Practice Point

Burnaid App: A New Tool for Comprehensive Burn Care

Alexander George[1], Reena Alexander[2], Jamie George Alexander[3], Steve George Alexander[4]

[1]Department of burns and plastic surgery, Ernakulam Medical Center, kochi, India.
[2]Department of Physiology, Sree Narayana Institute of Medical Sciences, Chalakka, Ernakulam, India.
[3]Kochi, India
[4]Teesside University, UK.

Manual estimation of total body surface area (TBSA) in burn patients often results in inaccuracies, particularly in children, leading to significant impacts on initial care, such as unnecessary referrals to burn centers or excessive fluid administration during resuscitation[1]. Additionally, valuable time is frequently lost during patient admission while consulting charts for TBSA estimation and applying inconsistent formulas for fluid resuscitation. Effective burn management requires a comprehensive approach, including emergency triage, accurate TBSA calculation, fluid resuscitation, nutritional planning, infection prevention, wound care, surgical interventions, and rehabilitation. To address these inefficiencies, a specialized app can streamline these processes by providing real-time critical information, allowing healthcare providers to deliver prompt and effective care while adhering to standardized burn care protocols. Recognizing this need, the authors developed the Burnaid App (Fig.1), a versatile application designed to enhance workflow efficiency across diverse clinical settings, including emergency departments, intensive care units (ICUs), and long-term care facilities. By bridging gaps in burn care, Burnaid supports every stage of burn care—from admission to discharge and follow-up routines—ensuring optimal outcomes for burn patients.

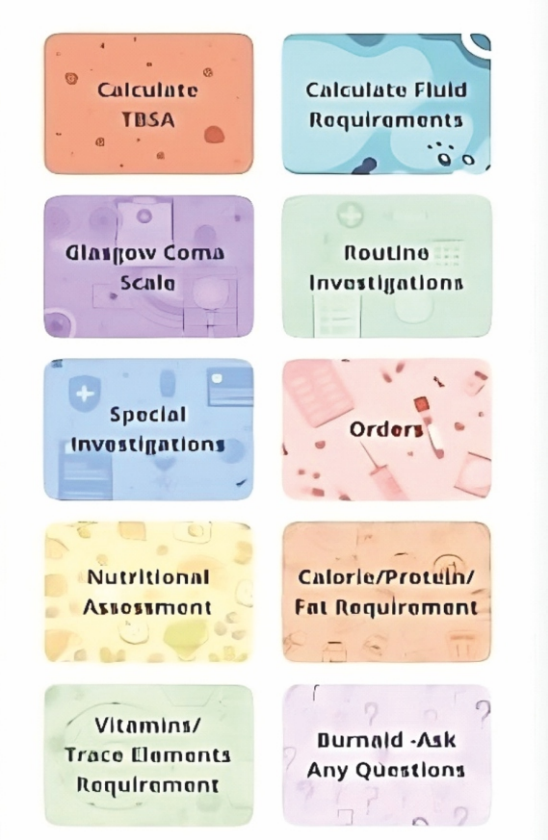


Fig.1: Picture showing the 10 modules of the Burnaid app.

Correspondence:
Dr. Alexander George, MCh
Consultant Burn and plastic surgeon,
Department of Burns and Plastic Surgery, Ernakulam Medical Center, Kochi, India.
E- mail: dralexanderg12@gmail.com
Phone: 9847139470

Access this article online

Website: www.jmsskims.org

DOI: https://doi.org/10.33883/jms.v27i4.1410

How to cite this article: George A, Alexander R, Alexander JG, Alexander SG. Burnaid App: A New Tool for comprehensive Burn Care. JMS 2024: 27 (4)44-47
Received: 2024-12-10 Accepted: 2024-12-18

This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Core Functionalities of the Burnaid App

The Burnaid app comprises 10 specialized modules, each addressing a critical aspect of burn care. Together, these modules create a comprehensive tool for clinicians, streamlining tasks, enhancing accuracy, and facilitating evidence-based, patient-specific care across various clinical settings and attempting to cover all aspects of burn care.

1. The TBSA calculation module offers precise burn extent estimation, essential for determining fluid resuscitation and nutritional needs. Using interactive body diagrams, users can mark affected areas, preview inputs, and calculate TBSA instantly based on standard Lund and Browder charts tailored to age. This functionality minimizes errors associated with manual calculations, forming the cornerstone of effective burn management.
2. Fluid resuscitation, a vital component of early burn care, is simplified by the app's fluid requirements module. This module calculates fluid needs using patient-specific factors such as age, weight, and TBSA, adhering to evidence-based protocols like the Parkland formula. It provides adjustable fluid calculation options (2 ml/3 ml/4 ml/kg) per cent burn area and includes guidance on selecting appropriate values for both adult and pediatric populations, even accommodating delayed presentations.
3. The Glasgow Coma Scale (GCS) module facilitates rapid neurological assessment through an intuitive interface. It instantly calculates scores, enabling clinicians to detect trauma-related or neurological complications early. This feature integrates seamlessly into burn management, underscoring the app's versatility in addressing complex cases.
4. Ongoing patient assessment is supported by the investigation modules. Routine investigations establish physiological baselines and identify complications, while the special investigations module addresses critical issues such as inhalation injuries and sepsis. With over 40 integrated diagnostic tests, these modules ensure comprehensive monitoring throughout the patient's recovery journey.
5. The Orders module streamlines treatment planning, encompassing everything from initial resuscitation to advanced recovery protocols. It offers customizable options for fluid therapy, analgesia, antibiotics, and specialized care for conditions such as inhalation injuries or fungal infections. This ensures that treatment plans are evidence-based and tailored to individual patient needs.
6. Nutritional support, a key factor in burn recovery due to hypermetabolism, is managed by the app's nutritional assessment module. It calculates metrics such as body mass index (BMI), body surface area (BSA), and basal metabolic rate (BMR) while offering age-appropriate comparisons based on World Health Organization (WHO) nutritional charts. The module also evaluates additional parameters like height-for-age, weight-for-age, BMI-for-age, weight-for-height, mid-upper arm circumference (MUAC), skinfold thickness, and head circumference. Paediatricians can benefit from detailed growth assessments without referring to growth charts, while evaluations for adults incorporate waist circumference and waist-to-height ratio, adjusted for ethnicity. Body composition metrics, including body fat percentage, lean body mass, ideal body weight, and total body water, are also provided. For ICU patients, the module identifies malnutrition risks through a Nutric Score assessment, offering tailored insights into nutritional status.
7. Caloric, protein, and fat requirements are determined with the calorie/protein/fat requirement module, which provides practical guidance for enteral and parenteral feeding practices. Complementing this, the micronutrient module highlights the importance of vitamins and trace elements in wound healing and immune support. It tailors supplementation recommendations to ensure patients receive optimal levels of nutrients like zinc, selenium, and copper.
8. The Ask Any Question module serves as an extensive repository of burn care knowledge, featuring over 3,000 questions and answers. Covering topics like infection control, wound management, nutritional support, rehabilitation, and recent advances in immunomodulation, it functions as an encyclopedia of burn care, ensuring clinicians remain updated on the latest protocols and therapies.

9. The Help module enhances user accessibility with detailed instructions and interactive tutorials. Regular updates based on user feedback ensure that the app remains user-friendly and adaptable, catering to both new and experienced clinicians in various clinical environments.

DISCUSSION

In the digital era, mobile applications have transformed the way professionals handle complex tasks, with healthcare undergoing a significant shift toward app-based solutions. These tools provide instant access to critical information, streamline workflows, and enhance decision-making. For clinicians, particularly in fast-paced and high-stakes fields like burn management, apps bridge gaps in efficiency and accuracy by reducing manual effort and improving patient outcomes. In one study[2], more than 30 apps related to burn care were found on Google Play Store and App Store. Of these, most of them were either TBSA or fluid calculation apps. Burnaid appears to be the only application that covers all aspects of burn care through its ten modules. Burnaid exemplifies this shift by integrating evidence-based guidelines based on the American Burn Association guidelines and other established protocols, automated calculations, and comprehensive resources into a single, portable platform designed for healthcare workers, paramedical staff, patients, and caregivers.

Despite their many advantages, burn management apps face certain limitations. Many apps also oversimplify complex cases, offering generalized recommendations that fail to account for specific burn types or to address comorbidities and pediatric-specific requirements[3]. Burnaid overcomes these shortcomings by offering detailed calculations, information and protocols tailored to both paediatric and adult patients, ensuring its usability across diverse clinical scenarios. Furthermore, a significant drawback of many apps is the lack of clinical validation, raising concerns about reliability in decision-making[4]. Burnaid, being a newly developed app, validation studies on Burnaid have been planned for the future. Being freely available on Google's Android and Apple's iOS store, the Burnaid is open for researchers to validate its clinical utility and efficacy. Accessibility and cost are also frequent barriers, with advanced features like 3D mapping or telemedicine often tied to expensive subscriptions, limiting their availability in low-resource settings[4]. The Burnaid mitigates this by providing a cost-effective solution that functions offline once downloaded, ensuring usability in remote areas with no internet connectivity. Data security and Privacy, a critical concern in app development, is also addressed, as Burnaid does not store patient data within the app, leaving all data storage decisions to the user. A common challenge for burn apps is the lack of integration with electronic medical records (EMRs), which necessitates manual data entry and increases the risk of documentation errors. Burnaid addresses this by enabling users to download, save, and share results as needed. While it currently operates as a standalone mobile application, Burnaid can easily be integrated into hospital EMR based on user needs and adoption.

Some apps are specifically designed for triage, effectively stratifying patients with intermediate-sized burn injuries and directing them to appropriate care settings[5]. Burnaid, however, goes beyond triage, supporting care from initial assessment to discharge through its 10 specialized modules. Burn applications can significantly improve patients' understanding of burn conditions and empower them to undertake effective self-care[6]. Burnaid's 'Ask Any Question' module with more than 3000 questions provides comprehensive self-care information in an easy-to-navigate question-and-answer format, making it an invaluable resource for managing burn care outside hospital settings. In comparison to apps which have a steep learning curve[7] that can discourage use, Burnaid features a simple and intuitive interface, making it accessible for clinicians and first responders with varying levels of expertise. Its "Ask Any Question" module further enhances its utility by offering a comprehensive repository of burn-related knowledge, eliminating the need for internet-based searches and improving accessibility for all users. Burnaid is meticulously designed to balance innovation and usability, overcoming many limitations observed in other burn management apps while maintaining a user-centred focus. Its intuitive design and comprehensive functionality establish it as a valuable tool for enhancing burn care outcomes. Future trials and user feedback will further refine the app, identifying potential areas for improvement and ensuring it continues to meet the evolving needs of clinicians and patients effectively.

Funding: No funding in any form has been received for this project

REFERENCES

1) Colson CD, Alberto EC, Milestone ZP, et al. EasyTBSA as a method for calculating total body surface area burned: a validation study. Emerg Med J. 2023 Apr;40(4):279-284.

2) Wurzer P, Parvizi D, Lumenta DB, et al. Smartphone applications in burns. Burns. 2015 Aug;41(5):977-89.

3) Patel B, Edwards T, Schrire T, et al. Is the Quality of Mobile Health Applications for Burns Being Adequately Assessed? J Burn Care Res. 2022 Jul 1;43(4):814-826.

4) Wallis LA, Fleming J, Hasselberg M, et al. A Smartphone App and Cloud-Based Consultation System for Burn Injury Emergency Care. PLoS One. 2016 Feb 26;11(2).

5) Carmichael H, Dyamenahalli K, Duffy PS, et al. Triage and Transfer to a Regional Burn Center-Impact of a Mobile Phone App. J Burn Care Res. 2020 Sep 23;41(5):971-975

6) Asghari Amrei S, Ayatollahi H, Salehi SH. A Smartphone Application for Burn Self-care. J Burn Care Res. 2020 Feb 19;41(2):384-389.

7) Cheah AKW, Kangkorn T, Tan EH, et al. The validation study on a three-dimensional burn estimation smartphone application: accurate, free and fast? Burns Trauma. 2018 Feb 27;6:7.