Turkish EMERGENCY MEDICINE Foundation

ORIGINALRESEARCH

DOI: 10.14744/globecc.2026.77487
Glob Emerg Crit Care 2026;5(2):90-97

Investigation of the Effectiveness of BAR, Shock Index and Early Warning Scores in the Prognosis of Patients with Diabetic Foot

Ayşe Kılıç[1], Melih Yüksel[1], Mehmet Oğuzhan Ay[1], Yeşim İşler[1], Halil Kaya[1], Umut Ocak[1], Cengizhan Keski[2]

[1]*University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Department of Emergency Medicine, Bursa, Türkiye*
[2]*Çekirge State Hospital, Department of Emergency Medicine, Bursa, Türkiye*

Abstract

Objective: Diabetic foot infections are severe complications of diabetes mellitus and are associated with substantial morbidity and mortality. This study aimed to evaluate the prognostic performance of commonly used early warning scores, the shock index (SI), and the blood urea nitrogen-to-albumin ratio (BAR) in predicting clinical outcomes among patients with diabetic foot infections presenting to the emergency department (ED).

Materials and Methods: This prospective study included adult patients presenting to the ED with diabetic foot infections. The predictive value of qSOFA, MEWS, NEWS2, REMS, TREWS, SI, and BAR was assessed for 28-, 90-, and 180-day mortality and amputation outcomes using receiver operating characteristic (ROC) curve analysis.

Results: A total of 92 patients were included. BAR demonstrated the highest prognostic accuracy for mortality at all time points (AUC: 0.802 at 28 days, 0.774 at 90 days, and 0.787 at 180 days). SI was the only parameter significantly associated with 28-day amputation risk (AUC: 0.636). None of the evaluated scores showed adequate predictive performance for 90- or 180-day amputation.

Conclusion: BAR appears to be a reliable marker of short- and medium-term mortality risk in patients with diabetic foot infections presenting to the ED, whereas SI may assist in the early identification of patients at increased risk for early amputation. These findings highlight the complementary roles of systemic and hemodynamic markers in the emergency risk stratification of diabetic foot infections.

Keywords: Amputation, diabetic foot, emergency department, mortality, shock index

Introduction

Diabetic foot infections are severe complications of diabetes mellitus (DM), significantly increasing both morbidity and mortality rates. Patients presenting to emergency departments (EDs) with diabetic foot infections are often in advanced stages with complicated infection patterns, posing significant challenges in determining appropriate treatment strategies [1,2]. Approximately 18.6 million people globally have diabetic foot ulcers, which are associated with reduced physical capacity, lower quality of life, and greater demands on healthcare services. Without appropriate treatment, these ulcers can progress to severe soft tissue infections, gangrene, and potentially limb loss [3,4].

Blood urea nitrogen (BUN), a byproduct of protein metabolism in the human body, is primarily eliminated through the kidneys. BUN concentration is a crucial determinant of renal function, metabolic status, and nutritional state [5]. Albumin, a negative acute-phase reactant, has demonstrated prognostic significance in various critical illnesses, often indicating adverse outcomes [6,7]. The blood urea nitrogen-to-albumin ratio (BAR) has recently been identified as a predictive factor associated with the prognosis of multiple diseases. It has been reported as an independent risk factor in determining the prognosis of critical conditions such as aspiration pneumonia, sepsis, and gastrointestinal bleeding [5,8-10].

The shock index (SI), defined as the ratio of heart rate to systolic blood pressure, serves as a reliable, easily obtainable, and noninvasive measure of hemodynamic stability. It integrates two vital signs into a single, comprehensive physiological variable [11].

Address for Correspondence: Melih Yüksel, Department of Emergency Medicine, University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Bursa, Türkiye
E-mail: melihdr@gmail.com **ORCID-ID:** 0000-0002-0793-3693

Received: 02.10.2025 **Revised Date:** 02.01.2026 **Accepted:** 21.01.2026

Cite this article as: Kılıç A, Yüksel M, Ay Oğuzhan M, İşler Y, Kaya H, Ocak U, Keski C. Investigation of the effectiveness of BAR, shock ındex and early warning scores in the prognosis of patients with diabetic foot. Glob Emerg Crit Care. 2026;5(2):90-97.

It is recommended for grading hypovolemic shock and assessing transfusion requirements [12].

Early identification of critically ill patients at risk for adverse outcomes is crucial. The development of early warning scores can aid clinicians in expediting treatment, potentially leading to improved outcomes. Several scoring systems, including the Rapid Emergency Medicine Score (REMS) [13], Quick Sequential Organ Failure Assessment (qSOFA) [14], Modified Early Warning Score (MEWS) [15], National Early Warning Score (NEWS2) [16], and Emergency Department Triage Early Warning Score (TREWS) [17], are widely used in EDs as primary early warning tools.

This study aimed to investigate the relationship between early warning scores derived from vital signs, laboratory parameters, and clinical outcomes in patients diagnosed with diabetic foot who presented to the ED. Specifically, we sought to evaluate the potential utility of SI and BAR in addition to routinely used early warning scores. The findings of this study may contribute to the development of new strategies for the early diagnosis, treatment, and follow-up of diabetic foot infections.

Materials and Methods

Study Design

This single-center, prospective study was conducted under protocol number 2011-KAEK-25-2022/06-08 and approved by the Clinical Research Ethics Committee of Bursa Yuksek Ihtisas Training and Research Hospital (Date: 29.06.2022, Decision no: 2011-KAEK-25-2022/06-08). Patients diagnosed with diabetic foot and presenting to a tertiary ED between July 1, 2022, and December 31, 2023, were enrolled in the study. The sample size was determined by the number of consecutive eligible patients presenting to the ED during the predefined study period.

Inclusion and Exclusion Criteria

Patients aged ≥18 years with a confirmed diagnosis of diabetes mellitus who provided informed consent were included. Patients were excluded if they were <18 years old, declined consent, were pregnant, had a history of lower extremity amputation, had chronic kidney disease, had chronic hepatic failure, or presented with a repeat visit for the same condition.

Data Collection

A standardized data collection form was meticulously developed to ensure the systematic and comprehensive documentation of patient information throughout the study. The collected data included demographic variables (age, sex, educational status), detailed medical history (including comorbidities, current medications, and type of diabetes), as well as key clinical parameters such as wound characteristics, laboratory results, and vital signs. ED outcomes were also recorded.

To facilitate objective assessment and risk stratification, several prognostic scoring systems were calculated for each patient, including BAR, SI, TREWS, MEWS, NEWS2, REMS, and qSOFA.

Longitudinal follow-up data regarding major outcomes, specifically amputation and mortality, were collected at 28, 90, and 180 days after admission through a review of hospital records and/or structured telephone interviews conducted with patients or their designated relatives.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 21.0 (IBM Corp., Armonk, NY, USA; 2012 release). Numerical data were summarized using mean±standard deviation (SD), median with range, or interquartile range (IQR), whereas categorical variables were expressed as counts and percentages. Normality of distribution was evaluated using the Kolmogorov-Smirnov test, and homogeneity of variances was assessed using Levene's test. To evaluate the ability of BAR, SI, and early warning scores to predict mortality and amputation, receiver operating characteristic (ROC) curve analyses were performed. Logistic regression was used to determine factors independently associated with mortality. A two-sided p-value of <0.05 was considered statistically significant, and results are presented with 95% confidence intervals (CIs).

Results

Patient Characteristics and Clinical Findings

A total of 92 patients meeting the inclusion criteria were enrolled in the study. The mean age of the patients was 62.40±11.53 years, and 65 patients (70.7%) were male. Comorbid conditions were present in 76 patients (82.6%), with hypertension (64.1%) and coronary artery disease (CAD) (34.8%) being the most common. The majority of patients were diagnosed with type 2 diabetes mellitus (95.7%), and 10 patients (10.9%) were not receiving any antidiabetic treatment at the time of admission. Diabetic ketoacidosis was identified in 2 patients (2.2%) at ED presentation. Local wound characteristics demonstrated a high burden of advanced infection. Wound discharge was observed in 66 patients (71.7%), wound necrosis in 62 patients (67.4%), and ulceration in 52 patients (56.5%) (Table 1). Although a formal guideline-based infection severity classification such as IWGDF could not be systematically applied because of the lack of complete systemic infection parameters, these findings indicate that the study

Table 1. Baseline clinical and demographic characteristics of the study population		
Demographic characteristics		
Age (year) *		62.40±11.53
Age Range#	<65 year	55 (59.8)
	≥65 year	37 (40.2)
Gender#	Male	65 (70.7)
	Female	27 (29.3)
Comorbidities		
Comorbidity#		76 (82.6)
Hypertension#		59 (64.1)
Coronary Artery Disease#		32 (34.8)
Asthma/COPD#		4 (4.3)
Cerebrovascular Disease#		2 (2.2)
Congestive Heart Failure#		17 (18.5)
Peripheral Vascular Disease#		24 (26.1)
Malignancy#		0
Other#		8 (8.7)
Smoking#		30 (32.6)
Diabetes-Related Characteristics		
Regular use of medication for diabetes#	Does Not Use Medication	10 (10.9)
	İnsulin	56 (60.9)
	Oral Antidiabetic agent	20 (21.7)
	İnsulin+ Oral Antidiabetic agent	6 (6.5)
Type of diabetes #	Type 1	4 (4.3)
	Type 2	88 (95.7)
Diabetic Ketoacidosis#		2 (2.2)
Diabetic Ketosis#		1 (1.1)
Wound Characteristics and Care		
Antibiotic use for diabetic foot#		29 (31.5)
Wound ulceration#		52 (56.5)
Wound necrosis#		62 (67.4)
Wound discharge#		66 (71.7)
Emergency Department Outcomes		
Admission to the service#		55 (59.8)
Admission to intensive care unit#		3 (3.3)
Transfer to another hospital#		1 (1.1)
Discharged#		33 (35.9)

Table 1. Baseline clinical and demographic characteristics of the study population	
Demographic characteristics	
Clinical Outcomes	
Mortality within 28 days#	14 (15.2)
Amputation within 28 days#	37 (40.2)
Mortality within 90 days#	17 (18.5)
Amputation within 90 days#	47 (51.1)
Mortality within 180 days#	20 (21.7)
Amputation within 180 days#	49 (53.3)
Total#	92 (100)

n (%), * mean ± standard deviation, COPD: Chronic Obstructive Pulmonary Disease

population predominantly consisted of patients with advanced local diabetic foot infection at the time of ED presentation.

Mortality and Amputation Outcomes

During the 180-day follow-up period, 20 patients (21.7%) died, and 49 patients (53.7%) underwent amputation. Mortality and amputation rates increased progressively over time, with clinically meaningful events occurring at 28, 90, and 180 days.

Scoring Systems

The median values of the prognostic scores were as follows: SI, 0.7 (IQR, 0.6–0.8); qSOFA, 0 (IQR, 0–0); MEWS, 1 (IQR, 0–1); NEWS2, 1 (IQR, 0–2); REMS, 3 (IQR, 3–6); TREWS, 4 (IQR, 3–5); and BAR, 7.70 (IQR, 4.92–13.09) (Table 2).

Mortality Prediction

Receiver operating characteristic (ROC) curve analyses were performed to evaluate the ability of BAR, SI, and early warning scores to predict mortality. For 28-day mortality, BAR demonstrated the highest discriminative ability, with an AUC of 0.802 (95% CI: 0.685–0.918; $p<0.001$), followed by REMS (AUC: 0.749; $p=0.003$). Similar findings were observed for 90-day mortality, for which BAR remained the strongest predictor (AUC: 0.774; $p<0.001$), and for 180-day mortality, for which BAR again showed superior performance (AUC: 0.787; $p<0.001$) (Table 3, Figure 1).

Optimal cut-off values were determined using the Youden index. A BAR threshold of 9.84 consistently demonstrated favorable sensitivity and specificity for predicting mortality across all time points.

Amputation Prediction

In ROC analyses evaluating amputation outcomes, SI showed modest predictive value for 28-day amputation (AUC: 0.636; $p<0.05$).

Table 2. Baseline Clinical and Laboratory Characteristics of the Study Cohort

Variables	Value
DM time (year), Median IQR (25-75)	10 (10-20)
Time of onset of wounds(day) IQR (25-75)	30 (14-60)
Clinical Scores	
qSOFA Score Median IQR (25-75)	0 (0-0)
MEWS Score Median IQR (25-75)	1 (0-1)
NEWS2 Score Median IQR (25-75)	1 (0-2)
REMS Score Median IQR (25-75)	3 (3-6)
TREWS Score Median IQR (25-75)	4 (3-5)
Shock Index Median IQR (25-75)	0.7 (0.6-0.8)
BAR Median IQR (25-75)	7.70 (4.92-13.09)
Vital Signs	
Temperature, C^0 Mean ± SD	36.36 ±0.25
Heart rate, /min Median IQR (25-75)	88.5 (83-95.75)
SBP, mm/Hg Median IQR (25-75)	122 (110-139.75)
DBP, mm/Hg Median IQR (25-75)	70 (64-80)
MAP, mm/Hg Median IQR (25-75)	89.5 (83-95.75)
Oxygen Saturation, Median IQR (25-75)	97 (95.25-99)
Respiratory Rate, /min Median IQR (25-75)	15 (14-16)
GCS, Median IQR (25-75)	15 (15-15)
Laboratory Parameters	
Glucose, mg/dL Median IQR (25-75)	222.50 (175.75-319.25)
BUN, mg/dL Median IQR (25-75)	24 (16-39.25)
Lactate, Median IQR (25-75)	1.4 (0.9-2.07)
Base Deficit Median IQR (25-75)	1.1 (-2.17-3.1)
Creatinine, mg/dL Median IQR (25-75)	1.07 (0.82-1.65)
Albumin, g/dL Mean ± SD	3.14±0.7
Leukocyte Count, Median IQR (25-75)	14315 (10335-20145)
Platelet Count, Mean ± SD	376000.01±145000.36
CRP,mg/L Mean ± SD	144.42 ±106.70

DM: Diabetes Mellitus, BAR; BUN/Albumin Rate, qSOFA: Quick Score of Sepsis, MEWS: Modified Early Warning Score, NEWS2: National Early Warning Score, REMS: Rapid Emergency Medicine Score, TREWS: Triage in Emergency Department Early Warning Score, SBP: Systolic Blood Pressure, DBP: Diastolic Blood Pressure, GCS: Glasgow Coma Scale, MAP: Mean Arterial Pressure, CRP: C-Reactive protein

However, none of the evaluated scores, including BAR and early warning scores, demonstrated statistically significant predictive performance for amputation at 90 or 180 days (Figure 2).

Multivariate Analysis

Additionally, multivariate logistic regression analysis was conducted to identify independent predictors of 180-day mortality. The analysis revealed that congestive heart failure was significantly associated with increased mortality risk at 180 days [odds ratio (OR): 3.338; 95% confidence interval (CI): 1.072–10.396; p=0.038], as was coronary artery disease (CAD) [OR: 4.134; 95% CI: 1.396–12.242; p=0.010] (Table 4).

Discussion

In this prospective study, we evaluated the prognostic performance of BAR, SI, and commonly used early warning scores in predicting mortality and amputation outcomes in patients presenting to the ED with diabetic foot. The principal finding of this study is that BAR consistently outperformed all other evaluated scores in predicting 28-, 90-, and 180-day mortality, whereas none of the scoring systems demonstrated adequate performance in predicting long-term amputation outcomes.

Diabetic foot infections are associated with substantial morbidity and mortality, particularly in advanced stages of disease. Reported rates of amputation and mortality vary widely in the literature, reflecting differences in patient populations, comorbidity burden, access to healthcare services, and disease severity at presentation [18-23]. In our cohort, the 180-day amputation rate (53.7%) and mortality rate (21.7%) were relatively high. These outcomes should be interpreted in the context of advanced local infection at ED presentation, as more than two-thirds of patients exhibited wound necrosis and discharge, clinical features commonly associated with moderate-to-severe diabetic foot infections according to IWGDF definitions [2].

Early warning scores such as qSOFA, MEWS, NEWS2, REMS, and TREWS are widely used for risk stratification in ED patients with suspected infection or sepsis [13-17,24]. Although these tools have demonstrated variable prognostic performance in general sepsis populations [25-30], evidence specific to diabetic foot patients remains limited. In the present study, several scores showed statistically significant associations with short- and medium-term mortality; however, their overall discriminative ability in diabetic foot patients was inferior to that of BAR.

SI has been proposed as a simple and noninvasive indicator of hemodynamic instability and has demonstrated prognostic value in sepsis and critical illness [12,31-33]. In our cohort, SI did not

Table 3. 28, 90 and 180-Day Mortality Performance Table of Scores According to ROC Analysis

	AUC (95% CI)	p	Scores	Cut-off value	Sensitivity %	Specificity %	Youden index
28-Day mortality	0.802 (0.685-0.918)	<0.001	BAR	9.8≤	71.4	67.9	0.393
	0.666 (0.522-0.809)	<0.05	MEWS	1≤	85.7	43.6	0.293
	0.749 (0.608-0.890)	0.003	REMS	6≤	64.3	79.6	0.439
	0.742 (0.601-0.883)	=0.004	TREWS	5≤	57.1	78.2	0.353
90-Day mortality	0.774 (0.645-0.902)	<0.001	BAR	9.8≤	70.6	69.3	0.399
	0.689 (0.559-0.818)	<0.05	MEWS	1≤	88.2	45.3	0.335
	0.689 (0.542-0.837)	<0.05	NEWS2	1≤	76.5	50.7	0.272
	0.691 (0.536-0.845)	<0.05	REMS	5≤	70.6	58.7	0.293
	0.702 (0.556-0.849)	0.009	TREWS	5≤	52.9	78.7	0.316
180-Day mortality	0.787 (0.674-0.900)	<0.001	BAR	9.8≤	75.5	72.2	0.399
	0.685 (0.566-0.804)	<0.05	MEWS	1≤	90.0	47.2	0.335
	0.651 (0.507-0.796)	<0.05	NEWS2	1≤	70.0	50.0	0.272
	0.649 (0.497-0.801)	<0.05	TREWS	4≤	70.0	45.8	0.293

AUC: Area Under The Curve, CI: Confidence Interval, BAR: BUN/Albümin Rate, MEWS: Modified Early Warning Score, NEWS2: National Early Warning Score, REMS: Rapid Emergency Medicine Score, TREWS: Triage in Emergency Department Early Warning Score

predict mortality but showed modest predictive performance for early (28-day) amputation. A high SI reflects early hemodynamic compromise driven by systemic inflammatory response and relative hypovolemia, which are hallmark features of sepsis. In the setting of diabetic foot infection, this systemic deterioration may exacerbate microvascular dysfunction and tissue hypoperfusion in the affected limb, accelerating ischemia, necrosis, and failure of limb-salvage strategies. Consequently, patients presenting with elevated SI may require more urgent and aggressive surgical interventions, including early amputation, to achieve source control and prevent further systemic deterioration. However, SI failed to predict amputation outcomes at later time points, suggesting limited utility beyond the acute phase.

BAR integrates information on renal function, nutritional status, and systemic inflammatory burden into a single composite marker. Previous studies have demonstrated its prognostic value in conditions such as sepsis, aspiration pneumonia, gastrointestinal bleeding, and critical illness [5,8-10,34]. Mechanistically, an elevated BAR may reflect renal hypoperfusion, increased protein catabolism, and hypoalbuminemia secondary to inflammation and vascular permeability. Experimental and clinical studies

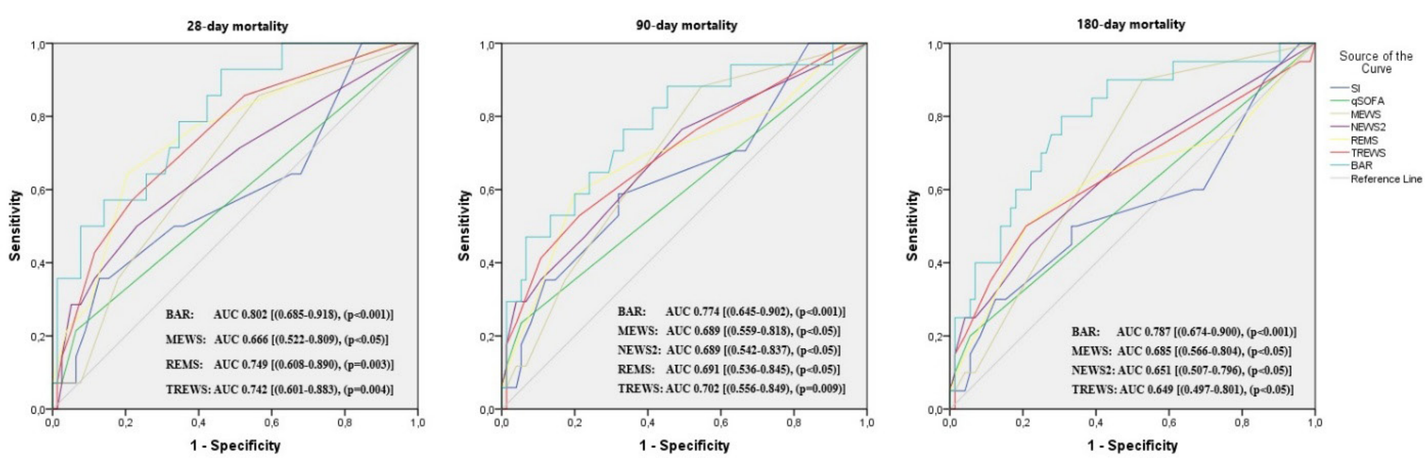

Figure 1. Receiver-operating characteristic curves of the BAR, MEWS, NEWS2, REMS and TREWS for the prediction mortality at 28, 90, and 180 days. AUC: Area Under the Curve, BAR: BUN/Albumin Rate, MEWS: Modified Early Warning Score, NEWS2: National Early Warning Score, REMS: Rapid Emergency Medicine Score, TREWS: Triage in Emergency Department Early Warning Score

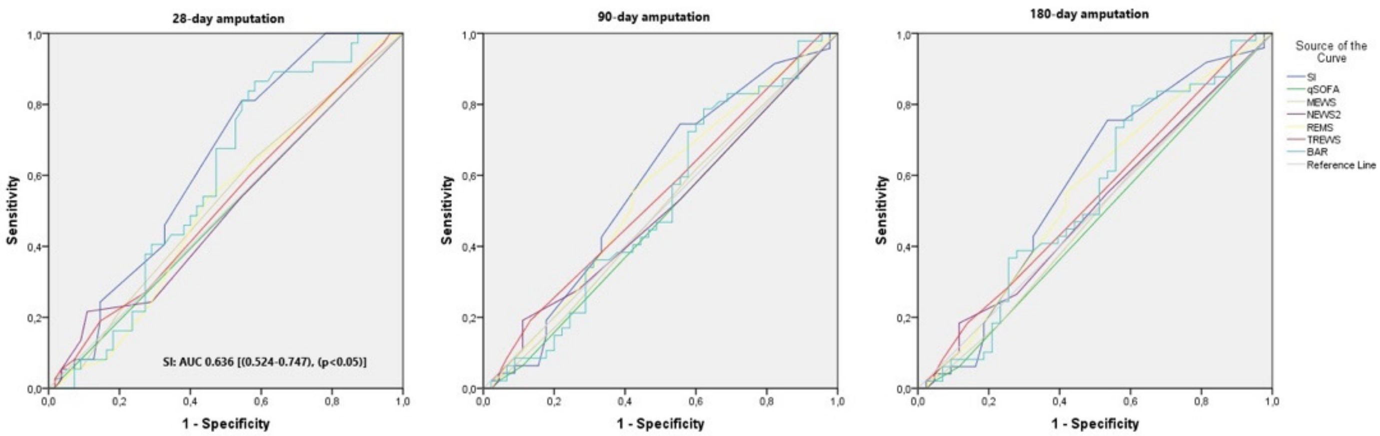

Figure 2. Receiver-operating characteristic curves of the SI for the prediction amputation within 28, 90, and 180 days. AUC; Area Under the Curve; SI: Shock Index

Table 4. Logistic Regression Analysis Table of Variables with 180-Day Mortality

Variables	OR	95 % CI	p
Peripheral Vascular Disease	0.809	0.245-2.672	0.728
Smoking	0.857	0.293-2.510	0.779
GCS	0.221	0.038-1.277	0.092
Congestive Heart Failure	3.338	1.072-10.396	0.038
Coronary Artery Disease	4.134	1.396-12.242	0.010
Hypertension	2.698	0.819-8.890	0.103
Age	1.016	0.948-1.089	0.656

GCS: Glasgow Coma Scale. CI: Confidence interval

have emphasized the role of inflammatory modulation, renal injury, and autophagy-related pathways in systemic infections and diabetic complications [35,36]. Our findings extend this literature by demonstrating that BAR is a robust and consistent predictor of mortality in patients with diabetic foot, a population characterized by chronic inflammation, metabolic dysregulation, and heightened susceptibility to systemic infection.

Although BAR and other systemic scores demonstrated predictive value for mortality, none of the evaluated scores reliably predicted amputation outcomes. This finding is not unexpected, as amputation decisions in diabetic foot disease are primarily driven by local factors such as the extent of tissue necrosis, infection severity at the limb level, vascular status, and feasibility of limb salvage, rather than systemic inflammatory or hemodynamic parameters alone. Therefore, although BAR and SI may reflect overall physiological stress and risk of death, they may have limited ability to capture the complex, multidisciplinary, and locally determined nature of amputation decision-making [37].

Limitations

This study has several limitations. First, its single-center design may limit the generalizability of the findings to other healthcare settings. Second, the relatively small sample size may have reduced the statistical power for certain subgroup analyses. Third, although detailed wound characteristics were available, complete systemic infection parameters were lacking, precluding systematic guideline-based infection severity classification according to the IWGDF criteria. Fourth, follow-up was limited to 180 days, preventing assessment of longer-term outcomes. Finally, residual confounding related to unmeasured clinical or treatment-related factors cannot be excluded. Future multicenter studies with larger cohorts and standardized severity classification are warranted to validate and extend these findings.

Conclusions

In conclusion, this study demonstrates that BAR is a strong and consistent predictor of short- and medium-term mortality in patients presenting to the ED with diabetic foot. Although BAR did not predict amputation outcomes, SI showed modest predictive value for early amputation, suggesting complementary roles for these parameters in risk stratification. Given its simplicity, availability, and prognostic performance, BAR may serve as a useful tool for identifying high-risk diabetic foot patients in the emergency setting. Future studies should explore the integration of BAR into multimodal prognostic models and evaluate its role in guiding clinical decision-making and resource allocation.

Ethics

Ethics Committee Approval: Ethical committee approval was obtained from Bursa Yuksek Ihtisas Training and Research Hospital Ethical committee during the study planning phase (Date: 29.06.2022, Decision no: 2011-KAEK-25-2022/06-08).

Informed Consent: Written informed consent was obtained.

Conflict of Interest: None declared.

Financial Disclosure: The author declared that this study has received no financial support.

Use of AI for Writing Assistance: None declared.

Authorship Contributions: Concept: A.K., M.Y., M.O.A., Y.İ., H.K., U.O., C.K.; Design: A.K., M.Y., M.O.A., Y.İ., H.K., U.O., C.K.; Supervision: A.K., M.Y., M.O.A., Y.İ., H.K., U.O., C.K.; Resource: A.K., M.Y., M.O.A., Y.İ., H.K., U.O., C.K.; Materials: A.K., M.Y., M.O.A., Y.İ., H.K., U.O., C.K.; Data collection and/or processing: A.K., M.Y., M.O.A., Y.İ., H.K., U.O., C.K.; Analysis and/or interpretation: A.K., M.Y., M.O.A., Y.İ., H.K., U.O., C.K.; Literature review: A.K., M.Y., M.O.A., Y.İ., H.K., U.O., C.K.; Writing: A.K., M.Y., M.O.A., Y.İ., H.K., U.O., C.K.; Critical review: A.K., M.Y., M.O.A., Y.İ., H.K., U.O., C.K.

Peer-review: Externally peer-reviewed.

References

1. Armstrong DG, Boulton AJM, Bus SA. Diabetic foot ulcers and their recurrence. N Engl J Med 2017;376:2367–75.
2. Senneville É, Albalawi Z, van Asten SA, Abbas ZG, Allison G, Aragón-Sánchez J, et al. IWGDF/IDSA guidelines on the diagnosis and treatment of diabetes-related foot infections (IWGDF/IDSA 2023). Diabetes Metab Res Rev. 2024;40:e3687.
3. Zhang Y, Lazzarini PA, McPhail SM, van Netten JJ, Armstrong DG, Pacella RE. Global disability burdens of diabetes-related lower-extremity complications in 1990 and 2016. Diabetes Care. 2020;43:964–74.
4. Petersen BJ, Linde-Zwirble WT, Tan TW, Rothenberg GM, Salgado SJ, Bloom JD, et al. Higher rates of all-cause mortality and resource utilization during episodes-of-care for diabetic foot ulceration. Diabetes Res Clin Pract. 2022;184:109182.
5. Zhang J, Zhong L, Min J, Wei Y, Ding L. Relationship between blood urea nitrogen to serum albumin ratio and short-term mortality among patients from the surgical intensive care unit: a population-based real-world study. BMC Anesthesiol. 2023;23:416.
6. Jin X, Li J, Sun L, Zhang J, Gao Y, Li R, et al. Prognostic value of serum albumin level in critically ill patients: observational data from large intensive care unit databases. Front Nutr. 2022;9:770674.
7. Eckart A, Struja T, Kutz A, Baumgartner A, Baumgartner T, Zurfluh S, et al. Relationship of nutritional status, inflammation, and serum albumin levels during acute illness: a prospective study. Am J Med 2020;133:713–22.e7.
8. Ryu S, Oh SK, Cho SU, You Y, Park JS, Min JH, et al. Utility of the blood urea nitrogen to serum albumin ratio as a prognostic factor of mortality in aspiration pneumonia patients. Am J Emerg Med. 2021;43:175–9.
9. Han T, Cheng T, Liao Y, Tang S, Liu B, He Y, et al. Analysis of the value of the blood urea nitrogen to albumin ratio as a predictor of mortality in patients with sepsis. J Inflamm Res. 2022;15:1227–35.
10. Bae SJ, Kim K, Yun SJ, Lee SH. Predictive performance of blood urea nitrogen to serum albumin ratio in elderly patients with gastrointestinal bleeding. Am J Emerg Med. 2021;41:152–7.
11. Gupta S, Alam A. Shock index is better than conventional vital signs for assessing higher level of care and mortality in severe sepsis or shock. Am J Emerg Med 2021;46:545–9.
12. Rossaint R, Afshari A, Bouillon B, Cerny V, Cimpoesu D, Curry N, et al. The European guideline on management of major bleeding and coagulopathy following trauma: sixth edition. Crit Care. 2023;27:80.
13. Olsson T, Terent A, Lind L. Rapid Emergency Medicine score: a new prognostic tool for in-hospital mortality in nonsurgical emergency department patients. J Intern Med. 2004;255:579–87.
14. Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA. 2016;315:801-10.
15. Subbe CP, Kruger M, Rutherford P, Gemmel L. Validation of a modified Early Warning Score in medical admissions. QJM. 2001;94:521–6.
16. Royal College of Physicians (RCP). National early warning score (NEWS) 2: standardising the assessment of acute-illness severity in the NHS. Updated report of a working party. London: RCP; 2017. Avaible at: https://www.rcp.ac.uk/media/umzn4ntq/news2_additional-guidance-002-_0.pdf Accessed 21 05,2026
17. Lee SB, Kim DH, Kim T, Kang C, Lee SH, Jeong JH, et al. Emergency department triage early warning score (TREWS) predicts in-hospital mortality in the emergency department. Am J Emerg Med 2020;38:203-10.
18. Zhang Y, Liu H, Yang Y, Feng C, Cui L. Incidence and risk factors for amputation in Chinese patients with diabetic foot ulcers: a systematic review and meta-analysis. Front Endocrinol (Lausanne). 2024;15:1405301.
19. Armstrong DG, Tan TW, Boulton AJM, Bus SA. Diabetic Foot Ulcers: A Review. JAMA. 2023;330:62–75.
20. Bundó M, Vlacho B, Llussà J, Bobé I, Aivar M, Ciria C, et al. Prediction of outcomes in subjects with type 2 diabetes and diabetic foot ulcers in Catalonian primary care centers: a multicenter observational study. J Foot Ankle Res. 2023;16:8.
21. Zamzam A, McLaren AM, Ram E, Syed MH, Rave S, Lu SH, et al. A novel Canadian multidisciplinary acute care pathway for people hospitalised with a diabetic foot ulcer. Int Wound J. 2023;20:3331–7.
22. Fournier C, Singbo N, Morissette N, Thibeault MM. Outcomes of diabetic foot ulcers in a tertiary referral interdisciplinary clinic: a retrospective canadian study. Can J Diabetes. 2021;45:255–60.
23. Ulusoy S, Oruc M. Characteristics and management of patients undergoing emergency surgery for diabetic foot attack. Ulus Travma Acil Cerrahi Derg. 2023;29:1122–9.
24. Korkmaz N, Karakaya Z, Acar H, Bilgin S, Kayalı A, Ermete Güler E. Use of early warning scoring systems to predict the prognosis of COVID-19 patients in the emergency department. *J Contemp Med*. 2023;13:490–5.
25. Evans L, Rhodes A, Alhazzani W, Antonelli M, Coopersmith CM, French C, et al. Surviving sepsis campaign: international guidelines for management of sepsis and septic shock 2021. Intensive Care Med. 2021;47:1181–247.
26. Sabir L, Ramlakhan S, Goodacre S. Comparison of qSOFA and Hospital Early Warning Scores for prognosis in suspected sepsis in emergency department patients: a systematic review. Emerg Med J. 2022;39:284–94.
27. Ruan H, Ke D, Liao D. Prognostic accuracy of qSOFA and SIRS for mortality in the emergency department: a meta-analysis

and systematic review of prospective studies. Emerg Med Int. 2022;2022:1802707.

28. Chatchumni M, Maneesri S, Yongsiriwit K. Performance of the Simple Clinical Score (SCS) and the Rapid Emergency Medicine Score (REMS) to predict severity level and mortality rate among patients with sepsis in the emergency department. Australas Emerg Care. 2022;25:121–5.
29. Ruangsomboon O, Boonmee P, Limsuwat C, Chakorn T, Monsomboon A. The utility of the rapid emergency medicine score (REMS) compared with SIRS, qSOFA and NEWS for Predicting in-hospital Mortality among Patients with suspicion of Sepsis in an emergency department. BMC Emerg Med. 2021;21:2.
30. Aygun H, Eraybar S. The role of emergency department triage early warning score (TREWS) and modified early warning score (MEWS) to predict in-hospital mortality in COVID-19 patients. Ir J Med Sci. 2022;191:997–1003.
31. Xu F, Zhang L, Huang T, Han D, Yang R, Zheng S, et al. Effects of growth trajectory of shock index within 24 h on the prognosis of patients with sepsis. Front Med (Lausanne). 2022;9:898424.
32. Middleton DJ, Smith TO, Bedford R, Neilly M, Myint PK. Shock index predicts outcome in patients with suspected sepsis or community-acquired pneumonia: a systematic review. J Clin Med. 2019;8:1144.
33. Berger T, Green J, Horeczko T, Hagar Y, Garg N, Suarez Aet al. Shock index and early recognition of sepsis in the emergency department: pilot study. West J Emerg Med. 2013;14:168–74.
34. Wang Y, Gao S, Hong L, Hou T, Liu H, Li M, et al. Prognostic impact of blood urea nitrogen to albumin ratio on patients with sepsis: a retrospective cohort study. Sci Rep. 2023;13:10013.
35. Yalçın MB, Bora ES, Çakır A, Akbulut S, Erbaş O. Autophagy and anti-inflammation ameliorate diabetic neuropathy with Rilmenidine. Acta Cir Bras. 2023;38:e387823.
36. Bora ES, Arda DB, Erbas O. The renoprotective effect of Tibolone in sepsis-induced acute kidney injury. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub. 2024;168:311–8.
37. Küçükceran K, Ayrancı MK, Girişgin AS, Koçak S, Dündar ZD. The role of the BUN/albumin ratio in predicting mortality in COVID-19 patients in the emergency department. Am J Emerg Med. 2021;48:33–7.