Albanian Journal of Trauma and Emergency Surgery (2024) 8/2:1439-1442
DOI: 10.32391/ajtes.v8i2.394

ORIGINAL ARTICLES

Effectiveness of the Oakland Score for Safe Discharge of Patients with Acute Lower Gastrointestinal Bleeding: A Validation Study

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Received: 01 April 2024 / *Accepted:* 23 April 2024 / *Published online:* 20 July 2024
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Abstract

Background: Acute lower gastrointestinal bleeding (LGIB) presents a significant challenge in emergency medicine, necessitating tools for effective risk stratification and management. The Oakland Score, developed to predict safe discharge and Mortality in LGIB patients, offers potential utility but requires validation in diverse clinical settings.

Material and Methods: This retrospective study analyzed 365 patients presenting with LGIB at Kartal Dr. Lütfi Kırdar City Hospital between January 1, 2021, and January 1, 2022. We evaluated the Oakland Score's effectiveness in predicting safe discharge and Mortality, employing statistical analyses to determine the score's predictive accuracy and identify critical thresholds.

Results: Among the study population, 60.27% presented with hematochezia, with a diverse age and gender distribution. Invasive procedures were performed in 42.47% of cases, and cardiovascular diseases were prevalent in 51.78%. The average Oakland Score was significantly lower for discharged patients (18.22) compared to those hospitalized (21.90), with a critical discharge threshold identified at a score of 16. The Oakland Score also demonstrated a sensitivity of 77% and specificity of 52.3% for predicting discharge outcomes and a critical value of 24 for increased mortality risk, substantiating its predictive value.

Conclusions: The Oakland Score effectively predicts safe discharge and Mortality among LGIB patients in a Turkish hospital setting. With defined critical thresholds for clinical decision-making, it is a valuable tool for optimizing emergency department patient management and resource allocation.

Keywords: Acute lower gastrointestinal bleeding, Oakland Score, Safe discharge, Mortality

Introduction

Lower gastrointestinal bleeding (LGIB) represents a significant cause of morbidity and Mortality, with mortality rates ranging between 2% and 4% [1,2]. Patients with multiple comorbidities and those of advanced age exhibit increased rates of morbidity and Mortality. LGIB accounts for 20-30% of all hemodynamically significant gastrointestinal bleedings, and its incidence is estimated to be between 33 and 87 per 100,000, contributing to 3% of emergency surgical referrals [3-5]. There is a noted increase in the incidence of LGIB, which can be attributed to the aging population and the more prevalent use of antithrombotic drugs, leading to a rise in hospitalizations for LGIB patients. Furthermore, LGIB requires greater resource utilization than upper gastrointestinal bleeding [6-8].

In addressing the pervasive challenge of managing acute LGIB, a novel scoring system, the Oakland Score, has been meticulously developed and externally validated. This pioneering model harnesses a blend of seven easily accessible clinical parameters: age, gender, history of LGIB, findings from digital rectal examination (DRE), heart rate, systolic blood pressure, and hemoglobin levels. Distinctively, this risk assessment tool aims to stratify patients based on their safety for discharge, focusing on minimizing unnecessary hospital admissions. The Oakland Score is underpinned by comprehensive data from the National Comparative Audit of Lower Gastrointestinal Bleeding across 143 hospitals in the UK, ensuring its foundation on a robust, large-scale patient dataset. Its external validation was

Original article, no submission or publication in advance or in parallel

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conducted with 288 patients from two additional hospitals, demonstrating its reliability and effectiveness. The score uniquely outperforms existing models by offering a more accurate prediction of safe discharge, with a score of 8 or less indicating a 95% probability of safe discharge [9]. This breakthrough in LGIB management stands as a testament to innovation in clinical prediction models, streamlining patient care while addressing the economic and resource implications for healthcare institutions.

The primary objective of this study is to rigorously evaluate the applicability and effectiveness of the Oakland Score within our hospital setting, with a particular focus on its utility for safely discharging patients presenting with acute LGIB.

Material and Methods

This retrospective study was conducted at the emergency department of Kartal Dr. Lütfi Kırdar City Hospital, reviewing cases from January 1, 2021, to January 1, 2022. The research focused on evaluating the effectiveness and applicability of the Oakland Score for predicting safe discharge and Mortality among patients presenting with acute LGIB. For this study, LGIB was defined as bleeding originating from a source distal to the ligament of Treitz manifested through hematochezia, maroon stools, or blood mixed with stool without evidence of upper gastrointestinal bleeding. All patients aged 18 years and above who presented to the emergency department within the specified study period with a primary complaint or diagnosis related to LGIB were included. Exclusion criteria encompassed patients with upper gastrointestinal bleeding, those who developed LGIB after admission for another condition, patients transferred from other hospitals without initial evaluation in our emergency department, and individuals lacking complete medical records necessary for applying the Oakland Score. Safe discharge was defined as the discharge of a patient from the emergency department without the need for blood transfusion, therapeutic intervention (endoscopic, radiological, or surgical) to control bleeding, without re-admission for LGIB within 28 days, and survival without in-hospital Mortality. The primary outcomes of this study were the assessment of safe discharge, as defined above, and Mortality. The effectiveness of the Oakland Score in predicting these outcomes was the focus of our analysis, aiming to validate the score's utility in a local hospital setting distinct from its initial development and external validation cohorts. Data on demographics, clinical presentation, outcomes, and variables required to calculate the Oakland Score were extracted from electronic health records. This included age, sex, details of the current LGIB episode, previous admissions for LGIB, results of digital rectal examinations, vital signs at presentation, and laboratory results, including hemoglobin concentration. Ethical considerations for this retrospective study were managed by local institutional review board guidelines, ensuring confidentiality and compliance with ethical standards for medical research (ethics committee ruling number: 2022/514/228/4, date: 30.06.2022). Statistical analyses were conducted using the SPSS statistical software package (version 25.0; SPSS Inc., Chicago, IL, USA). The data were summarized using descriptive statistical methods, including mean, standard deviation, count, minimum-maximum values, and percentages. The Shapiro-Wilk Test was employed to assess the normality of continuous variables.

Given that the condition for normal distribution was not met for the comparison between two group means, the Mann-Whitney U Test was applied. Independence tests between two categorical variables were performed using Fisher's Exact Test for two-group variables. The Receiver Operating Characteristic (ROC) Analysis was utilized to determine the predictive power of the Oakland Score in identifying patient outcomes concerning discharge and Mortality. The level of significance for all tests conducted was set at 0.05.

Results

The study encompassed 365 patients presenting with LGIB. Hematochezia was observed in 220 patients (60.27%), while 145 patients presented without this symptom. The age distribution showed 47 patients (12.88%) under 40 years, 167 patients (45.75%) between 40 and 70 years, and 151 patients (41.37%) above 70 years. Gender distribution included 142 females (38.90%) and 223 males (61.10%).

Regarding heart rate, 25 patients (6.85%) had less than 70 beats per minute (bpm), 151 patients (41.37%) had 70-89 bpm, 126 patients (34.52%) had 90-109 bpm, 63 patients (17.26%) had more than 110 bpm, and 35 patients (9.59%) had over 160 bpm. Systolic blood pressure ranged with 109 patients (29.86%) having 130-159 mmHg, 98 patients (26.85%) having 120-129 mmHg, and 89 patients having 90-119 mmHg. Hemoglobin levels varied, with eight patients (2.19%) exceeding 16 gr/dl and most falling within lower ranges, indicating varying degrees of blood loss severity(Table 1).

	Group	Number	Percent
Age	<40	47	12.88
	40-70	167	45.75
	>70	151	41.37
Sex	Female	142	38.90
	Male	223	61.10
Previous lower GI bleeding	No	253	69.32
	Yes	112	30.68
DRE findings	No blood	145	39.73
	Blood	220	60.27
Heart rate,BPM	<70	25	6.85
	70-89	151	41.37
	90-109	126	34.52
	>110	63	17.26
SBP, mmHg	>160	35	9.59
	130-159	109	29.86

	120-129	98	26.85
	90-119	89	24.38
	50-89	34	9.32
Hemoglobin, g/dL	>16	8	2.19
	13-15.9	63	17.26
	11-12.9	82	22.47
	9-10.9	64	17.53
	7-8.9	78	21.37
	3.6-6.9	70	19.18

Table 1: Characteristics of the study patients

Invasive procedures such as endoscopy or colonoscopy were performed on 155 patients (42.47%), while 210 patients (57.53%) did not undergo any invasive interventions. Cardiovascular disease was present in 189 patients (51.78%), while 176 patients (48.22%) had no cardiovascular conditions. Underlying malignancy was found in 94 patients (25.75%), absent in 271 patients (74.25%), liver disease in 23 patients (6.30%), and kidney disease in 47 patients (12.88%).

Medication usage revealed that 212 patients (58.08%) were not on any of the four drug groups (antiaggregants, anticoagulants, NOACs, NSAIDs), while the rest used at least one. Erythrocyte replacement was administered to 184 patients (50.41%), and unstable hemodynamics were observed in 49 patients (13.42%). Discharge outcomes indicated that 174 patients (47.67%) were safely discharged home, while 191 patients (52.33%) were hospitalized.

Survival was noted in 335 patients (92.03%), with 29 (7.97%) succumbing to their condition. The average Oakland Score for discharged patients was 18.22, contrasting with 21.90 for those not discharged, with the difference being statistically significant (p=0.006, Mann-Whitney Test). Moreover, the Oakland Score demonstrated a sensitivity of 77% and a specificity of 52.3% in predicting discharge outcomes, with an area under the curve (AUC) of 67.4%, indicating statistical significance (p<0.05) (Figure 1).

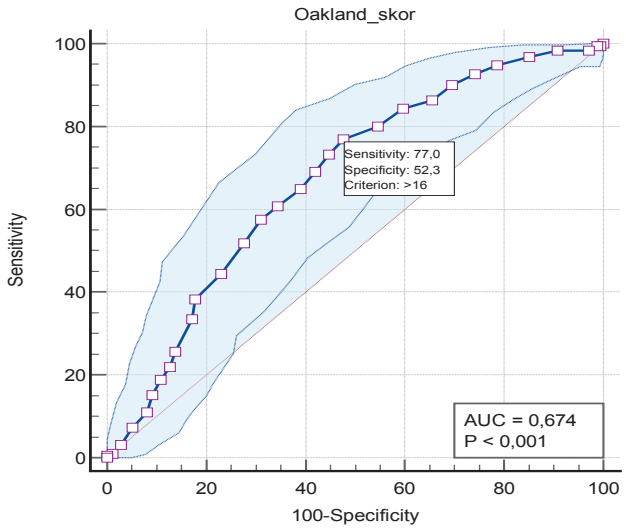

Figure 1.Receiver operating characteristic curve of the Oackland score in predicting safe discharge among patients with LGIB

The critical threshold was identified at a score of 16, above which patients experienced discharge difficulties. Regarding Mortality, the ROC analysis yielded an AUC of 73.8%, with a critical value of 24, indicating higher mortality risk at scores above this threshold (Figure 2).

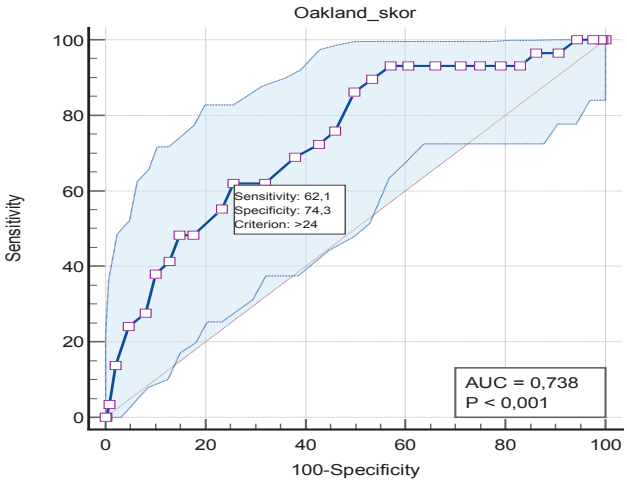

Figure 2.Receiver operating characteristic curve of the Oackland score in predicting Mortality among patients with LGIB

Discussion

This study sought to evaluate the Oakland Score's applicability and predictive accuracy in determining safe discharge and Mortality among patients with LGIB. The findings underscore the utility of the Oakland Score as a significant predictor of patient outcomes, aligning with previous validations yet extending its applicability to our local setting.

Emergency departments are crucial in managing gastrointestinal (GI) bleeding, a common and urgent reason for visits. Both upper and lower GI bleeds require rapid diagnosis and effective intervention. Upper GI bleeds often present with more dramatic symptoms and potentially higher mortality risk, while lower GI bleeds can have a subtler onset, complicating diagnosis [10-13]. Prompt intervention in both cases can be life-saving and significantly improve patient outcomes. Therefore, emergency healthcare professionals must understand the various causes, potential complications, and treatment strategies for GI bleeds. Tools like the Oakland Score are valuable in identifying patients with lower GI bleeds who can be safely discharged, contributing to more efficient resource use and enhanced patient safety.

In the comprehensive analysis conducted by Oakland and colleagues across multiple regions, including a multicenter study in Vietnam, a large-scale investigation in the United States, and the original development and

validation study in the United Kingdom, the Oakland Score has been meticulously evaluated for its predictive capability in the management of acute lower gastrointestinal bleeding (LGIB) [9,14,15]. These studies collectively highlight the Oakland Score's robustness and versatility as a predictive tool for safely discharging patients with LGIB across diverse healthcare settings and populations.

The study from Vietnam revealed that the Oakland Score, alongside the locally developed SALGIB score, performed comparably well and even surpassed the Glasgow-Blatchford Score (GBS) in predicting adverse outcomes of LGIB. This finding underscores the Oakland Score's adaptability and efficacy in a Vietnamese healthcare context, suggesting its potential applicability in similar settings [14].

In the United States, the external validation study by Oakland et al. affirmed the Oakland Score's utility in identifying LGIB patients at low risk of adverse outcomes, supporting safe outpatient management for many patients. By extending the score threshold to include more patients as low-risk, this study proposes a broader application of the Oakland Score to reduce unnecessary hospital admissions, highlighting its significance in resource optimization [15].

The Oakland Score for Mortality's predictive power, with a critical value of 24, indicates its broader applicability beyond discharge decisions to encompass patient survival. This dual utility underscores the score's potential as a comprehensive LGIB management tool, facilitating immediate clinical decisions and longer-term patient outcome predictions.

Conclusion

The Oakland Score has demonstrated significant predictive accuracy for safe discharge and Mortality among LGIB patients in our study. With a clear critical threshold for discharge challenges and mortality risk, it presents a valuable tool for clinicians in tailoring patient management strategies, potentially reducing unnecessary hospital admissions and optimizing resource allocation. Moreover, its utility in a diverse patient population suggests broad applicability across different healthcare settings.

COI Statement: This paper has yet to be submitted in parallel, presented fully or partially at a meeting, podium, or congress, or published or submitted for consideration beforehand. This research received no specific grant from any funding agency in the public, commercial, or non-profit sectors. There are no relevant or minor financial relationships with external companies from authors, their relatives, or next of kin.

Disclosure: The authors declared no conflict of interest. No funding was received for this study.

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