



Epidemiological and Clinical Profile of Burn Injuries Linked to Mobile Device Chargers: Experience from a Specialized Burn Unit in Morocco

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Abstract:

Background: Burn injuries related to mobile device chargers are emerging as a concerning cause of domestic accidents, particularly in young populations with prolonged exposure to electronic devices. These injuries may result from thermal or electrical incidents linked to defective or improperly used chargers. **Objectives:** This study aimed to describe the epidemiological and clinical profile of patients with burn injuries caused by mobile device chargers and to highlight potential prevention strategies based on local data from a Moroccan burn unit. **Methods:** We conducted a retrospective, descriptive study over a 26-month period (January 2022 to February 2024) at the Plastic Surgery and Burn Unit of the University Hospital Center (CHU) of Marrakech. All patients admitted for burn injuries related to mobile device chargers were included. Demographic data, injury characteristics, management strategies, and clinical outcomes were analyzed. **Results:** Eight patients were included. The mean age was 27.4 years (range: 1.5–89 years), with a male predominance (sex ratio 1.66). The most common injury mechanism was thermal burn by flame (5 cases), followed by electrical flash burns (3 cases). The average burned surface area was 16.6%, with frequent involvement of the face and upper limbs. Two patients required multiple surgical interventions, and the mortality rate was 22.2%. **Conclusion:** Burns caused by mobile chargers represent a rare but severe domestic hazard. Public awareness, use of certified charging devices, and preventive education are essential to reduce their incidence. Further studies are needed to guide national preventive strategies in similar contexts.

Keywords: Mobile device chargers; Burn injuries; Electrical burns; Domestic accidents; Epidemiology; Morocco.

Review Article

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1. INTRODUCTION

Burn injuries remain a significant cause of morbidity and mortality worldwide, particularly in low- and middle-income countries [1]. While traditionally associated with flames, hot liquids, or electricity, recent years have seen an increase in thermal and electrical burns related to the widespread use of mobile electronic devices [2, 3]. Mobile phone chargers, especially counterfeit or low-quality models, have emerged as an underrecognized source of domestic burn injuries [4].

In many households, chargers are left plugged in for extended periods or used in unsafe environments such as beds or near flammable materials. Such misuse, combined with substandard electrical components, increases the risk of overheating, electric sparks, or even battery explosions. The injuries that result may range from superficial burns to deep tissue damage, often involving sensitive anatomical regions such as the face, neck, and upper limbs [5].

Although media and anecdotal reports have described incidents involving spontaneous mobile phone explosions or charger malfunctions, scientific literature documenting their epidemiology and clinical patterns—particularly in the North African context—remains scarce [6, 7].

The objective of this study was to describe the epidemiological and clinical features of burn injuries caused by mobile device chargers and to highlight the mechanisms of injury and potential preventive strategies, based on data collected from a specialized burn unit in Morocco.

2. METHODS

1) Study Design and Setting

This was a retrospective, descriptive study conducted in the Plastic Surgery and Burn Unit of the University Hospital Center (CHU) Mohammed VI in Marrakech, Morocco. The unit functions as a regional referral center for burn care, serving both urban and rural populations in southern Morocco.

2) Study Period and Population

The study covered a 26-month period, from January 2022 to February 2024. All patients admitted to the unit for burn injuries directly or indirectly caused by mobile device chargers were included.

3) Inclusion Criteria

Patients were included if they had sustained:

- Thermal burns (e.g., flame) or electrical burns (e.g., flash or true contact)
- Injuries clearly associated with the use, presence, or malfunction of mobile phone chargers
- Sufficiently documented medical records

4) Exclusion Criteria

Patients with:

- Burns from other electrical sources not related to phone chargers
- Incomplete clinical records or insufficient documentation were excluded.

5) Data Collection

Patient medical records were reviewed to collect the following data:

- Sociodemographic characteristics (age, sex, residence, socioeconomic level)
- Circumstances of injury (type of charger involved, place of incident, mechanism of injury)
- Clinical data (burn depth and extent, delay of admission, anatomical location)
- Hospital course (length of stay, surgical interventions, complications, outcome)

6) Ethical Considerations

This study was conducted in accordance with institutional ethical standards and the Declaration of Helsinki. As it was a retrospective chart review, formal written consent was not required. Patient anonymity was maintained throughout data handling.

3. RESULTS

1) Incidence

During the study period (January 2022 – February 2024), eight patients with burn injuries related to mobile device chargers were admitted to the Plastic Surgery and Burn Unit at CHU Marrakech. These cases represented a very small fraction of the total burn admissions during this period.

2) Demographics

The mean age of the patients was 27.4 years (range: 1.5–89 years). The sample included five males and three females, yielding a male-to-female ratio of 1.66. Two patients were under 18 years old, including a 1.5-year-old infant; the remaining five were adults.

All patients resided in urban areas. Socioeconomic status ranged from low to middle income. No significant differences were noted in terms of access to healthcare or comorbidities.

3) Circumstances of Injury

All burns were accidental in nature (100%). The injuries occurred predominantly at home (7/8 patients, 87.5%), while one case was work-related (12.5%).

In terms of burn mechanism:

- Thermal burns by flame were the most frequent, observed in 5 patients (62.5%)
- Electrical burns occurred in 3 patients (37.5%), including:
 - 2 cases of flash burns
 - 1 case of true electrical contact burn.



Fig 1: True electrical deep second-degree burn caused by a mobile phone charger

4) Clinical Findings

- The mean time from injury to hospital admission was 7.66 hours (range: 1–30 hours).
- The mean total body surface area (TBSA) burned was 16.66% (range: 7–35%).
- Burn depth distribution:
 - 5 patients had deep second-degree burns
 - 2 patients presented mixed second-degree (superficial and deep) burns
 - 1 patient had only superficial second-degree burns, but with 24% TBSA affected
- Affected body regions included:
 - Face and upper limbs (most frequent)
 - Neck and trunk (in some cases)



Fig 2: Flash electrical burn ranging from superficial to deep second-degree, affecting the face and upper limb

5) Hospital Course and Outcomes

- The average length of hospital stay was 10.33 days.
- Two patients (25%) had hospitalizations exceeding one month due to surgical management.
- Two patients died, resulting in a mortality rate of 22.2%.
- Surgical procedures included debridement and skin grafting. One infant required multiple procedures due to severe sequelae.

4. DISCUSSION

Burn injuries associated with mobile device chargers are an emerging subset of domestic trauma, increasingly observed in parallel with the widespread use of smartphones and electronic accessories. Despite their potential severity, these injuries remain underreported in the scientific literature, particularly in low- and middle-income countries.

In our study, eight patients were admitted over a two-year period for charger-related burns. The average patient was a young adult, with a male predominance—a demographic trend consistent with prior reports linking device-related injuries to higher-risk behaviors and increased exposure [1, 2]. As in other series, the home was the primary setting for injury (87.5%), reinforcing the domestic nature of these incidents [3, 4].

The majority of burns were thermal, caused by flames, while others were electrical, including flash burns and one case of true electrical contact. Similar patterns have been documented in the literature, with incidents resulting from charger overheating, electrical short circuits, or spontaneous lithium-ion battery explosions [5–7]. The case of an infant in our series who sustained deep second-degree burns requiring multiple surgical procedures is consistent with prior case reports describing severe tissue damage linked to device malfunctions [8, 9].

Average total body surface area (TBSA) affected in our patients was 16.66%, with facial and upper limb involvement being most frequent—patterns corroborated in existing case literature [6, 7]. The relatively high mortality rate in our series (22.2%) may be related to delayed hospital admission, injury severity, or age-related vulnerability, particularly in pediatric and elderly patients.

While the technical mechanisms vary—ranging from low-quality manufacturing to user misuse—the underlying risk remains clear: unregulated or prolonged use of mobile device chargers poses a tangible domestic hazard [5, 10]. Several case studies have implicated unauthorized third-party chargers as particularly dangerous, due to poor insulation, overheating, and lack of compliance with electrical safety standards [6, 7].

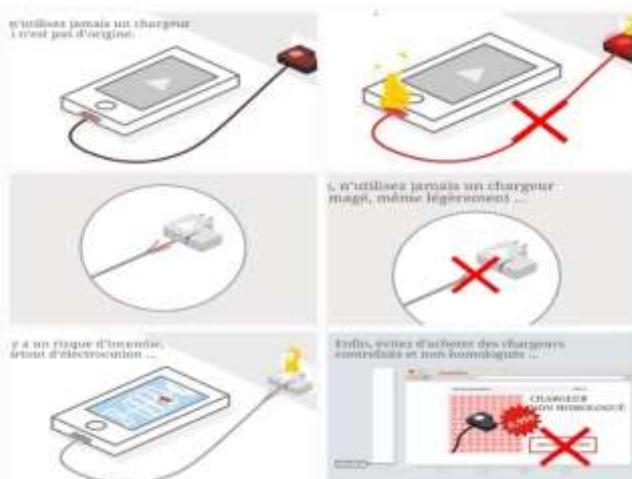


Fig 3: Underlying causes of burn injury related to mobile device chargers



Fig 4: Flame burn caused by a phone charging cable in a 1.5-year-old child, requiring multiple surgical procedures including necrosectomy, skin grafting, and release of burn-related contractures

1) Preventive Strategies

Effective prevention requires a multifaceted approach:

- **Public education:** Campaigns should emphasize the risks of using uncertified chargers and improper charging practices (e.g., overnight use, charging on flammable surfaces).
- **Regulatory enforcement:** Authorities must monitor and restrict the sale of substandard chargers and counterfeit accessories.
- **Clinical awareness:** Health professionals should remain alert to charger-related injuries and document them accurately for epidemiological tracking.
- **Technological innovation:** Manufacturers should integrate overheating prevention features and clearly label safe usage instructions.
- These strategies align with global burn prevention guidelines and are particularly relevant in settings where access to quality-certified devices is limited [1, 11].

2) Study Limitations

The small sample size limits the generalizability of our findings. The retrospective design and reliance on patient records may also have led to underreporting of contextual factors, such as the brand of device or detailed mechanism of injury. Nonetheless, this case series offers valuable insight into an underexplored area of burn epidemiology in North Africa.

3) Future Directions

Multicentric prospective studies with larger cohorts are needed to quantify the burden of charger-related injuries and assess the effectiveness of educational and regulatory interventions. A regional burn injury registry may help capture these emerging patterns more systematically.

5. CONCLUSION

Burn injuries associated with mobile device chargers, although infrequent, represent a serious domestic hazard with potentially severe clinical outcomes. This case series highlights the epidemiological and clinical characteristics of such injuries in a North African setting, emphasizing the vulnerability of both pediatric and adult patients.

Our findings confirm that these injuries are most often accidental, occur at home, and frequently result from unsafe charging practices or low-quality electrical accessories. The anatomical involvement of highly functional and visible areas such as the face and upper limbs further underlines the clinical significance of these events.

Public education on safe device usage, regulation of uncertified chargers, and clinician awareness are critical components in reducing the incidence and severity of such burns. Despite its small sample size, this study contributes to a growing body of evidence calling for targeted preventive strategies and improved surveillance of device-related injuries in emerging regions.

Future multicenter investigations are warranted to assess the broader public health impact of these preventable injuries and to evaluate the effectiveness of preventive interventions at both individual and policy levels.

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