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**Enhance Burn Care Outcome in the UAE: A Systematic Review of Burn Injuries:  
Statistics, and Psychological Complications, with a Proposal to Improve Diagnostic  
Accuracy by Introducing Advanced Technology and AI**

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**Enhance Burn Care Outcome in the UAE: A Systematic Review of Burn Injuries: Statistics, and Psychological Complications, with a Proposal to Improve Diagnostic Accuracy by Introducing Advanced Technology and AI**



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**Abstract**

**Purpose:** To systematically review existing published research that focuses on Burn injuries, psychological complications, and shed light on AI and advanced technologies that improve patient care and accuracy of diagnosis.

**Methodology:** The systematic review was conducted across several databases, including PubMed, ScienceDirect, SpringerLink, and Google Scholar, covering the period from 2018 to 2025, to highlight the application of AI technology in burn cases and their diagnosis.

**Findings:** With screening of more than 12 published studies that met the criteria, there were approximately 9 million burn cases globally, and burn was considered the 4th most common type of injury worldwide. SSMC has shared that in 2024, 84% of patients were from other Abu Dhabi hospitals, 5.7% from Ajman, and 1.7% from Umm Al Quwain. A study in the UAE has illustrated that burns can cause emotional and physical scars that last a lifetime. Burn injuries exhibit a risk of various psychological diseases, increasing anxiety levels, and young patients might develop depression and PTSD. The remaining challenge in the clinical assessment is that surgeons reported an accuracy reached 75%. LDI technology was introduced as a solution that provides 91% to 96% sensitivity and accuracy in assessing burn depth. It can serve as a predictive tool for a patient's recovery, helping improve the quality of care for burned patients.

**Unique Contribution to Theory, Practice and Policy:** This review examined local and international practices, illustrating the importance of burn cases by providing mortality statistics. Furthermore, it proposed introducing advanced technologies, focusing on current practices, and improving accuracy and efficiency.

**Keywords:** *Burn Cases Mortality, Burn Injuries, WHO Burn Injuries, Pain Management, AI Technology, Burns*

**JEL Codes:** *I10, I12, O33, O31, F35*

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## INTRODUCTION

Burn injury is considered the most dangerous type of trauma highlighted in healthcare facilities. It concerns public health, mortality, disability, and health burden. While the survivors are undergoing graft procedures, psychological rehabilitation, and physical therapy (N. Lee et al., 2025).

According to the World Health Organization (WHO), burns are a worldwide public health problem that leads to 180,000 deaths annually. At the same time, the majority of these cases occur in low and middle-income countries (Yin et al., 2024). In the eastern Mediterranean region, there was an increase in the burn rates, with mean mortality ranging from 5 to 7% in the years from 1989 to 2006 (Mater et al., 2020). A study conducted in Saudi Arabia found an overall mortality rate of 17.6%, lower than the reported rate in Cameroon (23.4%). However, it was higher than in developing countries such as Iraq (13.3%) (Alshammari et al., 2022). A dataset on the WHO webpage has shared that in India, there were over 1 million patients burnt yearly, while about 173,000 patients were burnt every year in Bangladesh (*Burns*, 2023).

Specifically, in the United Arab Emirates, the healthcare sector has placed full emphasis on advancing digital transformation and developing emerging technologies. This growth is based on healthcare facilities ensuring significant collaboration to improve the quality of healthcare services (Abdulla & Al-shami, 2023). Moreover, A study published in the UAE stated that there was a focus on enhancing long-term burn victim cases (Mohamed Muftah Alzaabi, Bairapareddy, et al., 2022).

## Background

There are four degrees of burns: first degree burns mainly affect the epidermis, second degree burns affect the dermis, third degree burns extend into the subcutaneous fat, and fourth degree burns involve deeper structures like bones or muscle (Milner, 2024). Moreover, it depends on the size/depth of burns, which consequently increases the need for grafting, leading to the risk of shock, sepsis, and death (Milner, 2024). These kinds of injuries are leading to serious complications that lead to prolonged hospitalization and disability because of the complexity of pathophysiology and the infections that patients develop; they could have hypothermia, hypovolemia, or even death (J. J. Lee et al., 2025). In Sheikh Shakhbout Medical City (SSMC), Abu Dhabi, UAE, published research has mentioned that infections are the most common cause of morbidity/mortality in burned patients. It highlights the importance of recognizing infection in burn patients to initiate medications (Anti-microbial therapy) with no delays (Maskari et al., 2023). The severity of the burn is assessed by its mechanism, and the Total Body Surface Area Affected (TBSA% %) and its depth, which guides the resuscitation and the treatment decisions (J. J. Lee et al., 2025). In addition to that, the patient's condition must be stabilized, including airway control, breathing, ensuring circulation, accessibility for intravenous, and starting fluid resuscitation (Radzikowska-Büchner et al., 2023). A retrospective cohort study noted that the Society of Critical Care Medicine (SCCM) recommends multimodal pain management approaches that introduce different types of non-opioid medications to reduce the side effects of pain-relieving medications. (Garelli et al., 2025). A study done in 2024 divided burn injuries into superficial and deep, Superficial treatment is conservative, such as applying typical antibacterial ointments, while the deep injuries are best treated by excision/grafting (Milner, 2024). Caregivers had a good knowledge of pediatric burns, a positive attitude about physiotherapy treatment, and highly satisfaction level to the physiotherapy sessions (Mohamed Muftah Alzaabi, Bairapareddy, et al., 2022).

## **Aims**

This Systematic review aims to comprehensively summarize and analyze published research on Burn injury-related outcomes. It shed light on the burn injuries, incidents, and mortality rates, psychological complications, challenges in treatments, and introduced AI in the field. By reviewing papers published since 2018, conducted in the UAE, Gulf Cooperation Council countries, and worldwide, this study identifies trends by capturing the interventions and improvements described in the papers. Furthermore, the objective of reaching out to health policymakers is to provide evidence-based results that enhance burn services, reduce mortality rates, and improve the quality of care for survivors.

## **METHODOLOGY**

This systematic review has been conducted according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines to maintain transparency and rigor. This comprehensive search covers databases such as PubMed and ScienceDirect and uses Google Scholar to identify published studies from 2018 to 2025. The Keywords used for search are “Burn cases”, “Burn injuries mortality”, “Classification of Burn injuries”, “WHO Burn injuries”, “Pain management”, “AI technology and burns”, with combinations in the regions such as “Worldwide”, “Middle East”, “GCC”, “UAE”. Exclusion criteria were studies conducted before 2018 and non-academic research, while inclusion criteria were peer-reviewed articles, research on main topics, and research published in English.

## **RESULTS**

### **Statistics**

A study done by Gerstl et al., (2024) Stated that there were around 9 million burn cases globally and 111,000 deaths due to burns in 2019. Moreover, in 2019, there were 8,378,122 new burn injury cases, and it was the cause of death for 111,292 cases and the highest recorded number of these cases was in China, followed by India (Radzikowska-Büchner et al., 2023). Yıldız et al. (2024) illustrate the common types of injuries, it states that worldwide burns are the 4th most common type of injury, right after road traffic accidents, falls, and physical violence.

As the SSMC Burn Centre has shared the scorecard of 2024 cases, 366 acute burns, 27% were medical skin loss, there were 84% of the patients from other Abu Dhabi hospitals, 5.7% from Ajman, 3.4% from Sharjah, 2.9% out of the country, 2.3% from Ras Al Khaimah, and 1.7% from Umm Al Quwain (Sheikh Shakhbout Medical City “Department of Surgery – Burn Centre-Scorecard,” 2024).

### **Psychological Complications**

Patients with burn injuries feel pain both mentally and physically. A published paper done in the United Arab Emirates (UAE) illustrated the fact that burns could cause emotional and physical scars that last a lifetime (Mohamed Muftah Alzaabi et al., 2022). This has been proven via a published study done by Woolard et al., (2021) Stated that patients with burn injuries exhibit a risk of various psychological diseases, increasing their anxiety levels. Young patients might develop depression, Post-Traumatic Stress Disorder (PTSD), which is a significant concern that lasts for a long time even after the wounds are healed. In Lebanon, the burned patients have frequently been diagnosed with PTSD and Major Depressive Disorder (MDD). The statistics in 2018 stated that 36% of those burned patients found had PTSD (Younes et al., 2025). Studies focused on a commonly validated tool to assess burn injuries, which is the Patient Health Questionnaire (PHQ-9), as an accurate diagnostic tool that was used in a study

done by (Loehr et al., 2022). These symptoms might persist in either the short or long term; follow-up and a multidisciplinary team are recommended to improve symptom outcomes.

### **AI Technology and Patient Care**

There were challenges in terms of the clinical assessment of the depth of the burns, which surgeons reported an accuracy of 60% to 75% for the mixed-depth burns, challenges even reaching the non-availability of such technological training and environment needed (J. J. Lee et al., 2025). Advances in Artificial Intelligence (AI) have shown great potential to improve patients' experience, reduce costs, and enhance burn care. An automatic calculation of burn size using mobile applications to detect the segment area of burns and categorize based on real-time photographs (Yıldız et al., 2024).

Furthermore, Laser Doppler Imaging (LDI) is considered the most accurate device, with a sensitivity of 91 to 96 percent of accuracy, which helps in predicting the recovery of patients from burns within a timeframe (J. J. Lee et al., 2025). The LDI's accuracy can reach up to 97% at 5 days, but only then, which delays the time to a prediction or requires accepting a less accurate prediction. Such limitations are seen in low-resource settings, which require them to search for alternatives that are accessible and affordable in clinical practices (J. J. Lee et al., 2025). Another published paper done by Wong She & Gibran, (2023) Demonstrated different burn assessment tools such as Laser Doppler Flowmetry, Laser Doppler Imaging (LDI), Thermography, Optical coherence tomography, and stated that LDI showed an emerging, accurate diagnostic tools that measure blood flow as well as healing potential.

An AI technology for processing the burn severity called "Convolutional Neural Network (CNN)" specifically (EfficientNet-B7), AI pipeline is used to determine the severity of burns, it identifies the burns region from a 2D color image via Digital Single Lens Reflex (DSLR) camera, it can classify the burn severity levels, predicting the highest burn severity, while Boundary Attention Mapper (BAM) helps identifying the contours of the burn (J. J. Lee et al., 2025).

Although the mentioned burn assessments were for the same purposes, the LDI has shown broad improvements in the imaging, while the LDF specifically focuses on the blood flow. Consequently, the CNN and AI pipelines have the potential to improve accuracy in clinical decision-making. Yet, there is a limitation in the cost, which could create challenges to initiatives involving these technologies.

### **Conclusion**

To conclude, this review examined global and regional burn care practices, illustrated mortality rates, highlighted psychological complications, and proposed AI and advanced technologies for the field. A comparison of traditional methods for assessing burns and recent advancements that offer promising improvements in accuracy and efficiency. The systematic review has identified challenges that may persist, such as early detection and training. The integration of advanced technologies such as LDI can help improve clinical diagnosis and decision-making. Furthermore, there are healthcare facilities in the UAE that started initiating the use of LDI, yet there is a limitation on publishing research on the effectiveness of the machine and patients' outcomes

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