ECRONICON OPEN ACCESS

EC PAEDIATRICS
Case Report

Neonatal Thermal Trauma as a Sentinel Event in a Secondary-Level Hospital: Case Report

Salazar Flores M[1], Yaneth Martínez Tovilla*[1] and Pérez Dosal Marcial[2]

[1]Medical Student School of Medicine at Benemérita Universidad Autónoma de Puebla (BUAP), México

[2]Plasctic Surgeron of Bunrs Unit of Hospital Para la Niñez Poblana (HN) Puebla, México

***Corresponding Author:** Yaneth Martínez Tovilla, Secretariant of Research and Graduate, Pediatrics Department at Benemérita Universidad Autónoma de Puebla, México (BUAP)/Mexican Burn Association, México. Tel: 2221401764; Fax: (222)229 55 00-ext 6301; E-mail: yaneth_tovilla@hotmail.com

Received: November 24, 2025; **Published:** December 02, 2025

Abstract

Introduction: Neonatal burns as sentinel events represent a preventable problem. Documenting this case aims to highlight the importance of strengthening hospital safety culture.

Clinical Case: A male newborn presented with iatrogenic second and third-degree burns after exposure to a gooseneck examination lamp, with complications including sepsis, encephalopathy, and acute kidney injury.

Discussion: The importance of multidisciplinary care is emphasized, while also evidencing the vulnerability of this population due to their thin skin, immature immune system, and limited renal function.

Conclusion: Our main objective is to emphasize the importance of preventing these accidents through a multidisciplinary approach and educational programs.

Keywords: *Hospital Burns; Sentinel Event; Neonatal; Vulnerability*

Abbreviations

WHO: World Health Organization; PAHO: Pan American Health Organization; APGAR Scale: Appearance, Pulse, Grimace, Activity and Respiration Scale; KDIGO: Kidney Disease: Improving Global Outcomes; NPASS: Neonatal Pain, Agitation, and Sedation Scale

Introduction

Patient´s safety is a fundamental pillar of medical care; therefore, burns due to sentinel events represent a crucial challenge for health systems. According to the World Health Organization (WHO), the Joint Commission, and the Pan American Health Organization (PAHO), this is defined as an unexpected event that may cause death, serious physical or psychological harm and is not related to the natural progression of the disease [1].

In this context, there have been different documentations at the international level regarding this problem. In Australia, a study conducted in 205 intensive care units documented 584 sentinel events in only 24 hours with a frequency of 38.8 per 100 days, predominantly medication errors and hospital device failures [2]. In Saudi Arabia, between the years 2016 and 2019, 727 sentinel events were reported,

of which 38.4% corresponded to unexpected deaths [3]. In the United States, the Joint Commission reported that approximately 11,000 patients were affected by sentinel events between 2005 and 2017 with 5,826 associated deaths [4]. In a Mexican center, data indicate that 55% of hospital burns correspond to pediatric patients under 5 years of age [5].

A study of 105 documented cases reports that the average age at hospital admission was 10 days with more than half occurring during the first week of life [6]. The most frequent causes were contact burns at 29.5%; flame burns, 25.7%; scalds, 23.8%; and exposure to radiant heat, 14.4%; while chemical burns, 4.8%, and electrical burns, 1.9%, were less common [6].

Neonatal thermal trauma in hospitals is considered a sentinel event in most cases due to its preventable potential and the legal and ethical implications it entails. Likewise, its management in neonates presents difficulties due to the absence of defined protocols in the literature [7]. These injuries are usually related, approximately 60%, to the misuse of heating devices such as phototherapy lamps, incubators, thermal blankets, failures in safety protocols, deficiencies in hospital infrastructure, or human errors, as well as the improper handling of antiseptic solutions or intravenous extravasation [6,8].

The relevance of reporting a case of neonatal thermal trauma as a sentinel event not only lies in the rarity of its presentation but also in the need to make visible an underreported issue in secondary-level hospitals [9]. The low adherence to international guidelines, failures in surgical team communication, and loss of situational awareness contribute to the persistence of these events, which increase neonatal morbidity and mortality [10]. Due to this, prevention becomes the main tool to reduce the incidence of these injuries, while strengthening hospital safety culture and confidence in health systems. Therefore, the objective of this work is to document the case of a burn in a neonate as a sentinel event caused by a heating lamp.

Clinical Case

This is a male newborn, single product, with pregnancy interrupted due to maternal hypertension. At birth, he weighed 3365 grams, measured 52 centimeters in length, and had a head circumference of 34 centimeters, with Appearance, Pulse, Grimace, Activity and Respiration (APGAR scores) of 8/9 and an adequate transition to extrauterine life. From the first days, exclusive breastfeeding was initiated. No vaccines had been administered and no abnormalities were reported in past medical or family health history.

In the second week of life, during the collection of the metabolic screening sample, the patient was exposed to direct heat using a gooseneck examination lamp, which led to the appearance of edema and blisters on the distal ends of both lower limbs. The parents reported hypoactivity, weak crying, and poor feeding tolerance.

On physical examination at admission, the infant was hypoactive and hyporeactive, with jaundiced and parchment-like skin and sticky mucous membranes. The crying was without the presence of tears, the anterior fontanelle measured 3 x 3 cm, and the abdomen was globular and depressible, without visceromegaly. Distal pulses were weak, and third degree burns were identified, involving approximately 10% of the body surface area (Figure 1). Body temperature was 36°C, respiratory rate 35 breaths per minute, heart rate 100 beats per minute, and blood pressure 71/45 mmHg.

Diagnostic evaluation was performed through physical examination, arterial blood gas analysis, serum electrolyte determination, and laboratory studies, with complete blood count revealing severe thrombocytopenia with 14,000 platelets. Blood cultures, urine culture, and peritoneal fluid culture were performed. Imaging studies included Doppler ultrasound of the lower limbs, confirming arterial flow present but decreased in the right foot, and transfontanellar ultrasound, which ruled out an epileptogenic focus. No diagnostic challenges related to cultural or economic barriers were identified, although the iatrogenic origin of the injuries delayed recognition of the full

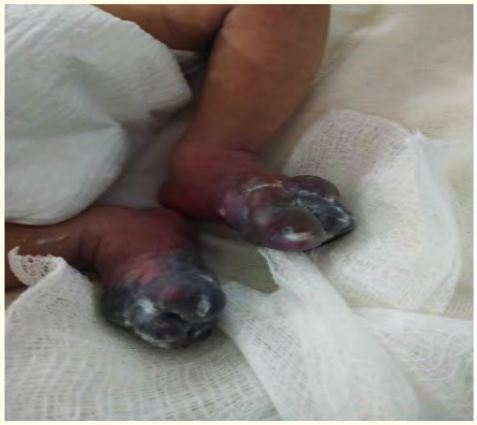
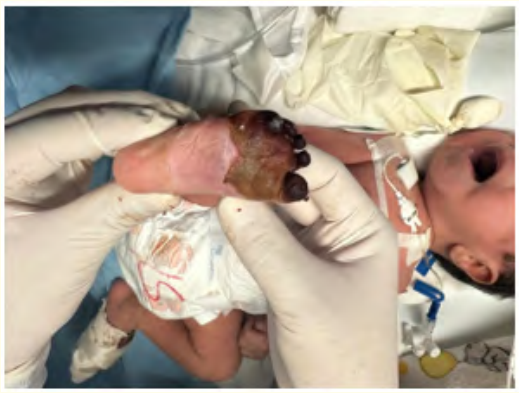


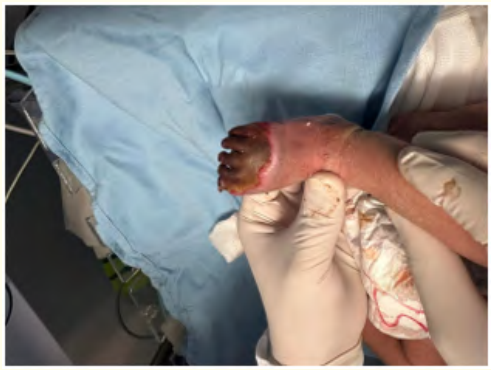
Figure 1: *The third-degree burns on lower limbs.*

clinical picture. The initial diagnostic reasoning considered neonatal sepsis and hypernatremia; finally, it was concluded that the patient presented second and third-degree burns, late-onset neonatal sepsis, and hypokalemia. The prognosis was guarded due to the extent of the burns and the presence of encephalopathy and Kidney Disease: Improving Global Outcomes (KDIGO) level 3.

Therapeutic management included pharmacological, supportive, and minor surgical interventions. Analgesia was administered with paracetamol at 10-15 mg/kg every 6 to 8 hours alternating with fentanyl at 0.5 mcg/kg; later, levetiracetam was added at a dose of 40 mg/kg/day due to seizure episodes. To control infection, cefotaxime 50 mg/kg every 8 hours and cefepime were initiated for 7 effective days. Severe thrombocytopenia required platelet concentrate transfusion at a dose of 15 ml/kg. Ventilatory support was provided with a head hood and supplemental oxygen, with an initial FiO_2 of 60%, followed by gradual reduction to low-flow nasal cannula and indirect oxygen. Hypernatremia was corrected with carefully adjusted intravenous fluids to avoid abrupt changes, with a calculated replacement for 72 hours and total fluid administration of 294.7 ml/kg/day. Additionally, a central venous catheter and a Tenckhoff catheter were placed for renal replacement therapy.

For wound management, periodic dressings were performed using Ulcoderm and Jelonet dressings, followed by enzymatic autolytic patches under the supervision of plastic surgery, with planned keratinocyte grafting. These intervention changes were justified by clinical evolution, improvement of renal function, and the need for progressive wound closure (Figure 2-5: Burn monitoring).





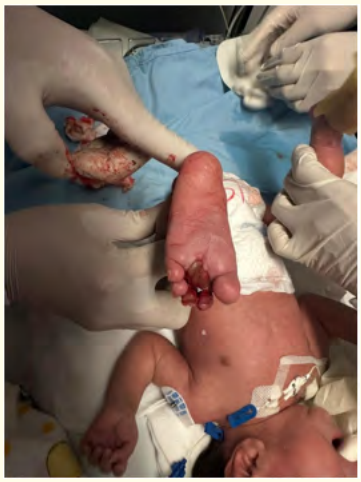


Figure 2-5: *Burn improvement 7 days.*

During follow-up, the patient was afebrile, without analgesia, and maintained on levetiracetam at 20 mg/kg/day. At that time, he was active and reactive, with a Neonatal Pain, Agitation, and Sedation Scale (NPASS) score of +2. On cardiopulmonary examination, heart sounds had good tone and intensity, and no wheezing or crackles were detected. The latest blood gas analysis showed no acid-base imbalance. Doppler ultrasound of the lower limbs showed arterial flow present in both feet, though decreased in the right one. The patient remained hemodynamically stable without the need for vasoactive support, with 24-hour diuresis of 5.7 ml/kg/hr. Urine and peritoneal fluid cultures were negative, allowing for antibiotic discontinuation. Neurologically, after initiating anticonvulsant therapy, no new seizure episodes were documented. Wound care by plastic surgery continued.

Finally, informed consent was obtained from the patient's parents for the publication of this clinical case, as well as for the use and dissemination of photographs, ensuring confidentiality and anonymity of the minor at all times.

Discussion

The case presented several strengths, among them multidisciplinary care, early completion of comprehensive diagnostic studies, and access to advanced interventions such as ventilatory support, renal replacement therapy, and management of skin lesions. Nevertheless, the sentinel event originated from the improper use of a hospital device.

The patient had expected complications, according to the literature, because neonatal skin is thinner compared to that of children and adults [11]. Likewise, the ratio between body surface area and weight is higher in this population, which implies a greater risk of electrolyte and acid-base imbalances such as hypernatremia in these patients [12].

The immune system is immature, which predisposes to local infections, and therefore, sepsis constitutes an important cause of morbidity and mortality in this age group [12,13]. On the other hand, renal function is also limited in the neonate, making it difficult to manage fluid overload and eliminate waste products, leading to complications in resuscitation and fluid management [12].

The incidence of neonatal and pediatric burns is lower in countries with high income levels thanks to prevention campaigns, improvements in infrastructure, and access to critical care and burn surgery units [14]. Additionally, factors such as low socioeconomic or maternal educational level and delays in medical care aggravate sequelae and complications [15]. Therefore, investment in prevention, safe living conditions, and access to medical care are essential to reduce the global burden of burns [9,16].

Likewise, it is important to integrate pediatricians, plastic surgeons, intensivists, and nursing staff in these cases to optimize treatment, from pain control and infection prevention to functional rehabilitation and emotional support for the family [17-19].

Conclusion

The prevention of these events require a multidisciplinary approach and appropriate, close, and continuous patient monitoring. In this sense, most effective burn prevention programs are based on the education of healthcare personnel and patients regarding safe practices, risk identification, and first aid [20]. It has been demonstrated that these strategies contribute to improving knowledge [21] and, consequently, may reduce the incidence of burns as sentinel events.

Conflict of Interest

Authors reclaim to have no conflict of interest in this article.

Bibliography

1. Valentin A., *et al*. "Patient safety in intensive care: results from the multinational Sentinel Events Evaluation (SEE) study". *Intensive Care Medicine* 32.10 (2006): 1591-1958.

2. Thompson GN. "Lucy Letby case: Lessons for our health system". *Journal of Paediatrics and Child Health* 59.9 (2023): 1015-1016.

3. Altalhi N., *et al*. "Top four types of sentinel events in Saudi Arabia during the period 2016-19". *International Journal for Quality in Health Care* 33.1 (2021): mzab026.

4. Misty Stone. "Experiencias de enfermeras clínicas con eventos Centinela". *Nursing Management* (2019).

5. Garcia JA., *et al*. "Burn injuries among paediatric patients treated at Mexican public hospitals: a retrospective cohort analysis of nationwide hospitalisation data". *BMJ Global Health* 10.3 (2025): e017915.

6. Muntean A., *et al*. "Etiology of neonatal burns: a systematic review". *Annals of Burns and Fire Disasters* 35.3 (2022): 186-193.

7. Allotey G. "Dilemmas of neonatal burn management: A case report". *Burns Open* 3.2 (2019): 62-67.

8. Ligi I., *et al*. "Iatrogenic events in admitted neonates: a prospective cohort study". *The Lancet* 371.9610 (2008): 404-410.

9. Smolle C., *et al*. "Recent trends in burn epidemiology worldwide: A systematic review". *Burns* 43.2 (2017): 249-257.

10. Calder LA., *et al*. "Surgical Fires and Burns: A 5-Year Analysis of Medico-legal Cases". *Journal of Burn Care and Research* 40.6 (2019): 886-892.

11. De Bengy A., *et al*. "Newborn and elderly skin: two fragile skins at higher risk of pressure injury". *Biological Reviews of the Cambridge Philosophical Society* 97.3 (2022): 874-895.

12. Cox SG., *et al*. "Thermal injury within the first 4 months of life". *Burns* 37.5 (2011): 828-834.

13. Purcell LN., *et al*. "Characteristics and predictors of mortality in-hospital mortality following burn injury in infants in a resource-limited setting". *Burns* 48.3 (2022): 602-607.

14. Puthumana J., *et al*. "Global hospital infrastructure and pediatric burns". *Journal of Burn Care and Research* 43.3 (2022): 548-551.

15. Meng F., *et al*. "Pediatric burn contractures in low- and lower middle-income countries: A systematic review of causes and factors affecting outcome". *Burns* 46.5 (2020): 993-1004.

16. Sengoelge M., *et al*. "The global burden of child burn injuries in light of country level economic development and income inequality". *Preventive Medicine Reports* 6 (2017): 115-120.

17. Pérez PA., *et al*. "Third-degree nasal tip burn in a preterm infant treated with amniotic membrane (Case report)". *Burns Open* 10 (2025): 100393.

18. De Rose DU., *et al*. "Staphylococcal infections and neonatal skin: data from literature and suggestions for the clinical management from four challenging patients". *Antibiotics* 12.4 (2023): 632.

19. Saad R., *et al*. "Neonatal epidermolysis bullosa: a clinical practice guideline". *British Journal of Dermatology* 190.5 (2024): 636-656.

20. Price K., *et al*. "Burn injury prevention in low- and middle- income countries: scoping systematic review". *Burns* 9 (2021): tkab037.

21. Rybarczyk MM., *et al*. "Prevention of burn injuries in low- and middle-income countries: A systematic review". *Burns* 42.6 (2016): 1183-1192.

Volume 14 Issue 12 December 2025