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Multidimensional Prognostic Assessment in Burn Patients: An Integrative Systematic Review of Clinical Scoring Systems and Their Limitations

Fabiano Arruda, Luciano Lucas Gordo Ferreira, Wernon de Freitas

Hospital Santa Helena, Hospital Einsten

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ABSTRACT

Background: Accurate prognostic assessment in burn patients is essential for guiding clinical management and resource allocation. Several clinical scoring systems have been proposed, but their comparative performance across populations remains uncertain.

Objective: To evaluate the performance, applicability, and limitations of clinical scoring systems for predicting mortality and severity in burn patients.

Methods: A PRISMA-based integrative systematic review was conducted. A total of 4,403 records were identified across multiple databases. After screening and eligibility assessment, 17 studies were included, comprising cohort studies and meta-analyses. Methodological quality was assessed using the Newcastle-Ottawa Scale and an AMSTAR-style approach.

Results: The Revised Baux Score demonstrated consistently high predictive accuracy for mortality (AUC 0.84–0.99), with strong external validation (AUC 0.96). However, reduced performance was observed in high-risk subgroups. The Abbreviated Burn Severity Index (ABSI) showed robust evidence, with a pooled association with mortality (OR 1.72; 95% CI 1.48–2.00) and significant correlation with length of hospital stay. The Revised Baux Score outperformed general critical care scores such as qSOFA (AUC ~0.99 vs 0.68–0.73). In some populations, modified ABSI demonstrated improved specificity. Inhalation injury was a strong independent predictor of mortality (OR 13.16). Comorbidities and dynamic clinical variables further influenced outcomes.

Conclusions: Burn prognosis is multidimensional and cannot be defined by a single model. The Revised Baux Score remains the most practical and widely applicable tool, while ABSI provides strong complementary evidence. Integration of clinical scores with physiological and patient-specific factors offers the most accurate approach for outcome prediction.

Introduction

Burn injuries remain a major global public health problem, accounting for significant morbidity, mortality, and long-term disability worldwide. According to the World Health Organization, burns are responsible for approximately 180,000 deaths annually, with the majority occurring in low- and middle-income countries[1]. In addition to their clinical burden, burn injuries impose substantial economic costs on healthcare systems, particularly in severe cases requiring intensive care, multiple surgical procedures, and prolonged hospitalization[2].

Burn care represents a high-cost condition worldwide, with substantial variability across health systems. While low- and middle-income countries report average costs below US$1,000 in public systems, specialized centers reveal costs comparable to high-income countries. In contrast, the United States consistently reports the highest expenditures, often exceeding US$80,000 per patient, highlighting disparities in resource utilization and healthcare structure[3,4]. In Europe, the expensive is high, about U$ 80,000-100,000 per patient [5].

The clinical course of burn patients is highly variable and depends on several factors, including total body surface area (TBSA), burn depth, age, and the presence of inhalation injury[6]. Early identification of patients at higher risk of mortality or severe outcomes is essential for optimizing resource allocation, guiding therapeutic decision-making, and improving overall prognosis[7]. In this context, prognostic tools have become fundamental in modern burn care.

Over the past decades, several clinical scoring systems have been developed to estimate outcomes in burn patients. Among the most widely used are the Revised Baux Score and the Abbreviated Burn Severity Index (ABSI), which integrate key clinical variables to predict mortality[8,9,10]. These scoring systems provide a practical and accessible approach for early risk stratification and have been widely adopted in clinical practice. However, variability in predictive performance across different populations and healthcare systems remains a significant limitation[11,12].

Moreover, disparities in healthcare infrastructure and access to specialized burn care may influence both patient outcomes and the external validity of these prognostic models[13]. While high-income countries benefit from advanced burn units and standardized protocols, low- and middle-income settings may face constraints that affect the applicability and accuracy of existing scoring systems[14].

Given the increasing emphasis on evidence-based medicine and outcome prediction, a comprehensive evaluation of available clinical scoring systems is necessary. A better understanding of their predictive performance, strengths, and limitations across diverse clinical settings is essential to improve patient stratification and optimize burn care management.

Therefore, the aim of this integrative systematic review is to identify, analyze, and synthesize the available evidence regarding clinical scoring systems used as prognostic indicators of severity and mortality in burn patients, focusing on their predictive accuracy and clinical applicability.

Methods

STUDY DESIGN

This study was conducted as an integrative systematic review aimed at identifying and critically analyzing clinical scoring systems used as prognostic tools for severity and mortality in burn patients. The integrative design allows the inclusion of heterogeneous study types, providing a comprehensive evaluation of established prognostic models in burn care.

The methodology followed the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement. The review protocol was prospectively registered in the PROSPERO database (Registration number: 42026 1331181).

RESEARCH QUESTION AND ELIGIBILITY CRITERIA

The research question was structured using a modified PICO framework:

- Population (P): Patients with burn injuries (all ages and etiologies)
- Intervention/Exposure (I): Clinical prognostic scoring systems
- Comparator (C): Not mandatory
- Outcomes (O): Mortality, severity, ICU admission, and length of hospital stay

Inclusion Criteria

- Original studies evaluating clinical scoring systems in burn patients
- Studies assessing prognostic scores such as Revised Baux Score, ABSI, or similar validated tools
- Observational studies (cohort, case-control, cross-sectional) and clinical trials
- Studies published in English, Portuguese, or Spanish
- Studies published between January 2000 and March 2025

Exclusion Criteria

- Studies focusing exclusively on biomarkers without clinical scoring systems
- Case reports and small case series (<10 patients)
- Narrative reviews, editorials, and expert opinions
- Animal or in vitro studies
- Studies without clearly defined prognostic outcomes

SEARCH STRATEGY

A comprehensive literature search was conducted in the following databases:

- PubMed/MEDLINE
- Embase
- Cochrane Library
- LILACS
- SciELO

The search strategy combined controlled vocabulary (MeSH/Emtree terms) and free-text keywords related to burns and prognostic scoring systems.

Example of search string (PubMed):

("burns" OR "burn injury") AND ("mortality" OR "severity" OR "prognosis") AND ("score" OR "scoring system" OR "Revised Baux" OR "ABSI")

Manual screening of references from included studies was also performed to identify additional relevant articles.

STUDY SELECTION

All records were imported into a reference management software and duplicates were removed.

Two independent reviewers screened titles and abstracts, followed by full-text assessment of eligible studies. Disagreements were resolved through consensus or by consulting a third reviewer.

The study selection process was documented using a PRISMA flow diagram.

DATA EXTRACTION

Data extraction was performed independently by two reviewers using a standardized form. The following information was collected:

- Study characteristics (author, year, country)
- Study design and sample size
- Patient demographics
- Burn characteristics (total body surface area, burn depth, inhalation injury)
- Type of clinical scoring system evaluated
- Outcomes assessed (mortality, severity, ICU admission, length of stay)
- Performance measures (e.g., odds ratios, sensitivity, specificity, AUC)

QUALITY ASSESSMENT AND RISK OF BIAS

Methodological quality was assessed using:

- Newcastle-Ottawa Scale for cohort and case-
- AMSTAR for systemtic reviews and meta analysis

Two reviewers independently assessed risk of bias, with disagreements resolved by consensus.

DATA SYNTHESIS

Given the expected heterogeneity among studies, a qualitative synthesis was conducted.

Clinical scoring systems were analyzed based on:

- Predictive accuracy for mortality and severity
- Applicability across different populations
- Ease of use in clinical practice

When available, statistical performance measures such as area under the curve (AUC), sensitivity, and specificity were reported.

CERTAINTY OF EVIDENCE

The certainty of evidence was evaluated using the GRADE approach framework, considering consistency, precision, risk of bias, and overall strength of evidence.

ETHICAL CONSIDERATIONS

As this study used previously published data, ethical approval and informed consent were not required.

Results

A total of 4,403 records were identified through database searching and additional sources. After removal of 11 duplicates, 4,392 records remained. Following the application of predefined eligibility criteria (date, language, human studies, and relevance to clinical scoring systems), 37 studies were screened based on title and abstract, of which 11 were excluded. Fig 1. Prisma Chart

A total of 26 full-text articles were assessed for eligibility, and 9 were excluded due to evaluation of biomarkers only (n = 3), absence of mortality outcomes (n = 1), and insufficient data (n = 5). Ultimately, 17 studies were included in the qualitative synthesis. No quantitative meta-analysis was performed due to heterogeneity among study designs and reported outcomes . (Table 1)

MORTALITY PREDICTION

The Revised Baux Score demonstrated consistently high predictive performance across studies, with reported AUC values ranging from 0.84 to 0.99, confirming its strong discriminative ability. This performance was supported by meta-analytic evidence and external validation studies, including large cohorts (AUC = 0.96) and low-resource settings (AUC = 0.943).

However, reduced predictive performance was observed in specific subgroups, particularly in high-risk populations, pediatric patients, and certain ICU settings, indicating limitations in model calibration.

The ABSI score also showed robust association with mortality, supported by meta-analysis (OR = 1.72; 95% CI 1.48–2.00), and remained one of the most consistent predictors across different populations.

Comparative analyses demonstrated that burn-specific scores outperform general critical care tools. The Revised Baux Score showed significantly higher discriminative capacity compared to qSOFA (AUC ≈ 0.99 vs 0.68–0.73). In contrast, modified ABSI (mABSI) demonstrated improved specificity and overall accuracy in selected populations.

A summary of predictive performance across scoring systems is presented in Table 2.

LENGTH OF HOSPITAL STAY

The ABSI score was also significantly associated with length of hospital stay (LOS). Higher scores correlated with prolonged hospitalization ($p < 0.001$), with patients scoring 8–9 presenting mean hospital stays of approximately 25.4 days, compared to approximately 5 days in low-risk groups.

Additionally, burn etiology influenced hospitalization burden, with flame and electrical burns associated with longer LOS.

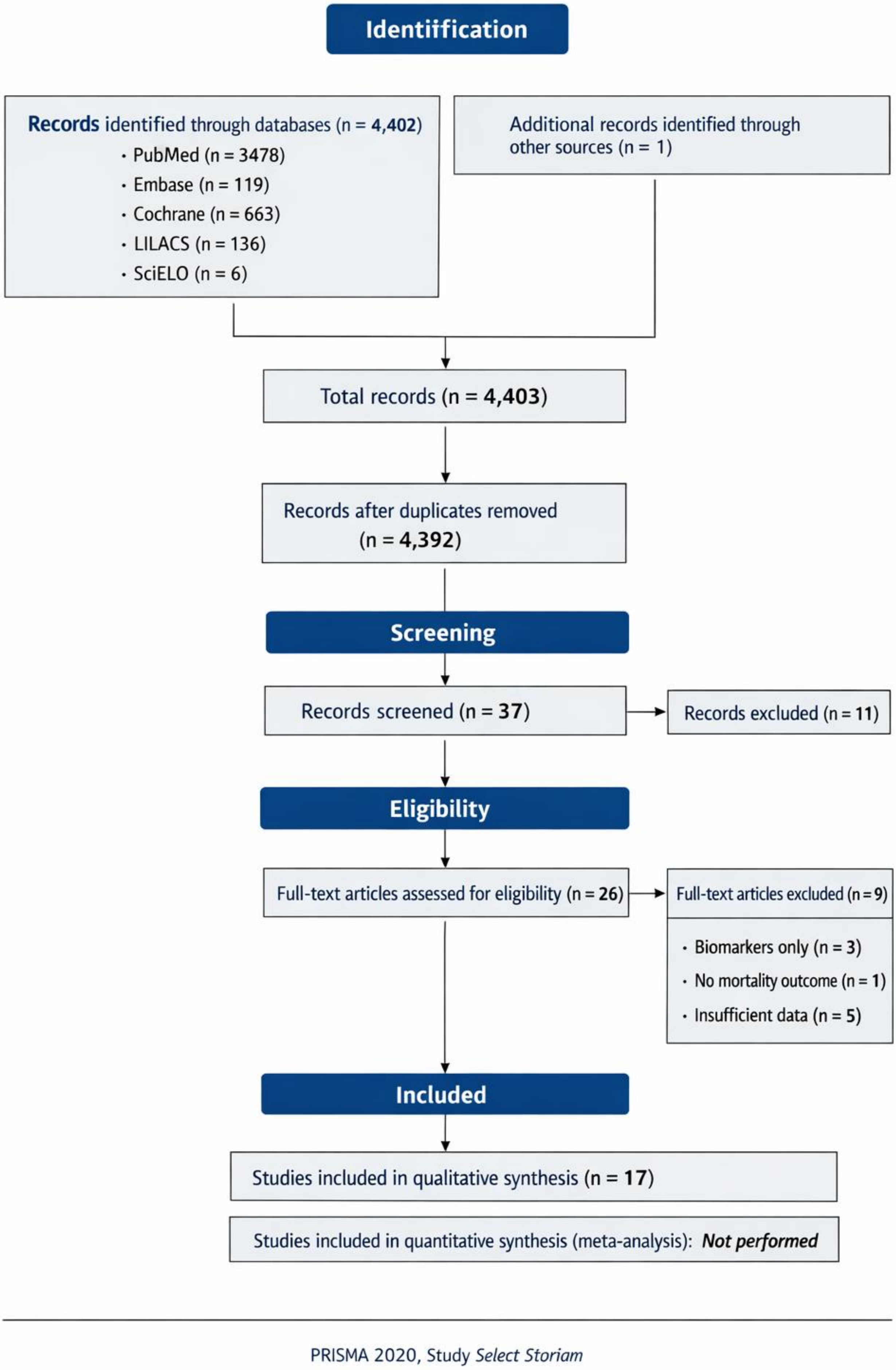

Fig1. PRISMA chart.

Table 1. Characteristics of Included Studies

Author	*Year*	*Country*	*Study Design*	*Sample Size*	*Patient Characteristics*	*Burn Characteristics*	*Scoring Systems*	*Outcomes*	*Main Findings*
Tobiasen et al.	*1982*	*USA*	*Cohort*	*1,073*	*Adults*	*TBSA variable*	*ABSI*	*Mortality*	*AUC ~0.85*
Tejero-Trujeque	*2000*	*UK*	*Review*	*—*	*Mixed*	*Variable*	*ABSI*	*Mortality*	*Good predictive ability*
Christofides et al.	*2020*	*South Africa*	*Cohort*	*~200+*	*Adults*	*Severe burns*	*Baux*	*Mortality*	*Valid predictor*
Dokter et al.	*2014*	*Netherlands*	*Prospective cohort*	*4,389*	*Mixed*	*TBSA median 6%; inhalation 10.5%*	*Revised Baux*	*Mortality*	*AUC 0.96; ↓ in high-risk*
Edgar et al.	*2023*	*International*	*Meta-analysis*	*—*	*Mixed*	*Variable*	*Revised Baux*	*Mortality*	*Strong validation*
Mrad et al.	*2022*	*International*	*Meta-analysis*	*98,610*	*Mixed*	*Variable*	*Multiple (FLAMES, Baux, ABSI)*	*Mortality*	*FLAMES highest AUC*
Deng et al.	*2025*	*China*	*Meta-analysis*	*4,011*	*Severe burns*	*Variable*	*ABSI*	*Mortality*	*OR 1.72*
Prasad et al.	*2020*	*USA*	*Cohort*	*1,039*	*Mixed*	*TBSA variable*	*Baux vs qSOFA*	*Mortality, ICU*	*Baux superior*
Melo et al.	*2022*	*Brazil*	*Cohort*	*122*	*ICU*	*Severe burns*	*ABSI vs SAPS3*	*Mortality*	*Similar performance*
Heng et al.	*2015*	*UK*	*Cohort*	*90*	*ICU ventilated*	*TBSA ≥15%*	*Baux+ CCI*	*Mortality*	*AUC 0.920*
Flinn et al.	*2023*	*USA*	*Prospective cohort*	*99*	*ICU intubated*	*Inhalation injury*	*I-ISS*	*Mortality*	*OR 13.16*
Ceniceros et al.	*2016*	*Spain*	*Cohort*	*73*	*Burn + bacteremia*	*Severe burns*	*SOFA*	*Mortality*	*OR 1.53*
Gimenez et al.	*2025*	*Brazil*	*Cohort*	*279*	*ICU*	*Severe burns*	*SOFA, qSOFA, SIRS*	*Mortality*	*HR 1.127*
Hager et al.	*2018*	*Germany*	*Cohort*	*—*	*Adults*	*Severe burns*	*IL-6*	*Severity*	*Correlates with severity*
Saadat et al.	*2021*	*USA*	*Cohort*	*56*	*Severe burns*	*TBSA ≥20%*	*Baux + BMI*	*Mortality*	*BMI protective*
Shah et al.	*2024*	*India*	*Cohort*	*504*	*ICU*	*Severe burns*	*Baux vs mABSI*	*Mortality*	*mABSI superior*
Baraka et al.	*2024*	*Uganda*	*Prospective cohort*	*101*	*Young population*	*TBSA 37%*	*Baux*	*Mortality*	*AUC 0.943*
Lam et al.	*2022*	*Vietnam*	*Cohort*	*314*	*Inhalation injury*	*Severe burns*	*Baux*	*Mortality*	*Variable by age*
Arruda et al.	*2016*	*Brazil*	*Cohort*	*130*	*Adults*	*Mean TBSA ~27%*	*Revised Baux, ISQA*	*Mortality, LOS*	*Baux best for mortality; ISQA best for LOS*
Turhan et al.	*2023*	*Turkey*	*Cohort*	*331*	*Mixed*	*TBSA variable*	*ABSI*	*Mortality, LOS*	*LOS↑ with ABSI*

Table 2. Predictive Performance of Clinical Scoring Systems

Score	Outcome	Performance	Key Finding
Revised Baux	Mortality	AUC 0.84–0.99	Best clinical applicability
ABSI	Mortality	OR 1.72	Strong evidence
mABSI	Mortality	AUC 0.827	Better specificity
FLAMES	Mortality	AUC 0.94	Highest accuracy
qSOFA	Mortality	AUC 0.68–0.73	Inferior performance
SOFA	Mortality	HR 1.127	Dynamic predictor
I-ISS	Mortality	OR 13.16	Strong inhalation predictor

DETERMINANTS OF MORTALITY

Across studies, the most consistent predictors of mortality included:

- Total body surface area (TBSA)
- Inhalation injury
- Full-thickness burns
- Age

Among these, inhalation injury emerged as a critical determinant, with the Inhalation Injury Severity Score (I-ISS) showing strong independent association with mortality (OR = 13.16).

Dynamic clinical variables also contributed to outcome prediction. The SOFA score was independently associated with mortality but demonstrated limited accuracy for infection diagnosis in burn populations. Similarly, bacteremia and organ dysfunction were strongly associated with adverse outcomes.

A structured summary of clinical predictors is presented in Table 3

Table 3. Integrated Prognostic Factors in Burn Patients

Domain	Factor	Clinical Impact
Injury severity	TBSA	Strong predictor
Respiratory injury	Inhalation injury	Major determinant
Tissue damage	Full-thickness burns	Increased mortality
Patient factors	Age	Independent predictor
Comorbidity	CCI	Improves prediction
Physiology	SOFA	Dynamic prognosis
Biomarkers	IL-6	Severity correlation only
Hospital burden	LOS (ABSI/ISQA)	Resource planning

ADDITIONAL PROGNOSTIC FACTORS

Comorbidities, particularly as measured by the Charlson Comorbidity Index (CCI), significantly improved prognostic accuracy in critically ill patients.

Body mass index (BMI) showed an inverse association with mortality, suggesting a possible "obesity paradox"; however, its inclusion did not improve predictive model performance.

Biomarkers such as interleukin-6 (IL-6) correlated with burn severity but did not independently predict mortality, limiting their role as standalone prognostic tools.

Comparative Performance of Prognostic Models
Among evaluated models:

- The Revised Baux Score showed the best balance between accuracy and clinical applicability
- FLAMES demonstrated the highest statistical accuracy (AUC ≈ 0.94), though with limited bedside practicality
- ABSI provided the strongest evidence base across studies
- mABSI improved specificity in selected settings
- SOFA contributed to dynamic prognosis rather than initial risk stratification

A comparative summary of model performance is presented in Table 4.

Table 4. Comparative Strengths and Limitations of Prognostic Models

Model	*Strength*	*Limitation*
Revised Baux	*Simple, widely validated*	*Reduced accuracy in extremes*
ABSI	*Strong evidence base*	*May overestimate mortality*
mABSI	*Better specificity*	*Limited validation*
FLAMES	*Highest accuracy*	*Complex*
SOFA	*Dynamic assessment*	*Poor infection detection*
qSOFA	*Easy bedside use*	*Low accuracy*

METHODOLOGICAL QUALITY
Most included cohort studies were of moderate to high quality according to the Newcastle-Ottawa Scale, particularly large prospective and ICU-based cohorts with robust outcome assessment and multivariable analysis.

Systematic reviews and meta-analyses demonstrated high methodological quality based on AMSTAR-style assessment, with comprehensive search strategies and appropriate statistical methods.

Despite overall strong methodological quality, heterogeneity in study design, population characteristics, and outcome definitions remains a limitation. (Table 5 and 6)

Table 5. Newcastle-Ottawa Scale Assessment of Cohort Studies

Study	*Country*	*Design*	*Selection (4)*	*Comparability (2)*	*Outcome (3)*	*Total /9*	*Quality*
Dokter et al.	*Netherlands*	*Prospective cohort*	*4*	*2*	*3*	*9*	*High*
Baraka et al.	*Uganda*	*Prospective multicentre cohort*	*4*	*2*	*3*	*9*	*High*
Prasad et al.	*USA*	*Retrospective cohort*	*4*	*1*	*3*	*8*	*High*
Heng et al.	*UK*	*Retrospective ICU cohort*	*4*	*2*	*3*	*9*	*High*
Flinn et al.	*USA*	*Prospective cohort*	*4*	*2*	*2*	*8*	*High*
Melo et al.	*Brazil*	*Cohort*	*3*	*2*	*3*	*8*	*High*

Study	*Country*	*Design*	*Selection (4)*	*Comparability (2)*	*Outcome (3)*	*Total /9*	*Quality*
Ceniceros et al.	*Spain*	*Cohort*	*3*	*2*	*3*	*8*	*High*
Gimenez et al.	*Brazil*	*Retrospective longitudinal cohort*	*4*	*2*	*3*	*9*	*High*
Saadat et al.	*USA*	*Retrospective cohort*	*3*	*1*	*2*	*6*	*Moderate*
Lam et al.	*Vietnam*	*Retrospective cohort*	*4*	*2*	*3*	*9*	*High*
Shah et al.	*India*	*Retrospective ICU cohort*	*4*	*1*	*3*	*8*	*High*
Turhan et al.	*Turkey*	*Retrospective cohort*	*3*	*1*	*3*	*7*	*High*
Arruda et al.	*Brazil*	*Cohort*	*3*	*1*	*2*	*6*	*Moderate*
Christofides et al.	*South Africa*	*Cohort*	*2*	*1*	*2*	*5*	*Moderate*
Hager et al.	*Germany*	*Cohort*	*3*	*1*	*2*	*6*	*Moderate*

Table 6. AMSTAR-Style Assessment of Systematic Reviews and Meta-Analyses

Study	*Protocol Registered*	*Search Strategy*	*Study Selection in Duplicate*	*Data Extraction in Duplicate*	*Risk of Bias Assessment*	*Meta-analysis Methods*	*Heterogeneity Assessment*	*Publication Bias*	*Overall Quality*
Edgar et al. (2023)	*Yes*	*Comprehensive*	*Yes*	*Yes*	*Yes*	*Appropriate*	*Yes*	*Not clearly repórter*	*High*
Deng et al. (2025)	*Yes*	*Comprehensive*	*Yes*	*Yes*	*Yes*	*Appropriate*	*Yes*	*Yes*	*High*
Mrad et al. (2022)	*Yes*	*Comprehensive*	*Yes*	*Yes*	*Yes*	*Appropriate*	*Yes*	*Yes*	*High*

Discussion

This integrative systematic review demonstrates that, although multiple clinical scoring systems have been developed to predict outcomes in burn patients, no single model adequately captures the full complexity of burn injury. Widely used scores such as the Revised Baux, ABSI, and FLAMES show acceptable to high predictive accuracy; however, their performance varies significantly depending on patient population, clinical setting, and available resources[15–18].

Among the evaluated models, the Revised Baux Score remains the most practical and widely applicable tool, combining simplicity with consistently high predictive accuracy (AUC 0.84–0.99) [1,4,5]and strong external validation. Its inclusion of inhalation injury—a major independent predictor of mortality—enhances its discriminative capacity. Nevertheless, reduced calibration in extreme cases and high-risk subgroups highlights its limitations in critically ill populations[6].

If in the population analyzed, the Revised Baux Score emerged as the most accurate predictor of mortality, whereas the ISQA demonstrated superior performance in identifying patients at risk for prolonged hospitalization (>30 days). This complementary behavior reinforces the concept that no single score fully captures the complexity of burn injury outcomes.

From a clinical and organizational perspective, the use of these indices at admission allows early risk stratification, enabling more efficient allocation of resources and the development of targeted, multidisciplinary care protocols. Such an approach promotes proactive decision-making, optimizes the use of available resources, and may contribute to improved functional recovery, facilitating earlier reintegration of patients into their social, familial, and occupational environments. However, reduced calibration in high-risk subgroups and extreme cases suggests limitations in its performance in critically ill populations[18,21].

The ABSI score also demonstrated robust association with mortality across multiple studies, supported by meta-analytic evidence (OR 1.72; 95% CI 1.48–2.00)[16], and showed additional value in predicting length of hospital stay. However, its tendency to overestimate mortality in modern burn care and the inclusion of variables with limited contemporary relevance may reduce its precision[22,23]. In contrast, the FLAMES score achieves higher statistical accuracy but is limited by complexity and reduced bedside applicability, illustrating the trade-off between predictive precision and clinical usability[17].

A major contribution of this review is the recognition of dynamic prognostic factors, particularly organ dysfunction and infection. A key finding of this review is the importance of dynamic prognostic factors. Scores such as SOFA[24], which incorporate organ dysfunction, were independently associated with mortality but showed limitations in distinguishing infection from burn-induced systemic inflammation[10,12]. This limitation is likely related to the overlap between systemic inflammatory response induced by burn injury and infection-related physiological changes. These findings suggest that infection in burn patients should be considered inherently severe, requiring early and aggressive management regardless of conventional score thresholds[25,26].

Inhalation injury consistently emerged as one of the strongest predictors of mortality, reinforcing the importance of incorporating pathophysiological variables into prognostic models. Similarly, comorbidities, particularly when assessed using indices such as the Charlson Comorbidity Index, improve risk stratification in critically ill patients. In contrast, biomarkers such as interleukin-6, although correlated with severity, do not independently predict mortality and therefore have limited utility as standalone prognostic tools[20].

Additionally, the ISQA score introduces an important dimension by predicting length of hospital stay, emphasizing the relevance of prognostic tools not only for mortality prediction but also for resource allocation and healthcare planning[27].Burn etiology also emerged as a relevant factor, with flame and electrical injuries associated with prolonged hospitalization[22], this is important in the work of the team to analyzed each patient and program individualized treatment to this patient return early to social and work activities.

Patient-related factors further influence outcomes. Comorbidities, particularly when assessed using the Charlson Comorbidity Index, improve prognostic accuracy in critically ill patient[2]. In contrast, biomarkers such as interleukin-6 correlate with burn severity but do not independently predict mortality, limiting their clinical applicability as standalone predictors[28].

From a methodological standpoint, most included cohort studies demonstrated moderate to high quality according to the Newcastle-Ottawa Scale, particularly large prospective cohorts and ICU-based studies with robust outcome assessment and multivariable adjustment[18,19,21,23,29]. However, heterogeneity in study populations, burn severity, subgroup definitions, and statistical adjustment likely contributed to variability in model performance. This may explain why the Revised Baux Score performs well in broad populations but shows reduced calibration in specific high-risk subgroups, while alternative models such as mABSI may demonstrate improved specificity in selected settings[21,23]. Most included studies demonstrated moderate to high quality; however, heterogeneity in study populations, burn characteristics, and statistical methods likely contributed to variability in model performance. This heterogeneity underscores the importance of contextual interpretation of prognostic scores and may explain why simpler models such as Revised Baux perform well in broad populations, whereas more complex or modified scores may offer advantages in specific subgroups.

The inclusion of high-quality systematic reviews and meta-analyses further strengthens the evidence base of this study. All included meta-analyses demonstrated strong methodological quality according to AMSTAR-style assessment, with comprehensive search strategies and appropriate statistical analyses[15-17]. This reinforces the consistency of findings across different populations and study designs, particularly for widely used scores such as the Revised Baux and ABSI.

From a clinical perspective, reliance on a single prognostic score may oversimplify decision-making and lead to misclassification of patient risk, particularly in complex cases. Prognostic scores should therefore be used as adjunct tools that support, but do not replace, clinical judgment. Combining different scoring approaches may improve risk stratification and guide more individualized management.

These findings reinforce that prognostic scores should be used as adjunct tools rather than definitive predictors, supporting—but not replacing—clinical judgment. In practice, combining different scoring approaches may improve risk stratification and guide more individualized patient management. This approach promotes proactive and individualized care, potentially improving outcomes and accelerating patient reintegration into social and occupational activities.

Importantly, this review supports the concept of a multidimensional prognostic approach in burn care. Burn injury is inherently complex, involving anatomical damage, systemic physiological response, metabolic changes, and evolving clinical conditions. Therefore, future prognostic models should integrate multiple domains, including anatomical severity, physiological parameters, and patient-specific factors, to more accurately reflect clinical reality.

Therefore, future prognostic strategies should integrate multiple domains, including anatomical severity (e.g., TBSA and depth), physiological parameters, laboratory biomarkers, and potentially imaging or perfusion data. A multidimensional model would more accurately reflect patient status and improve predictive performance.

Finally, important limitations must be acknowledged. Variability in TBSA estimation, burn depth assessment, and interobserver differences may affect the accuracy of prognostic models. Additionally, differences in healthcare systems and resource availability limit generalizability. These findings highlight the need for standardized assessment protocols and support the development of integrated, adaptive prognostic models. Another important limitation is the predominance of retrospective studies in the literature, which introduces selection bias and limits the robustness of predictive validation.

Future research should focus on the development of dynamic, data-driven prognostic models incorporating real-time clinical data and machine learning approaches. Prospective multicenter studies with standardized methodologies are essential to validate these models and improve prognostic accuracy in burn care.

Conclusion

Prognostic assessment in burn patients is inherently complex and cannot be fully captured by a single scoring system. This review demonstrates that widely used models, particularly the Revised Baux Score, provide reliable and clinically practical tools for mortality prediction, while complementary indices such as ISQA expand prognostic evaluation to outcomes such as length of hospital stay. Together, these findings support the concept that burn prognosis should be approached through a multidimensional framework rather than isolated metrics.

From a clinical perspective, early application of these tools enables effective risk stratification, guiding resource allocation and supporting the implementation of targeted multidisciplinary care strategies. However, important limitations persist, including reduced accuracy in specific subgroups, heterogeneity across populations, and limited integration of dynamic clinical variables.

Future advances should focus on the development of integrated prognostic models combining clinical scores, physiological parameters, and emerging technologies such as machine learning. Such approaches may enhance predictive accuracy and contribute to more individualized, efficient, and outcome-oriented burn care.

Conflicts of Interest Statement:

The authors declare that they have no conflicts of interest related to this study. No financial or non-financial relationships that could influence the work reported in this manuscript were identified.

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