Comparison of Scoring Systems for the Prediction of Outcomes in Patients with Nonvariceal Upper Gastrointestinal Bleeding: A Prospective Study

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ORIGINAL ARTICLE

Comparison of Scoring Systems for the Prediction of Outcomes in Patients with Nonvariceal Upper Gastrointestinal Bleeding: A Prospective Study

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## Introduction

- In recent years, several practice guidelines and risk scores, combining clinical and endoscopic parameters, have been developed with the aim of assisting physicians in the early stages of decision making.

## Introduction

- The aim of this study was to prospectively validate five commonly used risk scoring systems for the prediction of rebleeding and death in patients with acute nonvariceal UGIB.
- Forrest's classification
- Rockall scoring system
- Cedars-Sinai Medical Centre Predict Index
- Blatchford scoring system
- Baylor college scoring system.

## Patients and Methods

- This study was prospectively carried out at Samsung Medical Center from June 2003 to August 2004.
- We enrolled 239 consecutive patients who had undergone upper gastrointestinal endoscopy due to UGIB by two experienced endoscopists

## Patients and Methods

- Patients were excluded :
- if less than 16 years old
- if endoscopy was not performed within 24 h from the earliest signs of UGIB
- if bleeding was due to the rupture of gastro-oesophageal varices or due to portal hypertensive gastropathy
- if the upper gastrointestinal endoscopy showed neither a nonvariceal putative source of bleeding nor traces of blood in the upper gastrointestinal tract.

## Risk scores

- In Forrest classification, patients low risk if class III, intermediate risk if class IIc, and high risk if in the range of Ia–IIb.
- In Rockall scoring system, range of score is from 0 to 11. Risk category is classified as high (≧5), intermediate (3–4), and low (0–2).

## Risk scores

- In Cedars-Sinai Medical Centre Predict Index, range of score is from 0 to 11. Risk category is classified as high (≦5), intermediate (3–4), and low (0–2).
- In Blatchford scoring system, range of score is from 0 to 23. Risk category is classified as high >0.
- In Baylor college scoring system, range of score is from 0 to 24. Risk category in this study is classified as high (postendoscopy score>10) and low (postendoscopy score <10).

## Results

**Table 1** Characteristics of the patients with nonvariceal upper gastrointestinal bleeding

| | |
|---|---|
| Number of patients | 239 |
| Gender (male/female) | 191 (80%)/48 (20%) |
| Age (years) | 59.1 ± 14.6 |
| Hemorrhage while hospitalized for another reason | 22 (9.2%) |
| Etiology of bleeding | |
| Gastric ulcer | 107 (44.8%) |
| Duodenal ulcer | 47 (19.7%) |
| Malignancy | 41 (17.2%) |
| Mallory-Weiss tear | 10 (4.2%) |
| Angiodysplasia | 7 (2.9%) |
| Esophagitis | 7 (2.9%) |
| Others | 20 (8.4%) |
| Forrest classification | |
| Ia (spurting bleed) | 18 (7.5%) |
| Ib (oozing bleed) | 67 (28.0%) |
| IIa (nonbleeding visible vessel) | 41 (17.2%) |
| IIb (adherent blood clot) | 38 (16.0%) |
| IIc (black base) | 11 (4.6%) |
| III (lesion without stigmata of recent hemorrhage) | 64 (26.7%) |
| Endoscopic treatment | 135 (56.5%) |
| Rebleeding | 35 (14.6%) |
| Death | 20 (8.4%) |

## Results

**Table 2** Comparison of risk factor between the patients who rebled and those who did not

| | Rebleeding, no. (%) | Non-rebleeding, no. (%) | *P* value |
|---|---|---|---|
| Old (age >65 years): young | 13 (37):22 (63) | 72 (35):132 (65) | NS |
| Male:female ratio | 28 (80):7 (20) | 163 (80):41(20) | NS |
| NSAIDs use | 1 (3) | 12 (6) | NS |
| Comorbid disease | 21 (60) | 98 (48) | NS |
| Initial hemoglobin <10 g/dl | 22 (63) | 131 (64) | NS |
| SBP <100 mmHg | 10 (29) | 48 (23) | NS |
| Endoscopic therapy | 31 (23) | 104 (77) | <0.01 |
| In-hospital bleeding | 7 (20) | 15 (7) | <0.01 |

*NSAID* nonsteroidal anti-inflammatory drug; *SBP* systolic blood pressure

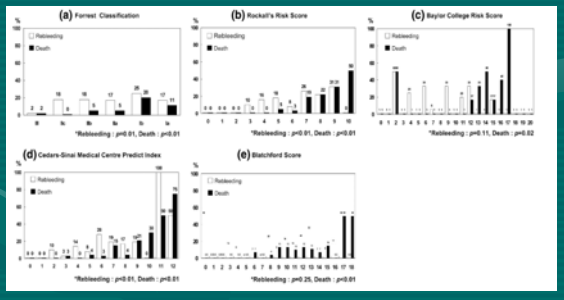
## Results

**Table 3** Comparison of risk factors between patients who died and those alive

| | Mortality, no. (%) | Survival, no. (%) | *P* value |
|---|---|---|---|
| Old (age >65 years): young | 8 (40):12 (60) | 77 (35):142 (65) | NS |
| Male:female ratio | 14 (70):6 (30) | 177 (81):42 (19) | NS |
| NSAIDs use | 1 (5) | 12 (5) | NS |
| Comorbid disease | 18 (90) | 101 (46) | <0.01 |
| Initial Hb <10 g/dl | 14 (70) | 139 (64) | NS |
| SBP <100 mmHg | 10 (50) | 48 (22) | <0.01 |
| Endoscopic therapy | 12 (10) | 121 (90) | NS |
| In-hospital bleeding | 6 (30) | 16 (7) | <0.01 |
| Rebleeding | 7 (35) | 28 (13) | <0.01 |

*NSAID* nonsteroidal anti-inflammatory drug; *SBP* systolic blood pressure

## Results



## Results

Table 4 Comparison of scores by rebleeding and death according to scoring system

| | Rebleeding | | | Death | | |
|---|---|---|---|---|---|---|
| | Present | Absent | *P* value | Present | Absent | *P* value |
| Rockall risk scoring system ($n = 239$) | 6.1 ± 1.9 | 5.0 ± 2.3 | <0.01 | 7.8 ± 1.4 | 5.0 ± 2.3 | <0.01 |
| Cedars-Sinai Medical Centre Predictive Index ($n = 239$) | 6.7 ± 2.5 | 5.4 ± 2.7 | <0.01 | 8.6 ± 2.4 | 5.3 ± 2.6 | <0.01 |
| Blatchford scoring system ($n = 239$) | 10.2 ± 4.0 | 9.4 ± 4.0 | NS | 11.8 ± 3.0 | 9.3 ± 4.0 | <0.01 |
| Baylor college scoring system ($n = 61$) | 10.4 ± 4.5 | 8.2 ± 3.6 | NS | 13.1 ± 4.8 | 9.4 ± 4.1 | 0.02 |

Table 5 Sensitivity, specificity, positive predictive value, and negative predictive value for rebleeding and death in the scoring systems

| | Rebleeding | Death |
|---|---|---|
| Forrest classification ($n = 239$) | | |
| Sensitivity | 71.43 (54.95–83.67) | 85.00 (63.96–94.76) |
| Specificity | 50.49 (43.68–57.28) | 50.23 (43.66–56.79) |
| Positive predictive value | 19.84 (13.81–27.65) | 13.49 (8.6–20.54) |
| Negative predictive value | 91.15 (84.77–95.12) | 97.35 (92.49–99.10) |
| Rockall risk scoring system ($n = 239$) | | |
| Sensitivity | 77.14 (60.98–87.93) | 100 (83.89–100) |
| Specificity | 39.22 (32.78–46.06) | 40.18 (33.91–46.79) |
| Positive predictive value | 17.88 (12.59–24.76) | 13.25 (9.67–17.89) |
| Negative predictive value | 90.91 (83.08–95.32) | 100 (95.82–100) |
| Cedars-Sinai Medical Centre Predictive Index ($n = 239$) | | |
| Sensitivity | 80.00 (64.13–89.96) | 95.00 (76.39–99.11) |
| Specificity | 41.67 (35.12–48.53) | 41.55 (35.22–48.17) |
| Positive predictive value | 19.05 (13.52–26.13) | 12.93 (8.44–19.31) |
| Negative predictive value | 92.39 (85.12–96.26) | 98.91 (94.09–99.81) |
| Blatchford scoring system ($n = 239$) | | |
| Sensitivity | 94.29 (81.40–98.42) | 100 (83.89–100) |
| Specificity | 0.98 (0.27–3.50) | 1.83 (0.71–4.61) |
| Positive predictive value | 14.04 (10.17–19.06) | 8.51 (5.58–12.79) |
| Negative predictive value | 50.00 (15.00–85.00) | 100 (51.01–100) |
| Baylor college scoring system ($n = 61$) | | |
| Sensitivity | 30.77 (12.68–57.63) | 87.50 (52.91–97.78) |
| Specificity | 47.92 (34.47–61.67) | 58.49 (45.09–76.74) |
| Positive predictive value | 13.79 (5.50–30.56) | 24.14 (12.22–42.11) |
| Negative predictive value | 71.88 (54.63–84.44) | 96.88 (84.26–99.45) |

Values inside parentheses are 95% confidence intervals

## Results

- Forrest classification was superior to the others in predicting rebleeding and death.
- The Cedars-Sinai Medical Centre Predict Index and Rockall scoring system showed high positive predictive value in predicting rebleeding and death, respectively.

## Discussion

- An ideal risk score would be straightforward, accurate, and easy to use, as well as prospectively and externally validated as effective in different patient populations.
- The ideal system should use clinically relevant predictors that typically are available during initial patient triage.

## Discussion

- Although there is greater consensus that certain endoscopic findings are associated with high risk for adverse outcomes (e.g., active bleeding, nonbleeding visible vessel), and others indicate a low risk (e.g., clean-base ulcer, Mallory-Weiss tear)
- There continues to be debate and some controversy as to whether endoscopy is an essential component of early risk stratification at the point of initial patient triage

## Forrest classification

- **Acute hemorrhage**
- Forrest I a (Spurting hemorrhage)
- Forrest I b (Oozing hemorrhage)
- **Signs of recent hemorrhage**
- Forrest II a (Visible vessel)
- Forrest II b (Adherent clot)
- Forrest II c (hematin on ulcer base)
- **Lesions without active bleeding**
- Forrest III (Lesions without signs of recent hemorrhage)

# Cedars-Sinai Medical Centre Predict Index

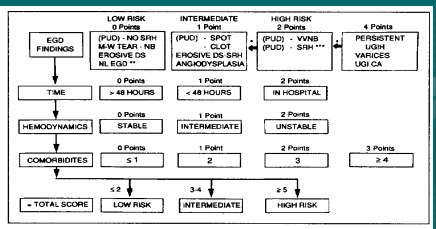



**Figure 1.** Cedars-Sinai Medical Center Predictive Index, the scoring system used for initial risk assessment. The total score equals the summation of points assigned to each of the 4 predictors of outcome. Esophagogastroduodenoscopy (EGD) findings defined in Table II. Time represents onset of symptoms prior to hospitalization. Hemodynamics determined by vital signs, hematocrit, type of symptoms, and nasogastric tube aspirate

**TABLE II**
**Definitions of Endoscopic Descriptors[28-59]**

Peptic ulcer disease
White-based break in mucosal surface with obvious depth
Clean base (no SRH)
Flat ulcer bed without pigmentation
Spot
Nonelevated red, brown, or black pigmentation in ulcer bed
Adherent clot
Thrombus overlying ulcer bed resistant to endoscopic washing
Visible vessel (nonbleeding)
Raised, rounded, relatively smooth-surfaced red or blue pigmented plug in ulcer crater (often associated with adherent clot).
Active
Pulsatile blood flow or continuous oozing during endoscopic exam.
Mallory-Weiss tear
Linear vertical break in mucosal surface at gastroesophageal junction;designated as bleeding or nonbleeding.
Erosive disease
Superficial break in mucosal surface without obvious depth.
No SRH (minor)
White-based lesions without associated thrombus, friability, or oozing.
SRH (major)
Pigment-based lesions with associated thrombus, friability, or intermittent oozing of extensive surface area.
Angiodysplasia
Intramucosal pigmented vessel; designated as bleeding or nonbleeding.
Varices
Tortuous columns of blue-pigmented submucosal vessels; designated as bleeding or nonbleeding.
UGI CA (mass)
Elevated submucosal lesion without break in mucosa or pigmentation; designate as bleeding or nonbleeding
Normal endoscopy
No abnormality seen.
Active
No diagnosis made secondary to bleeding resulting in incomplete visualization.

SRH = stigmata of recent hemorrhage; UGI CA = upper gastrointestinal carcinoma.

**TABLE I**
**Comorbidity Definitions[24]**

Cardiac disease
Dysrhythmia, acute myocardial infarction, ischemic chest pain,* congestive heart failure*
Hepatic disease
Acute alcoholic hepatitis, cirrhosis
Pulmonary disease
Acute respiratory failure, pneumonia, obstructive lung disease*
Renal disease
Serum creatinine >4 mg/dL, dialysis therapy
Neurologic disease
Delirium, dementia, stroke within 6 months
Malignancy
Known solid tumor
Sepsis
Major surgery within 30 days
Age >60 years
Unstable comorbidity
Meets criteria for continued in hospital treatment

Data adapted from Silverstein et al.[24]
*Symptomatic and requiring treatment.

# Rockall scoring system

| Variable | Score 0 | Score 1 | Score 2 | Score 3 |
|---|---|---|---|---|
| age | <60 | 60- 79 | >80 | |
| Shock | No shock | Pulse >100 | SBP <100 | |
| Comorbidity | Nil major | | CCF, IHD, major morbidity | Renal failure, liver failure, metastatic cancer |
| Diagnosis | Mallory-Weiss | All other diagnoses | GI malignancy | |
| Evidence of bleeding | None | | Blood, adherent clot, spurting vessel | |

# Blatchford scoring system

Glasgow-Blatchford Score

| Admission risk marker | Score component value |
|---|---|
| **Blood Urea** | |
| ?6·5 <8·0 | 2 |
| ?8·0 <10·0 | 3 |
| ?10·0 <25·0 | 4 |
| ?25 | 6 |
| **Haemoglobin (g/L) for men** | |
| ?12·0 <13·0 | 1 |
| ?10·0 <12·0 | 3 |
| <10·0 | 6 |
| **Haemoglobin (g/L) for women** | |
| ?10·0 <12·0 | 1 |
| <10·0 | 6 |
| **Systolic blood pressure (mm Hg)** | |
| 100 - 109 | 1 |
| 90 - 99 | 2 |
| <90 | 3 |
| **Other markers** | |
| Pulse ?100 (per min) | 1 |
| Presentation with melaena | 1 |
| Presentation with syncope | 2 |
| Hepatic disease | 2 |
| Cardiac failure | 2 |

- Recent studies suggest that significant clinical predictors of persistent or recurrent bleeding in patients with acute nonvariceal UGIB are the following:

- age greater than 65 years
- Shock
- poor overall health status
- comorbid diseases
- low initial hemoglobin level
- Melena
- Transfusion requirement
- fresh red blood on digital rectal examination in the emesis, or in nasogastric lavage

- In addition, the following were associated with increased risk of death:
- continued or recurrent hemorrhage
- Hemorrhage while hospitalized for another reason (so-called secondary bleeding)
- Sepsis
- elevated blood urea nitrogen, creatinine, or serum aminotransferase levels

# Thank for your listening !