*P* value = 0.4). Church *et al*.[20] found no correlation between the type of SRH and severity of Rockall scoring system.

We found also significant statistical correlation between T-score groups and changes in pulse rate where *P* value is 0.01 and this is in agreement with Wolfe *et al*. where they found that pulse rate is very sensitive parameter in upper GIT bleeding and seems to be firstly affected.[27–29]

Conclusion

In conclusion, our study shows that the patients with upper GIT bleeding can be differentiated into three severity groups by a new simple clinical scoring system which show a benefit in predicting groups of patients who are likely to have a significant bleeding and most likely will benefit for early endoscopic intervention. T-scoring system allows to detect the low-risk patient in whom the bleeding is likely to stop spontaneously and who are candidate for early discharge and outpatient endoscopy.

Recommendation

We are highly recommended to apply such a simplified clinical score or other scoring system in patients admitted to the emergency department with upper GIT bleeding to delineate those patients who are at risk and significant bleeding and who are likely to benefit from early endoscopy and intervention.

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Conflicts of interest

There are no conflicts of interest.

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