ORIGINAL ARTICLE

DOI: 10.4274/hamidiyemedj.galenos.2025.42744

Hamidiye Med J

The Value of Systemic Inflammation Indices in Predicting Survival in Critical Flame Burn Patients: A Single-Center Retrospective Analysis

Sistemik İnflamasyon İndekslerinin Kritik Alev Yanığı Hastalarında Sağkalımı Öngörmedeki Değeri: Tek Merkezli Retrospektif Bir Analiz

Feyyaz Güngör[1], Hüseyin Kılavuz[1], Oğuzhan Aytepe[1], Mehmet Kuluş[1], Ceren Gökduman[2], Mustafa Turan[1]

[1]*University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital, Clinic of General Surgery, İstanbul, Türkiye*

[2]*University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital, Clinic of Anesthesia and Intensive Care, İstanbul, Türkiye*

ABSTRACT

Background: Burns are an important health problem that causes serious morbidity and mortality all over the world. Mortality in patients with critical burns is related to factors such as age, inhalation injury, and total burn surface area (TBSA). In recent years, it has been suggested that systemic inflammation indices may also be related to prognosis. In this study, we aimed to evaluate the potential prognostic value of systemic inflammation indices in predicting in-hospital mortality in patients with critical flame burns.

Materials and Methods: This retrospective study included 53 patients who were followed up in the burn intensive care unit at our center due to flame burns between January 1, 2024, and January 1, 2025. Patients' demographic data, burn etiology, inhalation injury, TBSA, revised Baux score, intubation status, operative debridement details, and systemic inflammation indices on the first, third, and fifth days of admission were analyzed. Patients were compared either as survivors or non-survivors. The Mann-Whitney U test was used for continuous variables, and the Pearson chi-square test was used for categorical variables.

Results: Mortality developed in 6 patients (11.3%). In the non-survivor group, inhalation injury ($p=0.038$), TBSA ($p<0.001$), and Baux score ($p<0.001$) were significantly higher. There were no differences between groups in the indices on the first day. However, on the third day, the lymphocyte/monocyte ratio (LMR) was lower and the systemic inflammation response index (SIRI) was higher in those who did not survive ($p=0.018$; $p=0.002$). Similar results were obtained on the fifth day (both $p<0.001$).

Conclusion: In our study, high LMR and low SIRI values on the third and fifth day were found to be associated with better survival. Prospective and multicenter studies with larger sample sizes are needed to confirm these results.

Keywords: Flame burn, survival, systemic inflammation, PLR, LMR, NLR, SII, SIRI

ÖZ

Amaç: Yanıklar, tüm dünyada ciddi morbidite ve mortaliteye yol açan önemli bir sağlık sorunudur. Kritik yanığı olan hastalarda mortalite; yaş, inhalasyon hasarı ve toplam yanık yüzey alanı (TYYA) gibi faktörlerle ilişkilidir. Son yıllarda, sistemik enflamasyon indekslerinin de prognozla ilişkili olabileceği öne sürülmüştür. Bu çalışmada, kritik alev yanığı olan hastalarda sistemik enflamasyon indekslerinin hastane içi mortaliteyi öngörmedeki potansiyel prognostik değerini değerlendirmeyi amaçladık.

Gereç ve Yöntemler: Bu retrospektif çalışmaya, 1 Ocak 2024–1 Ocak 2025 tarihleri arasında merkezimizde alev yanığı nedeniyle yanık yoğun bakımda izlenen 53 hasta dahil edildi. Hastaların demografik verileri, yanık etyolojisi, inhalasyon hasarı, TYYA, revize Baux skoru, entübasyon durumu, operasyonel debridman ayrıntıları ve başvurunun birinci, üçüncü ve beşinci günlerindeki sistemik enflamasyon indeksleri analiz edildi. Hastalar sağ kalanlar ve sağ kalamayanlar olarak karşılaştırıldı. Sürekli değişkenler için Mann-Whitney U, kategorik değişkenler için Pearson ki-kare testi kullanıldı.

Address for Correspondence: Feyyaz Güngör, University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital, Clinic of General Surgery, İstanbul, Türkiye
E-mail: feyyaz.gngr@gmail.com **ORCID ID:** orcid.org/0000-0002-4066-6072
Received: 24.07.2025 **Accepted:** 10.10.2025 **Epub:** 19.11.2025

Cite this article as: Güngör F, Kılavuz H, Aytepe O, Kuluş M, Gökduman C, Turan M. The value of systemic inflammation indices in predicting survival in critical flame burn patients: a single-center retrospective analysis. Hamidiye Med J. [Epub Ahead of Print]

ÖZ

Bulgular: Hastaların 6'sında (%11,3) mortalite gelişti. Sağ kalmayan grupta inhalasyon hasarı (p=0,038), TYYA (p<0,001) ve Baux skoru (p<0,001) anlamlı olarak daha yüksekti. İlk gün indekslerde gruplar arasında fark yoktu. Ancak üçüncü günde sağ kalmayanlarda lenfosit/monosit oranı (LMO) daha düşük, sistemik enflamasyon yanıt indeksi (SİYİ) daha yüksek bulundu (p=0,018; p=0,002). Beşinci günde de benzer sonuçlar elde edildi (her ikisi p<0,001).

Sonuç: Çalışmamızda, üçüncü ve beşinci günlerde yüksek LMO ve düşük SİYİ değerlerinin daha iyi sağkalım ile ilişkili olduğu tespit edilmiştir. Sonuçların doğrulanabilmesi için daha geniş örneklemlerle, prospektif ve çok merkezli çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Alev yanığı, sağkalım, sistemik enflamasyon, TLO, LMO, NLO, SİI, SİYİ

Introduction

Burns are a global health problem that affects approximately 11 million people each year and causes significant morbidity and mortality (1-3). The World Health Organization reports that burns are a leading cause of death, especially in low- and middle-income countries (4). Although mortality rates from flame burns vary by country income level, the rate reported in the United States is 5.52% (5). Mortality in critically burned patients can reach rates as high as 20% to 50%, depending on factors such as burn depth, patient age, and inhalation injury (6,7).

Accurately identifying risk factors associated with mortality is crucial for optimizing clinical management and enhancing patient outcomes. Traditional prognostic parameters, such as total body surface area affected (TBSA), age, and inhalation injury, have been extensively investigated for many years and remain among the primary determinants in clinical decision-making processes (8,9). However, considering the complex pathophysiologic processes and poor prognosis in burn patients, it is important to evaluate new biomarkers reflecting the systemic inflammatory response, not limited to traditional parameters (10,11). In recent years, the literature has focused on inflammation-based systemic indices that provide simple, rapid, and objective measurements with high practical applicability in this field (10,11). The potential value of these biomarkers in predicting survival in burn patients holds promise for making clinical management more personalized and effective.

This study aims to analyze the prognostic value of systemic inflammation indices in predicting survival in patients, followed up in the burn intensive care unit (BICU) due to critical flame burns, based on current literature.

Materials and Methods

This retrospective study included patients with flame burns who were admitted to the University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital BICU between January 1, 2024, and January 1, 2025.

Ethical approval for the study was obtained from the University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital Scientific Research Ethics Committee No. 2 (approval number: 2025–60, dated: 28.02.2025). The study was conducted in accordance with the ethical principles stated in the Declaration of Helsinki.

Inclusion criteria for the study:

- Patients being followed in the BICU due to flame burns
- Patients whose data were fully accessible from the hospital database or clinical records

Exclusion criteria for the study:

- Patients hospitalized to the BICU other than flame burns
- Patients with major trauma in addition to their burns
- Patients with combined burns

231 patients were followed in the BICU during the study period, and 53 patients who met the specified criteria were included in the study. Demographic characteristics, fire classes, inhalation injury, TBSA, burn depth, revised Baux score, timing of admission to the hospital, blood parameters on the 1st, 3rd, and 5th days of admission, systemic inflammation indices, intubation status, intubation duration, details of operative debridement performed, and survival of the patients included in the study were analyzed. Patients were divided into two groups according to in-hospital survival status, and analyses were performed between these two groups.

Systemic inflammation indices were calculated as follows:

Platelet/lymphocyte ratio (PLR): Platelet count (109/L)/ lymphocyte count (109/L)

Lymphocyte/monocyte ratio (LMR): Lymphocyte count (109/L)/monocyte count (109/L)

Neutrophil/lymphocyte ratio (NLR): Neutrophil count (109/L)/lymphocyte count (109/L)

Systemic immune-inflammatory index (SII): Neutrophil count (109/L) x platelet count (109/L)/lymphocyte count (109/L)

Systemic immune reflex index (SIRI): Neutrophil count (109/L) x monocyte count (109/L)/lymphocyte count (109/L)

TBSA was calculated by a burn-experienced surgical team using a combination of the "rule of nine" and Lund and Browder's chart (12). Burn depth was evaluated clinically. The revised Baux score was calculated for each patient using the following formula:

Revised Baux score = age (years) + TBSA (%) + 17 (if suffering from inhalation injury)

Inhalation injury was defined by the specialist physician based on clinical evaluation and bronchoscopic findings. Fire types are categorized into three groups: liquid-sourced, gas-sourced, and others.

Patient Management

After the initial evaluation, all patients underwent wound cleansing, and dressings were changed daily. In the initial assessment, a paraffin wound dressing containing 0.5% chlorhexidine and an appropriate antibiotic cream were used as wound dressings.

Tetanus prophylaxis was administered to all patients, and pain control was achieved with appropriate analgesic treatment. Patients were dynamically evaluated for compartment syndrome and operative debridement, and treatment algorithms were individualized on an individual basis. The decision regarding intubation of patients was based on American Burn Association criteria (13). All patients received low molecular weight heparin, antiulcer prophylaxis, and enteral nutritional support when clinically necessary. Intravenous fluid resuscitation was planned based on the Parkland formula, and treatment was continued to maintain urine output of 0.5–1 mL/kg/h.

Blood, wound, urine, and sputum cultures were obtained from all patients admitted to the BICU. Antibiotic treatment was administered based on the patients' clinical condition and culture results.

In patients requiring operative intervention, procedures such as tangential and facial excision, skin grafting, escharotomy, fasciotomy, and amputation were performed in accordance with the patient's clinical condition. In the permanent closure of burn defects, autologous partial-thickness skin grafts were performed, based on patient-specific decisions. In cases of deep or extensive tissue loss, biosynthetic skin coverings were used to support closure and neoderm formation.

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). The distribution properties of the continuous variables were evaluated using the Kolmogorov-Smirnov test, and it was determined that none of the continuous data showed a normal distribution. Therefore, the Mann-Whitney U test was used for comparisons between groups, and the Pearson chi-square (χ^2) test was used for comparisons of categorical variables. Continuous variables were presented as median (interquartile range); categorical variables as number (n) and percentage (%). A p-value of <0.05 was considered statistically significant.

Results

A total of 53 patients were included in the study, and in-hospital mortality occurred in 6 of these patients (11.3%). The median age of the study population was 35 years (range, 21–46 years), and 81.1% (n=43) of the patients were male. When the fire type was examined, the most common type was caused by flammable liquids, accounting for 49.1% (n=26) of the cases. Forty-five patients (84.9%) were admitted to the hospital within the first 3 hours. In the non-survival group, only one patient (16.7%) was admitted after more than 3 hours. While inhalation burns were present in 18.9% (n=10) of the patients, deep partial-thickness burns were detected in 50.9% (n=27). The median TBSA was 40% (37.5–47), and the revised Baux score was 80 (64–105) (Table 1).

When survival status was compared, inhalation injury was observed at a significantly higher rate in the non-survival group (50% vs. 14.9%; p=0.038). Similarly, the TBSA was significantly larger in the non-survival group [73 (57.5–82.5) vs. 40 (35–40.5); p<0.001]. The revised Baux score was also significantly higher in the non-survival group [122.5 (111–160.25) vs. 76 (64–96); p<0.001].

While the intubation rate was 100% in the non-survival group, it was determined to be 14.9% in the survivors (p<0.001). When the length of stay was evaluated, the median intubation length of stay in the entire study population was determined to be 4 (2–14) days. While this period was 3 (2–4) days in the survival group, it was 14 (7–20) days in the non-survival group. The median BICU stay for all patients was 15 (6–35) days, although the duration was longer in the non-survival group; the difference was not statistically significant [22.5 (6.5–37.75) vs. 14 (6–35); p=0.736].

Although the rate of deep partial thickness burns was higher in the non-survival group (83.3% vs. 46.8%), the difference was not statistically significant (p=0.092). The median number of operative debridements was 3.5 (2–8) in the survivors and 6 (3–10) in the non-survival group, and the difference was not significant (p=0.251). When operative interventions were evaluated, tangential and/or fascial excision was performed in 49 patients (92.5%), escharotomy in 30 patients (56.6%), fasciotomy in four patients (7.5%), and split-thickness skin grafting in 12 patients (22.6%).

When systemic inflammation indices were examined, PLR was calculated as 110.85 (51.66–212.74), LMR as 4.71

Table 1. Comparison of clinical characteristics and systemic inflammation indices between survivors and non-survivors				
	All patients (n=53)	**Survivors (n=47)**	**Non-survivors (n=6)**	**p-value**
Age (years)	35 (21–46)	33 (20–46)	45 (33.5–72.5)	0.084#
Male sexβ	43 (81.1)	39 (83)	4 (66.7)	0.336*
Fires classesβ Liquids Gasses Others	 26 (49.1) 10 (18.9) 17 (32.1)	 23 (48.9) 10 (21.3) 14 (29.8)	 3 (50) – 3 (50)	0.376*
Inhalation injuryβ (yes)	10 (18.9)	7 (14.9)	3 (50)	0.038*
Intubationβ (yes)	13 (24.52)	7 (14.89)	6 (100)	<0.00*
TBSAW	40 (37.5–47)	40 (35–40.5)	73 (57.5–82.5)	<0.001#
Burn depthβ (deep partial-thickness)	27 (50.9)	22 (46.8)	5 (83.3)	0.092*
Baux scoreW	80 (64–105)	76 (64–96)	122.5 (111–160.25)	<0.001#
Number of operative debridementsW	6 (3–10)	6 (3–10)	3.5 (2–8)	0.251#
BICU daysW	15 (6–35)	14 (6–35)	22.5 (6.5–37.75)	0.736#
1st day of hospital admission				
PLRW	116.14 (84.16–203.24)	116.14 (89.67–207.9)	110.85 (51.66–212.74)	0.632#
LMRW	2.62 (1.21–5.42)	2.44 (1.19–4.28)	4.71 (1.47–7.15)	0.314#
NLRW	4.73 (2.2–8.82)	5.17 (2.18–9.26)	2.72 (1.97–8.06)	0.555#
SIIW	1224.54 (539.95–2905.49)	1224.54 (514.17–2525.64)	2421.46 (539.25–4461.65)	0.612#
SIRIW	3.18 (1.44–11.12)	3.33 (1.49–11.1)	2.4 (1.36–20.83)	0.816#
3rd day of hospital admission				
PLRW	114.09 (80.13–169.8)	115.03 (81.2–169.23)	106.48 (36.22–212.87)	0.774#
LMRW	1.86 (1.2–2.47)	1.9 (1.32–2.52)	0.67 (0.31–2.69)	0.018#
NLRW	4.64 (3.56–7.39)	4.64 (3.58–7.01)	5.93 (2.92–14.9)	0.574#
SIIW	893.66 (609.1–1368.8)	800.14 (591.13–1311.42)	2062.73 (654.96–4562.44)	0.128#
SIRIW	4.37 (2.87–9.07)	4.34 (2.63–8.15)	31.61 (10.44–65.73)	0.002#
5th day of hospital admission				
PLRW	171.89 (98.35–236.88)	183.67 (103.71–237.57)	114.57 (69.94–200)	0.218#
LMRW	1.61 (1.1–2.69)	1.63 (1.18–3.2)	0.35 (0.11–0.52)	<0.001#
NLRW	5.27 (3.41–7.45)	5.24 (3.36–7.31)	6.51 (4.17–15.28)	0.197#
SIIW	1535.65 (748.62–2275.77)	1433.51 (737.43–2272.35)	2079.33 (1192.47–2694.58)	0.301#
SIRIW	4.95 (2.72–9.7)	4.2 (2.54–7.27)	48.4 (34.63–120.72)	<0.001#

β; numbers (%),W; median (IQR), *; Chi-square, #; Mann-Whitney U test. BICU: Burn intensive care unit, LMR: Lymphocyte-to-monocyte ratio, NLR: Neutrophil-to-lymphocyte ratio, PLR: Platelet-to-lymphocyte ratio, Baux score: Revised Baux score, SII: Systemic immune-inflammation index, SIRI: Systemic inflammation response index, TBSA: Total body surface area

(1.47–7.15), NLR as 2.72 (1.97–8.06), SII as 2421.46 (539.25–4461.65), and SIRI as 2.40 (1.36–20.83) on the first day of hospital admission in the non-survival group. However, no statistically significant relationship was found between any of these parameters and survival, with all p-values being above 0.05 (e.g., p=0.632, p=0.314, p=0.555, p=0.612, p=0.816). On the third day, LMR was significantly lower in the non-survival group [0.67 (0.31–2.69) vs. 1.9 (1.32–2.52); p=0.018], and SIRI was significantly higher [31.61 (10.44–65.73) vs. 4.34 (2.63–8.15); p=0.002]. Similarly, on the fifth day, LMR was significantly lower in the non-survival group [0.35 (0.11–0.52) vs. 1.63 (1.18–3.2); p<0.001] and SIRI was significantly higher [48.4 (34.63–120.72) vs. 4.2 (2.54–7.27); p<0.001].

Discussion

In this study, we aimed to evaluate the potential prognostic value of systemic inflammation indices in predicting in-hospital survival in critical flame burns. The most commonly used parameters to predict mortality in burns are age, TBSA, and inhalation injury. The Baux score, which combines these variables, and the revised Baux score, which also includes inhalation injury, are among the most widely accepted prognostic scores in the literature (8−10,14). In our study, although there was no statistically significant difference between the groups in terms of age, statistically significant differences were observed in terms of inhalation injury, TBSA, and revised Baux score.

Our study found that survival was significantly lower in patients requiring intubation. This finding may be related to the greater severity of burns in patients requiring intubation, or it may be due to the reduced tolerance of these patients to critical stress conditions resulting from their lower physiological reserves. Therefore, intubation can be considered a marker reflecting not only the need for respiratory support but also a more severe clinical picture and a high-risk patient group. However, it should not be forgotten that in critical burns, unnecessary intubation increases the risk of complications related to intubation, and intubation performed late, due to ignoring early intubation criteria specified in the current literature, can negatively affect survival (13).

In critical burns, a severe systemic inflammatory response may develop, which can lead to organ failure and death (15). Burn wounds contain many cell types, including neutrophils, lymphocytes, platelets, monocytes, macrophages, and fibroblasts (16). This cellular response plays a crucial role in determining the clinical manifestations of systemic inflammation. Parameters such as neutrophils, lymphocytes, platelets, and monocytes can be obtained easily and at low cost through routine blood tests, which can help physicians predict the clinical course at an early stage. However, it has been reported that these parameters alone have limited value in determining the prognosis of critical burns, as they can be influenced by numerous systemic factors (10). In contrast, there is increasing evidence that systemic inflammation indices, which are obtained by calculating the proportions of these parameters, reflect the immune response more holistically and have prognostic value in inflammatory diseases (10,11). Our study is the first in the literature to evaluate systemic inflammation indices specifically in critical flame burns, with a focus on etiology.

PLR is defined as the ratio of platelets to lymphocytes and is considered an indicator of the balance between proinflammatory and anti-inflammatory processes (17). High PLR values have been associated with worse outcomes in critically ill patients (18,19). In our study, no statistically significant difference was found in PLR values between the groups in patients with critical flame burns. In a meta-analysis by Wang et al. (11), including 11 studies, a significant association was found between high PLR values and short-term mortality in severely burned patientss. However, since all studies included in the meta-analysis had an observational design, this relationship cannot be interpreted at the level of causality. Additionally, all burn etiologies were evaluated collectively in the analysis, and etiology-specific subgroup analyses were not conducted.

LMR reflects the immune balance between lymphocytes and monocytes. Monocytes are responsible for the release of various proinflammatory cytokines, such as interleukin (IL)-1, IL-6, IL-10, and tumor necrosis factor-alpha, which are associated with poor prognosis, especially in critically ill patients (20). Therefore, a high LMR level may indicate better functioning of the immune system, and this has been associated with better prognosis in various diseases such as malignancy (21). However, studies examining the prognostic value of LMR in burn patients are not available in the literature, and our study is the first in this respect. In our study, in patients with critical flame burns, no statistically significant difference was found between the groups in the LMR value on the first day of hospital admission, but a significant difference was found between the LMR values on the third and fifth days. Although there is no direct study on burn patients, the better prognosis the group with high LMR levels is similar to the findings in other clinical studies on LMR.

It is reported in the literature that NLR reflects systemic inflammation more sensitively than evaluating neutrophil and lymphocyte levels alone, and is therefore considered a stronger biomarker (22). There are conflicting findings regarding NLR in the literature. Studies have shown that the change in NLR (ΔNLR) on the first and seventh days after injury is a significant biomarker for evaluating prognosis and disease severity in severe burn cases (23,24). While studies report that NLR is not a reliable prognostic risk factor in large-surface burns (10). In our study, no statistically significant difference was found between the groups in terms of NLR levels according to survival status in patients who developed critical burns from flame burns.

SIRI is calculated based on monocyte and neutrophil-to-lymphocyte ratios and has been identified as a highly sensitive biomarker of inflammation in various clinical conditions such as cancer, cardiovascular diseases, and infection (25,26). SII, derived from platelet counts and neutrophil-lymphocyte ratio, provides a more comprehensive reflection of the immune-inflammatory status when evaluated together with SIRI. Neutrophils, lymphocytes, and platelets are considered essential components of the inflammatory response in many clinical settings (27). Evaluating these parameters as ratios or composite indices enhances their predictive value and enables a more comprehensive evaluation of systemic inflammation (26). The number of studies evaluating the value of SII and SIRI in predicting survival in burn patients is quite limited. Li et al. (10) examined SII and SIRI in extensive burns. On the third day, the SII value was found to be statistically significantly higher in the survival group, while no significant difference was found between the groups in terms of SIRI. In our study, while no significant difference in SII values was found between the groups, a statistically significant difference in SIRI value levels was observed on the third and fifth days. Our study is the first in the literature to associate low SIRI values with a better prognosis in critical flame burns.

This study has some limitations. The research was designed retrospectively, which does not allow for the direct establishment of cause-and-effect relationships. Additionally, the study's single-center design and limited patient population restrict the generalizability of the findings.

Conclusion

In conclusion, this study is one of the first in the literature to evaluate the predictive value of systemic inflammation indices for survival in critical flame burn patients. Our findings confirmed the prognostic value of inhalation injury, TBSA, and revised Baux score, while the values of systemic inflammation indices LMR and SIRI on the third and fifth days were significantly associated with survival. High LMR and low SIRI values have been found to be associated with better survival. However, the results obtained need to be supported by larger samples prospective and multicenter studies. Further research may contribute to personalized burn treatment by revealing in which clinical subgroups these biomarkers may become more significant.

Ethics

Ethics Committee Approval: Ethical approval for the study was obtained from the University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital Scientific Research Ethics Committee No. 2 (approval number: 2025–60, dated: 28.02.2025).

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: F.G., M.K., M.T., Concept: F.G., H.K., M.T., Design: F.G., O.A., Data Collection or Processing: O.A., M.K., C.G., Analysis or Interpretation: F.G., C.G., Literature Search: F.G., H.K., M.T., Writing: F.G., M.T.

Conflict of Interest: No conflict of interest was declared by the authors.

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

REFERENCES

1. Jeschke MG, van Baar ME, Choudhry MA, Chung KK, Gibran NS, Logsetty S. Burn injury. Nat Rev Dis Primers. 2020;6:11. [Crossref]
2. Opriessnig E, Luze H, Smolle C, Draschl A, Zrim R, Giretzlehner M, et al. Epidemiology of burn injury and the ideal dressing in global burn care-Regional differences explored. Burns. 2023;49:1–14. [Crossref]
3. Greenhalgh DG. Management of burns. N Engl J Med. 2019;380:2349–2359. [Crossref]
4. Rybarczyk MM, Schafer JM, Elm CM, Sarvepalli S, Vaswani PA, Balhara KS, et al. A systematic review of burn injuries in low- and middle-income countries: epidemiology in the WHO-defined African Region. Afr J Emerg Med. 2017;7:30–37. [Crossref]
5. Nance ML, Rotondo MF, Fildes JJ, et al. NTDB Annual Report 2012. Chicago, IL: American College of Surgeons Committee on Trauma; 2012.
6. Zieliński M, Wróblewski P, Kozielski J. Prognostic factors in patients with burns. Anaesthesiol Intensive Ther. 2020;52:330–335. [Crossref]
7. Dries DJ, Endorf FW. Inhalation injury: epidemiology, pathology, treatment strategies. Scand J Trauma Resusc Emerg Med. 2013;21:31. [Crossref]
8. Gürbüz K, Demir M. Epidemiological and clinical characteristics and outcomes of inpatient burn injuries in older adults: Factors associated with mortality. Ulus Travma Acil Cerrahi Derg. 2022;28:162–169. [Crossref]
9. Huang YZ, Lu GZ, Zhao HS, Liu LJ, Jin J, Wu YF, et al. Clinical features and mortality-related factors of extensive burns among young adults: the Kunshan disaster experience. Ann Transl Med. 2020;8:1053. [Crossref]
10. Li F, He Q, Peng H, Zhou J, Zhong C, Liang G, et al. The systemic inflammation indexes after admission predict in-hospital mortality in patients with extensive burns. Burns. 2024;50:980–990. [Crossref]
11. Wang Z, Cui Z, Wang P. Association between platelet-to-lymphocyte ratio at admission and short-term mortality in severe burn patients: a meta-analysis. Burns. 2025;51:107444. [Crossref]
12. Miminas DA. A critical evaluation of the Lund and Browder chart. Wounds 2007;3:58–68. [Crossref]
13. American Burn Association. Advanced Burn Life Support Provider Manual, 2018 Update. J Burn Care Res. 2018. Available from: https://ameriburn.org/ (Accessed September 2, 2025).
14. Baraka SM, Kiswezi A, Olasinde AA, Edyedu I, Molen SF, Muhumuza J, et al. Role of the revised Baux score in predicting mortality among burn patients in an African low-income country: a multicentre prospective cohort. Ann Med Surg (Lond). 2024;86:4364-4367. [Crossref]
15. Legrand M, Dépret F, Mallet V. Management of burns. N Engl J Med. 2019;381:1188–1189. [Crossref]
16. Zhang P, Zou B, Liou YC, Huang C. The pathogenesis and diagnosis of sepsis post burn injury. Burns Trauma. 2021;9:tkaa047. [Crossref]
17. Gasparyan AY, Ayvazyan L, Mukanova U, Yessirkepov M, Kitas GD. The platelet-to-lymphocyte ratio as an inflammatory marker in rheumatic diseases. Ann Lab Med. 2019;39:345–357. [Crossref]
18. Wang G, Mivefroshan A, Yaghoobpoor S, Khanzadeh S, Siri G, Rahmani F, et al. Prognostic value of platelet to lymphocyte ratio in sepsis: a systematic review and meta-analysis. Biomed Res Int. 2022;2022:9056363. [Crossref]
19. Sarkar S, Kannan S, Khanna P, Singh AK. Role of platelet-to-lymphocyte count ratio (PLR), as a prognostic indicator in COVID-19: A systematic review and meta-analysis. J Med Virol. 2022;94:211–221. [Crossref]
20. Petty AJ, Yang Y. Tumor-associated macrophages: implications in cancer immunotherapy. Immunotherapy. 2017;9:289–302. [Crossref]
21. Ou Y, Liang S, Gao Q, Shang Y, Liang J, Zhang W, et al. Prognostic value of inflammatory markers NLR, PLR, LMR, dNLR, ANC in melanoma patients treated with immune checkpoint inhibitors: a meta-analysis and systematic review. Front Immunol. 2024;15:1482746. [Crossref]

22. Chan AS, Rout A. Use of neutrophil-to-lymphocyte and platelet-to-lymphocyte ratios in COVID-19. J Clin Med Res. 2020;12:448–453. [Crossref]

23. Angulo M, Moreno L, Aramendi I, Dos Santos G, Cabrera J, Burghi G. Complete blood count and derived ındices: evolution pattern and prognostic value in adult burned patients. J Burn Care Res. 2020;41:1260–1266. [Crossref]

24. Zheng JJ, Wang ZE, Zheng LW, Xu ZR, Chen S, Chen ZH. [Value of blood routine indexes and their ratios in judging the prognosis of adult patients with extensive burns]. Zhonghua Shao Shang Za Zhi. 2020;36:1167–1172. Chinese. [Crossref]

25. Guthrie GJ, Charles KA, Roxburgh CS, Horgan PG, McMillan DC, Clarke SJ. The systemic inflammation-based neutrophil-lymphocyte ratio: experience in patients with cancer. Crit Rev Oncol Hematol. 2013;88:218–230. [Crossref]

26. Kosidło JW, Wolszczak-Biedrzycka B, Matowicka-Karna J, Dymicka-Piekarska V, Dorf J. Clinical significance and diagnostic utility of NLR, LMR, PLR and SII in the course of COVID-19: a literature review. J Inflamm Res. 2023;16:539–562. [Crossref]

27. Nathan C. Neutrophils and immunity: challenges and opportunities. Nat Rev Immunol. 2006;6:173–182. [Crossref]