Letter to the Editor

The Evolving Landscape of Burn Severity Assessment: From the Rule of Nines to the Burn-Specific Frailty Index

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Dear Editor in Chief

Assessing and predicting outcomes for burn patients remains a major challenge in emergency and critical care. Quickly and accurately estimating the burn's seriousness, the needed fluids, and the risk of death is key to starting the right treatment, using resources well, and talking clearly with families. Over time, many scoring tools have been created to help with this and improve predictions [1]. This letter explains the development and use of the main tools, focusing on how they help in care.

Burn assessment classically begins with the Rule of Nines, an initial bedside tool that provides a rapid estimate of the total body surface area (TBSA) involved. This method divides the body into anatomical regions representing 9% or multiples thereof (e.g., 9% per arm, 18% for the anterior torso), facilitating early decisions regarding fluid resuscitation. While its simplicity is advantageous for initial triage, the Rule of Nines lacks precision for irregular or partial-thickness burns and is not directly applicable to pediatric patients. It remains, however, an essential first step in the algorithmic management of burn injury, guiding immediate intervention prior to more detailed evaluation [2].

Once the TBSA is estimated, the next step is to guide fluid resuscitation and prognostication. Rapid and adequate fluid replacement remains a cornerstone in the management of major burns. Introduced by Baxter in 1968, the Parkland formula (4 mL × body weight in kg × %TBSA burned) estimates the volume of Lactated Ringer's solution required over the first 24 hours following injury, with half administered during the first 8 hours and the remaining half over the next 16 hour) remains the most widely used method for estimating initial resuscitation fluid requirements in patients with burns exceeding 20% TBSA. This formula effectively restores extracellular fluid volume and continues to serve as a practical standard for early burn management [3].

Among the earliest and simplest prognostic models in burn care, the Baux Score, simply score estimates mortality by summing the patient's age and the percentage of TBSA burned. This straightforward approach reflects a fundamental clinical observation: mortality rises

proportionally with both burn extent and patient age [4]. However, the original score did not account for inhalation injury, a well-recognized independent predictor of death in burn patients [5]. To address this limitation, the Revised Baux Score was developed, adding 17 points when inhalation injury is present (Age + %TBSA + 17). This modification markedly improved predictive accuracy and remains one of the most widely used and validated tools for mortality estimation in modern burn care [6].

The Abbreviated Burn Severity Index (ABSI) was developed to improve the prediction of mortality in burn patients by including several clinical variables beyond burn size alone. The score incorporates sex, age, presence of inhalation injury, depth of burn (full-thickness component), and TBSA burned. Each factor is weighted, and the total score corresponds to an estimated probability of survival [7]. Compared with the traditional Baux score, the ABSI provides a more refined assessment of prognosis and allows for early identification of high-risk patients who may benefit from prompt and intensive management. Multiple validation studies have confirmed its reliability and ease of application across different patient populations, although ongoing evaluation and comparison with newer predictive models remain essential to ensure clinical accuracy [8].

The Prognostic Burn Index (PBI) was developed as an advancement of the traditional Baux score, aiming to improve mortality prediction in burn patients. The Burn Index (BI) is calculated as the percentage of full-thickness TBSA plus one-half of the partial-thickness TBSA (BI = full-thickness % TBSA + 0.5 × partial-thickness % TBSA). The PBI is then obtained by adding the patient's age to the BI (PBI = BI + age). These indices have been widely adopted in Japan as practical tools for early assessment of burn severity and survival probability [9].

Recent advances in burn prognostication highlight that physiologic resilience, rather than chronologic age, is a key determinant of survival. This has led to the development of the Burn-Specific Frailty Index (BSFI), which evaluates a patient's biologic age by incorporating factors such as functional status, comorbidities, nutrition, and cognitive function. Frailty—reflecting reduced physiologic reserve—has predicted complications and mortality more accurately than age alone in burn and critical care populations. Even patients with moderate burn size may have poor outcomes if they are physiologically frail, underscoring the need to assess the whole-patient condition rather than burn size alone [10].

Burn severity assessment has advanced from anatomical estimations, such as the Rule of Nines, to comprehensive prognostic models including the Baux, Revised Baux, ABSI, and PBI scores that integrate age, burn size, and inhalation injury. Recently, emphasis has shifted toward evaluating physiologic resilience through the Burn-Specific Frailty Index (BSFI), which reflects biological rather than chronological age. Each tool contributes uniquely across the continuum of burn care—the Rule of Nines for injury estimation, the Parkland formula for resuscitation guidance, and the Revised Baux and ABSI scores for early mortality prediction. Integrating frailty assessment with these established indices may provide a more individualized and accurate framework for outcome prediction. Further research is needed to validate and standardize the BSFI within a unified, dynamic prognostic model.

CONFLICTS OF INTEREST

The authors declare no competing interests

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