

## Therapeutic approach to emotional reactions accompanied with thermal skin injury – from basic to epidemiological research

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**Specialty type:** Psychiatry

**Provenance and peer review:**

Invited article; Externally peer reviewed.

**Peer-review model:** Single blind

**Peer-review report's scientific quality classification**

Grade A (Excellent): 0

Grade B (Very good): 0

Grade C (Good): 0

Grade D (Fair): 0

Grade E (Poor): 0

**P-Reviewer:** Liu XQ, China

**Received:** October 9, 2023

**Peer-review started:** October 9, 2023

**First decision:** December 6, 2023

**Revised:** December 15, 2023

**Accepted:** January 24, 2024

**Article in press:** January 24, 2024

**Published online:** February 19, 2024



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### Abstract

In this editorial, we discuss the status of a therapeutic approach to emotional reactions accompanying thermal skin injuries. Burns are considered a major health problem, as well as an economic and social problem, with potentially devastating and life-changing consequences. They affect a wide range of patients with different damage mechanisms, varied depths, and localizations of the burns. The most common are thermal burns, with more than 11 million occurrences annually according to the World Health Organization data. Thermal skin injuries are among the most tragic and catastrophic injuries, almost unsurpassed in terms of severity, morbidity, and mortality, as well as functional, aesthetic, social, economic, and psychological consequences. Burn survivors face stress, anxiety, depression, low self-esteem, body deformity, social isolation, unemployment, financial burden, and family problems. The advances in acute burn care have allowed researchers and physicians to pay more attention to other effects of burns, focusing on psychological consequences in particular. Apart from the significant improvements in routine protocols, it seems useful to take care of psychological disturbances that occur simultaneously but may emerge as the most lasting outcome of those injuries. In that sense, various standards and additional approaches may be involved to achieve overall recovery.

**Key Words:** Thermal skin injury; Anxiety; Depression; Psychological consequences of burns

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**Core Tip:** This editorial aimed to allow updated principle information considering the psychological consequences of burns by means of their medical, social, and economic significance in the population. Also, it aimed to bring some new insight into the potential therapeutic advances using alternative and adjuvant therapies. In that manner, we offered some evidence for the benefits of using a new methodology in the treatment of one of the most lasting consequences induced by thermal skin injury.

**Citation:** Krstic B, Krstic M, Selakovic D, Jovicic N, Rosic G. Therapeutic approach to emotional reactions accompanied with thermal skin injury – from basic to epidemiological research. *World J Psychiatry* 2024; 14(2): 199-203

**URL:** <https://www.wjgnet.com/2220-3206/full/v14/i2/199.htm>

**DOI:** <https://dx.doi.org/10.5498/wjpp.v14.i2.199>

## INTRODUCTION

### **Epidemiological data**

Burns represent injuries to the skin and local tissue occurring as a consequence of energy transfer from a heat source to the body, thus causing an increase in the local tissue temperature. The increase of the tissue temperature above a certain threshold leads to irreversible cellular injury, interrupting metabolic processes[1]. According to the basic characteristics of the etiological agent, burns, as a medical entity, are divided into thermal, electrical, chemical, and radiation injuries. The most common are thermal burns, which make up about 86% of all burns. These burns could be caused by flame, hot liquid, or steam, as well as by direct contact with a hot object. Approximately 4% of burns are caused by electricity, 3% by chemical substances, and 7% could be classified as other types of burns. Burns are a major health problem, as well as an economic and social problem, with potentially devastating and life-changing consequences[2]. According to the World Health Organization data, more than 11 million burns occur annually, with the majority taking place in underdeveloped and developing countries due to various environmental factors (old buildings, lower safety standards, absence of smoke detectors, faulty electricity, *etc.*).

### **Classification according to population categories**

There is a wide range of patients affected by burns, and their mechanisms of damage, burn depth, and localizations of burns are varied as well. The degree of damage depends on the power of the heat source, the duration of the heat effect, the method of injury, the age of the patient, the location of the burn, and the overall patient's health condition. According to the diagnostic criteria, burns can vary from small wounds treated on an outpatient basis to very large injuries that require specific protocols, including treatment in specialized centres. The treatment of severe burns includes prevention of progression to multiorgan system failure, which is usually accompanied by long stays in hospitals and long-term follow-up (to avoid risk from functional and psychosocial consequences). In total, more than 6% of all burn victims undergo specialized therapeutic protocols, yet with a devastating overall mortality rate[3]. Burn injuries affect the whole population, regardless of gender and age, although some studies suggest that these injuries are more common in men. Studies have shown certain patterns, indicating that males most often get burns outside the home (outdoors and at the workplace), whereas females are most frequently injured at home, and children usually get burns when they are not under the supervision of adults at home[4]. The morbidity and mortality risk of these injuries is also influenced by the population structure. Studies demonstrated that the highest rates of burn-related injuries and fatalities occur among the populations of young children, under 4 years of age and also senior adults over 60 years of age[5]. This kind of trauma is particularly important in children populations due to the long period of disability. A surveillance study in low and middle-income countries demonstrated that 17% of children with this kind of trauma experienced disability longer than 6 wk, while in 8% lifelong disability is predicted[6].

## SOCIAL CHALLENGES AND ECONOMIC IMPACT OF THERMAL SKIN INJURIES

This is an important public health issue with a significant disease burden, not only in terms of serious morbidity and mortality but also with a large economic impact. Between 7 and 12 million people who sustain burn injuries (and require medical treatment) are absent from school or work for longer periods[7]. Studies have shown that the average number of days off work after burn trauma was close to 60, thus indicating the high economic burden that burn trauma causes. Patients' return to active duty, such as work or school, are important outcome after burn trauma since work is not only a source of income but also evidence of integration and participation in the community. All regions are affected by the incidence and mortality of this kind of trauma globally, yet middle and lower-income areas have the highest occurrence rates, probably due to living conditions, infrastructure, lack of advanced safety measures and access to medical care. Survival rates after severe burns have increased significantly in recent decades, especially in developed countries, due to better treatment of burn shock, more active surgical approaches, more effective infection control, and immune and metabolic status. War operations should also be mentioned when discussing this type of injury as thermal injuries are a significant source of morbidity and mortality in times of war. They constitute 5% to 20% of all injuries and 4% of all

deaths in military personnel. These numbers are doubled in the civilian population[8,9]. The complexity and outcomes of treatment are significantly influenced by the lack of adequate medical care, as well as the specific psychological aspect that accompanies war situations.

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## THE PSYCHOLOGICAL IMPACT OF THERMAL SKIN INJURIES

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Burns are injuries of great medical, scientific, and economic importance and can affect and worsen the physical and mental health of survivors and present significant social challenges, especially for those with more extensive burns[10]. Thermal skin injuries are among the most tragic and catastrophic injuries, almost unsurpassed in terms of severity, morbidity, and mortality, as well as consequences that are functional, aesthetic, social, economic, and psychological. The psychological impact on the patient's health is very pronounced in these injuries. Understanding of trauma-related psychological complications has only recently been directed to burn care. There are several psychopathologic effects related to burn trauma. The range is wide, from acute stress disorder, within the first 30 d, to posttraumatic stress disorder, a reaction that persists longer than 30 days following an incident, to major depressive disorder[11,12]. A long stay in the hospital, intense pain, loss of function, fear of the reaction of the environment, the struggle to accept a new way of life, and many other factors lead to different emotional reactions in burned patients, who are a particularly vulnerable population. Burn survivors face stress, anxiety, depression, body deformity, low self-esteem, and unemployment followed by financial burdens. Social isolation and private, family problems also occur frequently. Burn survivors find it extremely difficult to live with visible scars in a modern society that values physical features and attractiveness. These consequences can lead to body image disaffection, which can cause social anxiety, social withdrawal, and depressive disorder[13]. Anxiety is a common response in burn recovery and to the treatments necessary to heal burned tissue, although the origin of anxiety can be related to the trauma itself. It was noted that most patients with superficial burns suffered from mild anxiety, while patients with deeper burns tended to suffer from severe anxiety. Burn survivors may also be at increased risk for depression due to impairment or loss of function, changes in physical appearance, difficulty managing pain, or time away from social interactions due to prolonged hospitalization and physical rehabilitation. Disfigurement of socially visible areas such as the face and dissatisfaction with the appearance of the body after a burn were found to be associated with the development and maintenance of psychological distress and lower self-esteem. For burn patients, even the common challenges of everyday life may present psychological stress. A previously familiar environment, due to physical and psychological limitations, can seem new and lead to helplessness, hopelessness, and loneliness. The realization that life may not return to the way it was before the injury, could lead to a series of negative feelings, which may result in various psychological disorders[14]. One-third of burn patients experienced a stress disorder, including post-traumatic stress disorder, according to previously published data[15]. Patients with moderate burns can also have psychological consequences, not only severe ones, which can occur even more than a year after the trauma. The emotional trauma caused by burns can affect all areas of a person's life: put stress on relationships, lead to depression or substance abuse, and even put additional strain on their physical health. There is a very high risk of death in burn patients in the first year after the burn, strongly correlated with trauma and mental illness. Burn survivors have a notable need for mental health care, and due to the known and prolonged effect of burn trauma on mental health, patients cannot be considered cured right after the physical healing of the wound[11].

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## THE PSYCHOLOGICAL CARE FOR BURN PATIENTS

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The advances in acute burn care have allowed researchers and physicians to pay more attention to some of the other effects of burns, particularly the psychological consequences. However, planning for physical and psychological rehabilitation after major burns should begin at the time of admission. Recently, great progress has been made in the recognition and treatment of psychological complications caused by these injuries. There has even been a linguistic change in nomenclature, with patients previously categorized as "burn victims" now being referred to as "burn trauma survivors" [16]. An initial focus on physical limitations in burn treatment is necessary, but treatment must also address the psychological trauma that may last longer than physical limitations. Coordinating psychological care for burn patients is challenging, and just as physical recovery occurs in stages, psychological needs vary over time. As the reaction to a burn is very complex, so is the approach to its treatment. This is why burn treatment is a multidisciplinary approach, as the focus is on restoring functionality both physically and mentally. To return to a normal life, patients need an adequate influence on the emotional reactions caused by the burn injury[17]. Along with the conventional approach that involves antidepressants, anxiolytics, and cognitive behavioral therapy, new therapeutic approaches are emerging to address scarring, mental health, and quality of life. New forms of treatment have the effect of improving the outcome of burns both acutely and in the long term, therefore proposing the additional therapeutic protocols, as potentially beneficial.

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## THE ADJUNCTIVE THERAPEUTIC APPROACHES IN BURN PATIENTS

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Among others, hyperbaric oxygen therapy (HBO) has long been used as an adjunctive therapy to promote wound healing. In addition to the benefits that HBO has on the wound healing process, several studies have shown that HBO reduces neuropathic pain caused by burns. Previously published data show that administration of HBO can induce

tolerance to ischemia through the regulation of antioxidative enzymes, suggesting that administration of HBO could also prevent impairment of cognitive functions[18]. In addition, numerous studies stated that antioxidant supplementations for burn patients significantly promote faster wound healing, shorten hospital stays, reduce mortality rate, and decrease the incidence of infection in all cases. At the same time, the administration of antioxidants and trace elements significantly enhances the rate of recovery, prevents complications, and reduces the mortality rate, thus affecting the psychological consequences of burns[19].

## CONCLUSION

Taken altogether, the multidimensional importance of thermal injuries and their widespread consequences implies the necessity for a multidisciplinary approach to their treatment. Aside from the significant improvement in routine protocols, it seems useful to take care of simultaneously occurring psychological disturbances that may appear as the most lasting outcome of those injuries. In that sense, future investigations of potential therapeutic protocols to treat thermal skin injury, including both standard and additional protocols, should include the estimation of their action in the brain regions involved in emotional regulations to achieve overall recovery.

## FOOTNOTES

**Author contributions:** Krstic B, Selakovic D, Rosic G designed the overall concept and outline of the manuscript; Krstic M and Jovicic N contributed to the discussion and design of the manuscript; Krstic B, Krstic M, Selakovic D, Jovicic N, Rosic G contributed to the writing, and editing the manuscript, and review of the literature.

**Conflict-of-interest statement:** Bojana Krstic, Milos Krstic, Dragica Selakovic, Nemanja Jovicic and Gvozden Rosic have nothing to disclose.

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**S-Editor:** Lin C

**L-Editor:** A

**P-Editor:** Zheng XM

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