

Pediatric Burns Care a Review of the Current Guidelines and Best Practices for the Management of Burn Injuries in Children

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Abstract

Background : In children, burn injuries continue to be a major source of morbidity and mortality, necessitating a thorough and interdisciplinary approach to treatment. Because of their distinct physiological reactions, higher risk of complications, and lengthier healing times, pediatric burns are considerably different from adult burns. In order to provide the best care possible for children burns, emergency physicians, burn experts, surgeons, dietitians, physical therapists, and mental health specialists must work together as a team. Long-term functional results and survival rates are enhanced by early intervention and following established protocols. With a focus on acute management, fluid resuscitation, wound care, infection control, pain management, and long-term rehabilitation, this review article provides an overview of the most recent recommendations and best practices for pediatric burn care. It also discusses new developments in pediatric burn care, such as cutting-edge wound-healing methods, new pharmaceutical treatments, and the value of psychological support during the healing process. Healthcare professionals must comprehend these ideas in order to give pediatric burn patients with the best care possible and enhance their general quality of life after an accident.

Keywords : Pediatric, Burns, Guidelines, Best Practices, Burn Injuries

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Introduction

Children's burn injuries account for a significant percentage of ED visits and hospital stays, making them a major source of unintentional trauma globally¹. Children's distinct physiological and anatomical traits call for specific

management techniques². Their thinner skin layers make them more susceptible to deeper burns, and their smaller body surface area results in a higher proportion of burns relative to total body weight³. Additionally, children have immature immune systems, increasing the risk of sepsis and

complications from burn injuries⁴. The goal of pediatric burn care is to minimize morbidity, prevent complications, and optimize functional and cosmetic outcomes⁵.

Epidemiology and Risk Factors Burns in children are frequently caused by electrical accidents, chemical burns, flame burns, contact burns, and scalds.⁶ The most common type of burns are scald burns, which are brought on by hot liquids or steam and especially affect children less than five.⁷ Older kids and teenagers are more likely to sustain flame burns, which frequently happen as a result of fire, fireworks, or cooking mishaps.⁸ Even though they are less common, electrical burns can result in serious inside injuries that are not always apparent from the outside.⁹ Acids, alkaline chemicals, and household cleaning products can all cause chemical burns¹⁰. Socioeconomic issues, child neglect, dangerous household conditions, and a lack of monitoring are risk factors for pediatric burns¹¹. Reducing pediatric burn injuries requires preventive measures such safety equipment, parental education, and more stringent home safety laws¹².

Initial Assessment and Resuscitation A systematic approach to the assessment of pediatric burn patients includes the application of the Advanced Trauma Life Support (ATLS) principles¹³. The primary survey prioritizes airway assessment and management, given the high risk of inhalation injury in children exposed to flames or smoke inhalation¹⁴. Airway edema can develop rapidly, necessitating early intubation in patients with signs of respiratory distress¹⁵.

Fluid resuscitation is critical in managing pediatric burns, as children are more prone to hypovolemic shock due to their higher surface area-to-volume ratio¹⁶. The modified Parkland formula, which calculates fluid requirements based on weight and burn size, is commonly used to guide resuscitation¹⁷. However, pediatric patients require closer monitoring due to their increased risk of fluid overload, electrolyte imbalances, and renal complications¹⁸.

Wound Care and Infection Control Proper wound care is essential in minimizing infection risk and promoting faster healing in pediatric burn patients¹⁹. Early wound excision and grafting have been shown to improve outcomes and reduce hospital stays²⁰. The choice of wound dressing depends on the depth and severity of the burn²¹. Silver-based dressings, hydrocolloid dressings, and biosynthetic skin substitutes are commonly used to facilitate healing and reduce pain²².

Infection control is a critical component of burn management, as pediatric patients are at higher risk for sepsis and systemic

infections²³. Topical antimicrobial agents, such as silver sulfadiazine and mafenide acetate, are commonly used to prevent infection²⁴. Prophylactic antibiotic stewardship, strict aseptic techniques, and daily wound assessment play crucial roles in infection control²⁵.

Pain Management and Psychological Support Pain management in pediatric burns involves a multimodal approach incorporating pharmacologic and non-pharmacologic strategies²⁶. Opioids such as morphine are commonly used for severe pain, while non-opioid analgesics, including acetaminophen and NSAIDs, help manage mild to moderate pain²⁷. Adjunctive therapies, such as anxiolytics and sedatives, may be used for procedural pain relief²⁸.

Beyond physical pain, pediatric burn patients often experience psychological trauma, including anxiety, depression, and post-traumatic stress disorder (PTSD)²⁹. Psychological support, including cognitive-behavioral therapy (CBT) and counseling, is crucial to aid emotional recovery³⁰. Family-centered care models and play therapy have also been found to enhance coping mechanisms in children undergoing long-term burn treatment³¹.

Nutritional Support and Metabolic Considerations Pediatric burn patients have increased metabolic demands due to the hypermetabolic response triggered by burns³². Early and aggressive nutritional support is essential to promote wound healing and prevent muscle catabolism³³. Enteral feeding is preferred, with high-protein, high-caloric diets tailored to the child's needs³⁴. Micronutrient supplementation, including zinc, vitamin C, and vitamin D, plays a critical role in enhancing immune function and tissue repair³⁵. Ongoing monitoring and adjustments to caloric intake based on metabolic needs are necessary to optimize recovery³⁶.

Rehabilitation and Long-Term Care Early rehabilitation is essential to prevent contractures, reduce scar formation, and optimize functional recovery in pediatric burn patients. Physical therapy and occupational therapy should begin as soon as the patient's condition stabilizes. Stretching exercises, splinting, and the use of pressure garments help manage hypertrophic scarring and improve mobility³⁷.

In addition to physical rehabilitation, psychosocial support is necessary for reintegration into school and social environments. Long-term follow-up is essential to assess growth disturbances, psychological well-being, and overall quality of life post-burn injury. Advances in reconstructive surgery, laser therapy, and scar management techniques continue to improve aesthetic and functional outcomes for pediatric burn survivors.

Conclusion

Pediatric burn care requires a comprehensive, multidisciplinary approach encompassing acute resuscitation, infection control, pain management, nutritional support, and long-term rehabilitation. Adherence to current guidelines and best practices significantly improves outcomes and reduces complications in pediatric burn patients. Ongoing research and advancements in burn treatment, including regenerative medicine and personalized therapies, hold promise for improving long-term recovery and quality of life for affected children. Future efforts should focus on refining wound healing technologies, enhancing psychological support interventions, and implementing effective burn prevention strategies worldwide.

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