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DOCTORS IN TRAINING

What You Need to Know About: Assessment of Burns and Initial Management

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Abstract

Burns are a significant public health concern, with thousands in the UK requiring treatment annually. Burn assessment and management are complex and require a systematic approach. This study aims to provide an in-depth review of how to evaluate and treat burns to enhance clinical decision-making and ultimately improve patient outcomes. This study explores key aspects of a burn assessment, including key points in the history, examination findings and the classification of the burn depth and total body surface area. It also highlights the Emergency Management of Severe Burn (EMSB) approach and its significance in managing burns, as well as different fluid resuscitation formulas such as Parkland and biological engineering technology (BET). Wound care strategies, indications for surgical and specialist management and additional measurements needed for special burns are also discussed.

Key words: burns; inhalation burns; chemical burns; electric burns; plastic surgery

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Introduction

13,000 burn injuries requiring hospital attention occur every year in England and Wales (Stylianou et al, 2015). Burns have a very high mortality when massive (Walker and Chipp, 2022) and are treated at a substantial cost for the NHS (Hop et al, 2014). Proper assessment of burn injuries is therefore vital and plays a key role in clinical management and directing the patient to the right place.

It is essential to start the assessment with a thorough history. This includes knowing details about the referral prior to the patient's arrival. Clinical examination of patients with burns should follow the Advanced Trauma Life Support (ATLS)/Emergency Management of Severe Burn (EMSB) approach; Airway, Breathing, Circulation, Disability, Exposure, Fluids to ensure that the patient is stable. Assessing the specific burned area then follows. This entails measuring the percentage of total body surface area (TBSA%) burned and the depth of the burn (Thim et al, 2012).

Current approaches to estimating the TBSA% include the Lund and Browder chart and Wallace's Rule of Nines. Recent advancements in digital tools, including the Mersey Burns app, have been developed to improve accuracy in estimating the TBSA%. A comprehensive history and accurate assessment can inform fluid resuscitation, determine surgical needs and predict patient outcomes.

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History Taking

The history taking is a crucial part of the burns assessment. The more information you gather from the history, the more accurate your management will be. Date and time of the burn will give you an idea of how much the burn caused tissue damage. This is because the burn damage is an ongoing process until medical intervention takes place (Jeschke et al, 2020). The place where the burn happened is also important. You should anticipate inhalational injury if there was a flame in a confined space; this is the leading cause of death in burn victims (Antonio et al, 2013). The signs of inhalational injury are singed facial hair (nostrils, eyelashes, eyebrows, and beard) (Foncerrada et al, 2018), hoarseness of voice (Casper et al, 2002), difficulty in breathing (Foncerrada et al, 2018), and decreased level of consciousness or confusion (Walker et al, 2015). This requires immediate anaesthetic review. You must also consider negligence if a child was left in a kitchen (Loos et al, 2022), and safety concerns if the burn happened in a factory or a workplace. The mechanism of the burn and the circumstances are the core part of the history and you must spend more time assessing this. This includes the type of burn (flame, scald, contact to hot object, flash, friction, radiation, chemical, electrical or even frost bite), the duration of exposure, the first action taken to stop the exposure, whether the burned area was covered (e.g., with clothes or gloves) or exposed, how fast clothes were taken off after the burn, what was the first aid commenced; details of water application if done—how long after the injury was it applied, and for how long. The quicker the cooling of the burn, the less the tissue damage is (Żwierełło et al, 2023). You also ask about any associated trauma and if any urgent treatment was given. Then you ask about past medical history (PMHx), medications, allergies, and tetanus status. History taking can be summarised in Fig. 1.

Clinical Examination

According to the ATLS/EMSB approach, the specific clinical examination of the burned area should follow the primary survey. Assessment of the burned area is divided into two key parts: the TBSA% and the depth of burn (Giretzlehner et al, 2021).

It is important to calculate the TBSA% as it is used to determine the amount of resuscitation fluid needed (Ho et al, 2023). The NICE guidelines discuss 3 methods for TBSA% estimation. The most reliable method is the Lund and Browder chart (Murari and Singh, 2019) (Fig. 2), which is available in all accident and emergency departments. Another simple way is the 1% hand rule, in which the patient's own hand (palm and fingers) is considered as 1% of the patient's TBSA% (Dargan et al, 2020). The final method recommended by NICE is Wallace's rule of 9's (García-Ballesteros et al, 2023), which is shown in Fig. 2. The estimations of TBSA% affected based on body part can also be found in NICE guidance, and are displayed in Table 1. Be mindful that erythema does not count towards the burn surface area (Ho et al, 2023). The Mersey Burns Mobile App is also commonly used to estimate the TBSA%. The app can also be used to calculate the fluid prescription needed and has been included in NICE Guidance (Barnes et al, 2015).

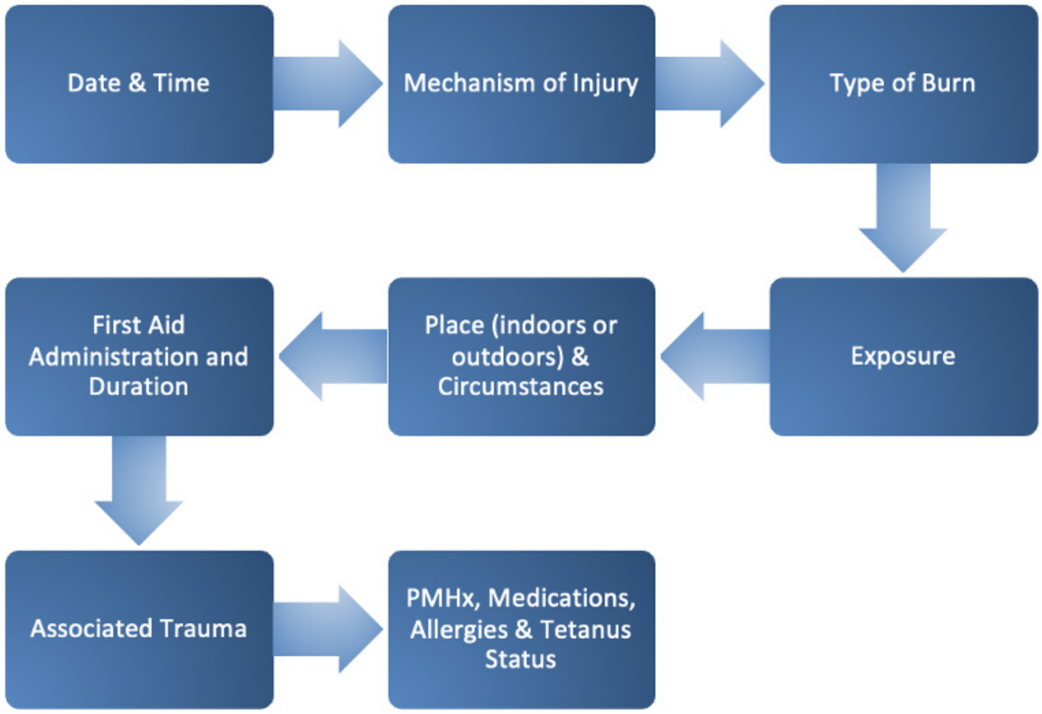


Fig. 1. The depiction of key aspects of a burn history. This flowchart was created using Microsoft Word (version 16, Microsoft Corporation, Redmond, WA, USA). PMHx, past medical history.

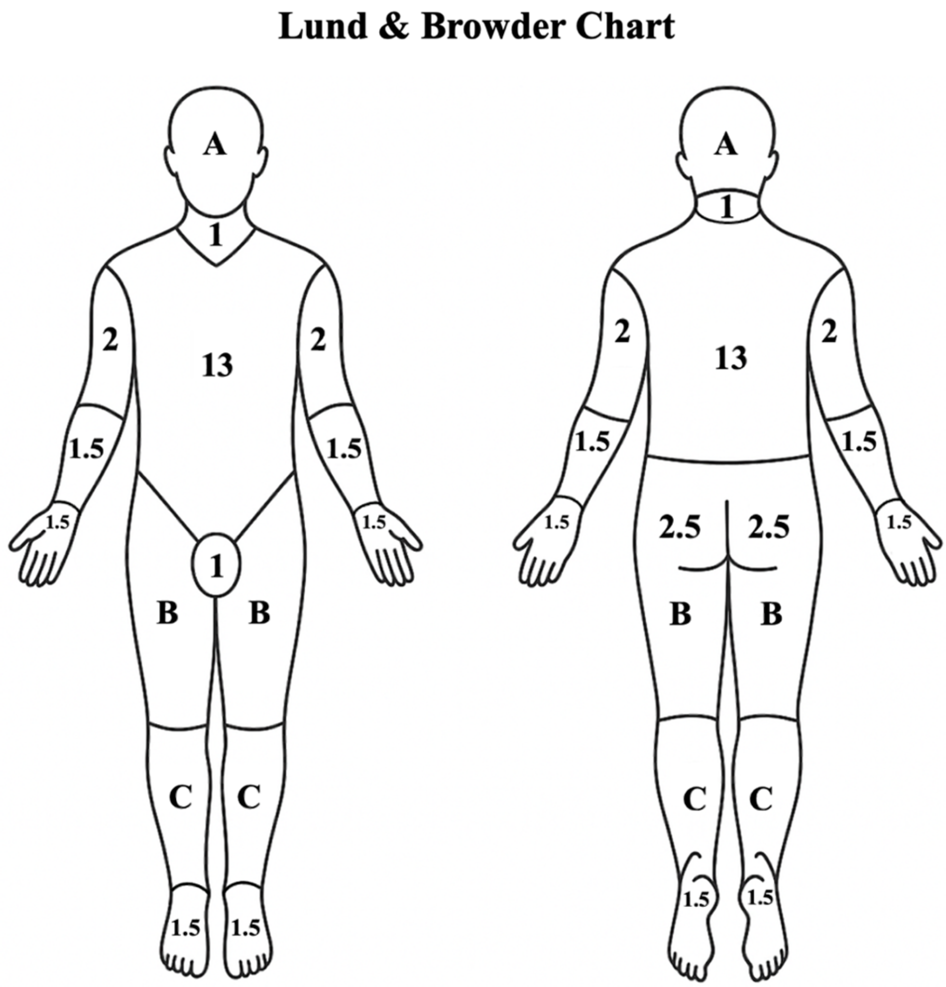
Table 1. An estimation for the TBSA% of the burn based on the body parts affected using Wallace's Rule of Nines.

Body part	Estimated TBSA%
Head & neck	9% in adults, 18% in children
Individual arm	9%
Anterior chest & abdomen	18%
Posterior chest & back	18%
Individual leg	18% in adults, 13.5% in children
Perineum	1%

TBSA%, percentage of total body surface area.

The skin consists of multiple layers: the epidermis, dermis (divided into two, superficial papillary and deep reticular), and hypodermis (the subcutaneous fatty tissue) (Mohamed and Hargest, 2022). Different burn depths require a different magnitude of medical and/or surgical intervention (Żwierełło et al, 2023). It is therefore vital to classify the burn depth. Burn depth is split into four categories: First degree, or superficial, burns involve only the epidermis. Partial, second degree, burns extend into the dermis, and are termed superficial partial or deep partial if they extend into the papillary or reticular layer respectively. Full third degree burns penetrate into the hypodermis and may go even further (Markiewicz-Gospodarek et al, 2022). This is displayed in Fig. 3.

Superficial burns are red and painful but do not blister (Noorbakhsh et al, 2021). They are blanching, which indicates it has adequate blood supply, and will heal on



Age	0	1	5	10	15	Adult
Front or back of:	(%) TBSA					
Head (A)	9.5	8.5	6.5	5.5	4.5	3.5
Thigh (B)	2.75	3.25	4	4.25	4.5	4.75
Leg (C)	2.5	2.5	2.75	3	3.25	3.5

Fig. 2. A Lund & Browder Chart is used to estimate the TBSA%. The figure was adapted from Murari and Singh (2019), available under the Creative Commons Attribution Non-Commercial License (http://creativecommons.org/licenses/by-nc/4.0/).

their own without intervention. Superficial partial thickness burns are very painful and often have blisters (Hermans, 2005). It is also blanching which means that it has a good blood supply enough for spontaneous healing if the appropriate dressing is applied. Deep partial burns are white, waxy, and relatively painless (Radzikowska-Büchner et al, 2023). These burns require burn excision and skin grafting; otherwise, spontaneous healing will cause severe contraction and scarring. Full thickness burns are typically painless, white brown or charred in colour, leathery in texture, and do not blanch. Realistically, most burns are a mixture of all depths. The decision of surgical or conservative management must therefore be made by a senior

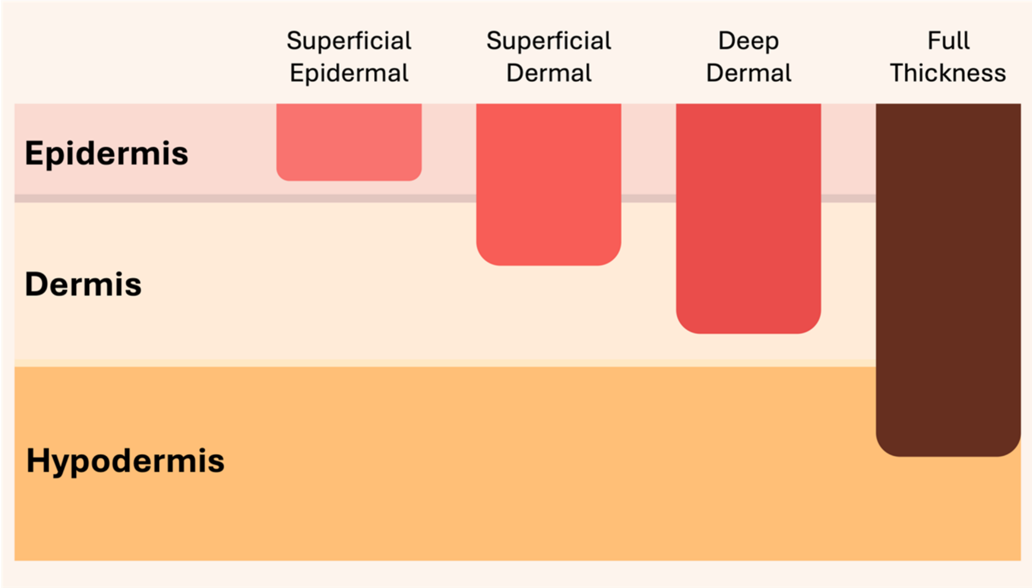


Fig. 3. The layers of the skin invaded in each burn depth classification. The figure was created using Microsoft Word (version 16, Microsoft Corporation, Redmond, WA, USA).

burns specialist. Some units will use laser-Doppler imaging in mixed depth burn injuries to help decide on management (Gill, 2013).

Burns evolve over time and may damage more of the surrounding tissue (Mulder et al, 2022). Understanding Jackson's thermal zones of burn wound (Fig. 4) will allow the burn assessor to appreciate the importance of resuscitating and cooling the burn area. Jackson described 3 different zones: the zone of coagulation, zone of stasis, and zone of hyperaemia. The zone of coagulation represents the point of maximum damage, and where irreversible tissue loss occurs (Hettiaratchy and Dziewulski, 2004). The extent of this zone depends on the temperature and/or concentration of the burning agent as well as the duration of exposure (Żwierełło et al, 2023). The zone of coagulation is surrounded by the zone of stasis. The tissue in the zone of stasis has decreased perfusion and is vulnerable to necrosis if not resuscitated or if subjected to further damage via infection or oedema. The zone of hyperaemia is at the periphery of the burn and will recover unless hypoperfusion is prolonged (Hettiaratchy and Dziewulski, 2004).

New Developments in Burn Assessments

Artificial intelligence has been at the forefront of innovation in plastic surgery (Kiwan et al, 2024), and many studies have now trialed it in burns assessments. An artificial intelligence (AI) powered burn app has been shown to assess burn depth as accurately as laser Doppler imaging. It also showed high accuracy in estimating the TBSA% (Lee et al, 2025). An AI assistant app based on Advanced Burn Life Support protocol has been developed to aid first responders. It ensures collection of critical information for handover and aims to assess the TBSA% and depth of burns, although accuracy in this is variable (Perry et al, 2024). Cocchi et al (2024) studied predictive factors for burn outcomes, and developed a free to use online

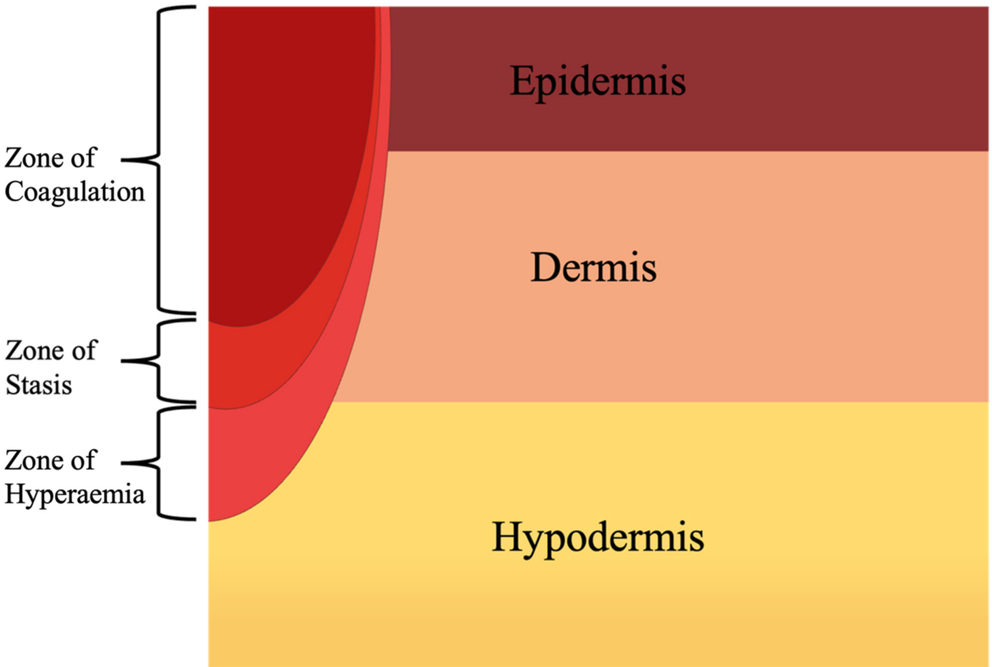


Fig. 4. Jackson's thermal zones provide an understanding of how burns can evolve over time. The figure was created using Microsoft Word (version 16, Microsoft Corporation, Redmond, WA, USA).

tool, burn-scores, to predict odds of survival, ventilation and hospitalization. A study by Rangaiah et al (2025) found a 96.7% accuracy rate in assessing burn depth and TBSA% using Adaptive Complex Independent Components Analysis and deep learning algorithms.

Management

The management starts from the time of clinical assessment during the primary survey of the ATLS/EMSB approach (Gianola et al, 2023). Airway "A" and breathing "B" are the time when inhalational injury is ruled out and/or chest wall escharotomy is needed to allow breathing in severe burns. In exposure "E" and fluids "F", you must calculate the TBSA% and the depth of burn which will determine the amount and type of resuscitation fluids. Once the patient is stable, proper burns dressing is used and a decision of surgical or conservative management will be taken. The airway, breathing, circulation, disability, exposure, fluids and glucose (ABCDEFG) approach is a synchronised approach; while someone is dealing with the airway and breathing (A & B), someone else will be inserting large bore cannulas, withdrawing blood, starting fluid administration and analgesia (C). Others will be checking for other injuries and calculating the TBSA%. A team leader will be orchestrating the process.

Assessing the airway is the first step, especially when inhalational injury is expected from the history (flame in a confined space). Inhalational injury can be divided anatomically into above the vocal cords and below the vocal cords (Sabri et al, 2017). It can also be systemic or part of acute respiratory distress syndrome

(ARDS) (Sabri et al, 2017). The airway above the vocal cords will suffer from a direct thermal injury from inhaling hot steam which can lead to swelling, edema and eventually obstruction (Dries and Endorf, 2013). Below the vocal cords, the injury will be mainly due to chemical reaction to inhaling products of combustion (Gupta et al, 2018). Systemic inhalation injury is related to carbon monoxide (CO) and/or cyanide poisoning which reduces oxygen delivery to tissues (Gupta et al, 2018). In severe burns, the status of hyperemia, inflammation and increased permeability will lead to fluid leaking into the lungs, causing ARDS (Foncerrada et al, 2018). Struggling patients may require emergency tracheostomy (Janik et al, 2021). In case of severe burns around the chest wall, the patient's airway may be clear, but the patient is still struggling to breathe due to the mechanical restriction caused by the circumferential burn preventing the chest wall from expansion (Datta et al, 2022). In this case, the ventilation pressure in an intubated patient on the ventilator will be high (Hess and Kacmarek, 2014) and emergency escharotomy is required to allow chest expansion (Richter and Ragaller, 2011). CO poisoning is treated with hyperbaric oxygen, this drastically drops the CO half-life and improves oxygen delivery to tissues (Zazzeron et al, 2015).

Circulation assessment involves monitoring vital signs as well as administration of analgesia. Vital signs include pulse, blood pressure, respiratory rate, and temperature (some of these may also be measured at other points such as breathing and exposure). Any history of cardiovascular disease should be highlighted at this stage and taken into consideration. In resus, a urinary catheter is inserted at this point to monitor the urine output (Stander and Wallis, 2011). Disability (D) is where the level of consciousness is assessed, Glasgow Coma Scale (GCS), and any neurological deficits are recorded (Bodien et al, 2021).

Exposure (E) is where the burns TBSA% and depth are determined (Chan et al, 2012). Special areas such as face, hands, genitalia, anus and over the joints require more attention. When exposing the patient, it is vital to assess for hypothermia, which has been shown to increase mortality (Savioli et al, 2023).

Fluids (F) needed, as mentioned earlier, are determined by the TBSA%. Burns with a TBSA% of 15% in adults and 10% in children and the elderly require resuscitation with intravenous fluids to compensate for the water loss caused by the burn (Garza, 2009). In children, maintenance fluid is also required in addition to the resuscitation fluids (Haberal et al, 2010). The Parkland's formula is the most widely used method to calculate the amount of fluid needed. The equation is: 3–4 milliliters of Hartmann's solution (Ringer's lactate) $\times$ TBSA% $\times$ body weight in kg to be given over the first 24 hours starting from the time of burn. Half of the amount is given in the first 8 hours and the other half is given over the remaining 16 hours (Bacomo and Chung, 2011). The criticism of this formula is that it can lead to fluid overload, which is known as "fluid creep" (Fodor et al, 2006). Over resuscitation can lead to serious complications such as ARDS, multi-organ failure and compartment syndrome (Vasileiadis et al, 2024).

The biological engineering technology (BET) formula, on the other hand, combines Ringer's lactate and 20% albumin which leads to less fluid administration. It estimates fluid resuscitation as a function of Body Burned Surface Area (BBSA) (mL/h = BBSA (m^2) × 220) starting at a ratio of 1:1 relationship (Ringer's lactate: 20% albumin). The proportion of albumin is decreased every 8 h, and infusion rate is modified according to urinary output (Blanco-Schweizer et al, 2020). The urine output in adults needs to be 0.5–1 mL per kg per hour, while in children it is 1–2 mL per kg per hour. Children need additional maintenance fluid which is calculated as 100 mL/kg for first 10 kg + 50 mL/kg for next 10 kg + 20 mL/kg for each additional kg, given over 24 hours (Meyers, 2024).

Permissive hypotension, also known as hypotensive resuscitation, is a strategy used where blood pressure is intentionally kept lower than normal to avoid complications from excessive fluid resuscitation (Kudo et al, 2017). Permissive hypotension was safe and feasible in children with burns covering 10–20% of their TBSA% (Toma et al, 2024). They can be managed with Biobrane and given 80% maintenance fluids without formal burn resuscitation (Walker et al, 2014).

Blanco-Schweizer et al (2020) found that the BET formula, successfully resuscitated burn patients with less fluid administration. Similarly, Daniels et al (2021) found that a restrictive fluid regime was associated with higher survival compared to the Parkland formula. However, further research is needed to determine the most effective fluid resuscitation formula for burn patients.

The adjuncts (G) include urine output monitoring via catheter and spotting any evidence of myoglobinuria (Schifman and Luevano, 2019). In severe resuscitation burns, gastric ulcers (curling's ulcer) are prevented by intravenous (IV) proton-pump inhibitors and nasogastric tube to allow early gastric feeding (Choi et al, 2015). In case of electric burns, a baseline electrocardiogram is required in low voltage electric burns (Gibran, 2016). It is also needed in high voltage burns if there was cardiac arrest at the scene (Gibran, 2016). Trauma series X-ray is performed at this stage to rule out any associated trauma (Hong and Lee, 2019). In female patients, urine pregnancy test should be done at this stage (Kantonen et al, 2015).

In the secondary survey, AMPLE is a well-known acronym to quickly go through the medical history in emergency (Gianola et al, 2023). It stands for allergies, medications, past medical history, last meal/drink, events at the time of injury. Tetanus status can also be established at this stage (Colombet et al, 2005). Head-to-toe examination is performed and a second look and assessment of the depth of burn to determine what kind of wound care should be provided (Ji et al, 2024). Checking the limb compartments in case of circumferential burns is paramount to avoid missing compartment syndrome (Tillinghast and Gary, 2019).

In case of mild burn which does not require resuscitation, wound care should start immediately by proper cooling of the burned area with running tap water for at least 20 minutes (NHS, 2017). The water temperature should be around 15 degrees Celsius. Cooling using ice or cold water increases tissue damage (Venter et al, 2007). The patient should be under proper analgesia such as morphine for initial wound care and deroofing of blisters (Coletta et al, 2024). It is important to know that the TBSA% may increase as more burned areas are revealed. At this stage, medical photos of the burn and microbiology wound swabs are taken. Antibiotics are not given unless the burn is infected, or the wound swabs are positive (Norbury et al, 2016).

Surgical management of the burn is beyond the scope of this article. However, there is strong evidence that early—within 48 hours—burn excision and skin graft resurfacing improve the overall survival and wound healing outcomes (Saaiq et al, 2012). Zora Janzekovic (2008) was the first surgeon to recommend tangential surgical excision of the burn wound over fascial excision. This method of excision is particularly used in partial thickness burns, as it removes thin layers of burned tissues until healthy bleeding bed is reached, then resurfaced with skin graft (Saaiq et al, 2012). This preserves unburned dermis and minimises wound contraction when compared to fascial excision (Palackic et al, 2022).

In severe burns of 30% TBSA% or more, the body acquires a pathophysiological stress response called hypermetabolic response (Stanojcic et al, 2018). It is characterised by increased blood pressure, heart rate, peripheral insulin resistance, and increased lipid and protein catabolism. This results in increased resting energy expenditure, leading to increased body temperature, total body protein loss, and eventually muscle wasting. This state of catabolism results in a substantial loss of lean body mass and a decline in immune function which subsequently affects wound healing, organ dysfunction, and increases susceptibility to infection (Jeschke et al, 2020).

Treating the hypermetabolic state needs a comprehensive approach: (1) Nutritional support with high protein and carbohydrate diet. Eternal nutrition over parenteral prevents gastric ulceration and avoids bacterial translocation. (2) Pharmacological intervention in the form of β-blockers such as propranolol, as well as anabolic agents such as oxandrolone, which promote muscle protein synthesis. (3) Wound care in the form of early burn excision and resurfacing. (4) Environmental control by maintaining a warm environment and minimising heat loss (Clark et al, 2017).

Special Burns

Facial Burns

When the face gets burned by either flash, flame or chemical burn, the priority is to secure the airway and to perform immediate fluorescein dye eye test to check for corneal abrasions (Lee et al, 2021). Isolated facial burns still require anaesthetic review of the airways even if the patient is talking and breathing normally. Laryngeal oedema and intra-oral swelling usually happen later after facial burns. Ophthalmology review is also mandatory if eyes were involved. This also must happen as soon as possible before the eyelids get swollen and eye examination becomes impossible (Hearne et al, 2018). In terms of wound care, olive oil or paraffin oil is widely used on the face (Lin et al, 2017).

Hand Burns

Burns on the hand require special care. If the burn crosses over the joints, healing may cause contracture scars and subsequent movement limitation and joint stiffness. That is why hand burns require immediate hand physiotherapy input along with proper burns dressing (Fischer and Rai, 2019).

Table 2. The damage mechanism of different types of chemical burns and how they are managed.

Chemical agent	Mechanism of action	Domestic products	Initial management
Hydrochloric acid	Reduction	Cleaning products, steel industry	Tap water irrigation
Sodium hypochlorite	Oxidation	Bleach, laundry or toilet cleaners	Tap water irrigation
Chromic acid	Oxidation	Surface treatment of steel, aluminium and polishing agent of ceramic and metals	Tap water followed by sodium hyposulfite
Hydrofluoric acid	Protoplasmic binding	Cleaning agent in petroleum industry	Tap water followed by Calcium gluconate 10%
Cement (calcium oxide)	Desiccant and alkali	Construction	Tap water irrigation
White phosphorus	Corrosive agent	Fertilizers, fireworks, and military ammunition	Copper sulphate after tap water irrigation
Phenol (carbolic acid)	Corrosive	Antiseptic	Tap water irrigation and polyethylene glycol

Chemical Burns

There are different types of chemicals that cause burns; acidic burns cause coagulative tissue necrosis, while alkaline compounds cause liquefactive necrosis. Organic solutions such as petrol products cause destruction by dissolving the lipid component of the cell membrane and disrupting the cellular protein structure (Akelma and Karahan, 2019). That is why it is crucial to identify the burning agent from the history. The most important aspect of first aid is to remove the offending agent from contact with the patient. This requires removal of all potentially contaminated clothing and copious irrigation (Friedstat et al, 2017). Neutralising agents, however, are not recommended because they cause exothermic reaction where the resulting reaction may liberate large amount of heat causing further thermal injury (Williams and Lee, 2018). If the agent is unknown, check the pH of the burned area and irrigate it with (preferably body temperature) tap water until the pH is neutralised (Palao et al, 2010). In hydrofluoric acid burns, fluoride ions chelate positively charged ions like calcium and magnesium, decreasing these ions' concentrations. Hypocalcaemia and hypomagnesemia cause electrocardiographic changes prolonging the QT interval. That's why it is crucial to neutralize the fluoride ions and prevent systemic toxicity. Calcium gluconate 10% injection into the area of the wound (0.5 mL/cm^2) is the neutralizing agent and should be applied as soon as possible after copious irrigation (Palao et al, 2010). Common chemical agents are described in Table 2.

Electric Burns

Electric burn injuries vary depending on voltage, type of current (alternating or continuous), duration of contact, and pathway of the current through the body (Teodoreanu et al, 2014). The history should identify these factors to be able to manage the case accordingly. Low voltage (less than 1000 volts) usually presents with local contact wound, muscle spasm or tetany. High voltage (more than 100 volts) current transmission presents with cutaneous and deep tissue burns, entrance and exit wounds, internal organ damage, evolving compartment syndrome, and myoglobinuria due to rhabdomyolysis (Ho et al, 2018). This requires more fluid resuscitation while keeping urine output between 1–2 mL/kg/hour. If myoglobinuria is suspected, the priority is to prevent acute renal injury. In addition to IV fluids, Mannitol is the diuretic of choice to reduce intratubular myoglobin deposition. Adding sodium bicarbonate to IV fluids minimises myoglobin breakdown into its nephrotoxic metabolites (Hewitt et al, 2012).

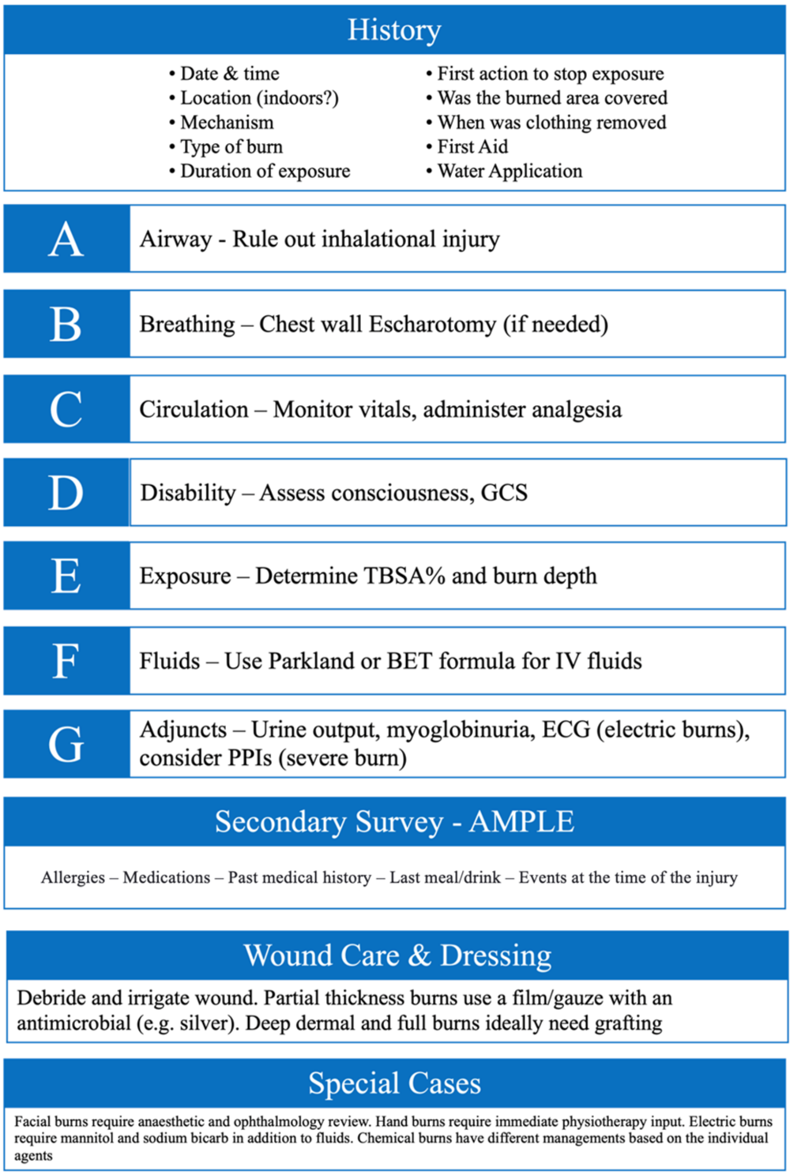


Fig. 5. The key aspects of assessing and managing burns. This figure was created using Microsoft Word (version 16, Microsoft Corporation, Redmond, WA, USA). GCS, Glasgow Coma Scale; BET, biological engineering technology; IV, intravenous; ECG, electrocardiogram; PPI, proton pump inhibitor.

Dressings and Wound Care of Burns

Choosing the right dressing is crucial for proper wound care and healing. The aim of dressing burn wounds is to prevent infection, optimise healing environment, and reduce the chance of scarring (Rowan et al, 2015). There are plenty of options on the market of burns dressing which is out of the scope of this article. Jelonet or Mepitel is generally used in the first 48 hours and applied after debridement and cleaning of the burned area from any dead skin or dirt until the burn is reviewed in a specialized burns unit (Heitzmann et al, 2023). In partial thickness burns, non-adherent film or mesh gauze combined with antimicrobial characteristics such as silver is commonly used for covering burn wounds (Wasiak et al, 2013). In deep dermal and full thickness burns, excision of the burn and resurfacing with skin graft is the ideal management (Hicks et al, 2019). However, this might not always be feasible as some patients may not be fit for surgery. In this case, the wound is relatively dry and needs a kind of dressing that keeps the wound moist to promote healing. Hydrogel dressings are composed mainly of water. They donate water to the wound to help with the autolytic debridement process of dry necrotic burn wounds (da Silva et al, 2016).

Summary Flowchart

The summary flowchart was created by the authors to summarize the information discussed in the text, it can be found as Fig. 5. The flowchart can be used by doctors as a comprehensive burns assessment and management guide.

Conclusion

Accurate assessment and management of burns are crucial in guiding treatment and improving patient outcomes. This study highlights key aspects of taking a burn history, ABCDEFG approach, burn depth classification, wound care and the management of special types of burns. Determining the TBSA% affected is a crucial aspect of a burns assessment and can be done using established methods such as the Lund and Browder chart or with new innovations like the Mersey Burns app. The pathophysiology of burns has also been discussed to provide the reader with an understanding of how burns evolve over time, showing why it is crucial to intervene as soon as possible. By providing an overview of these principles, this article should have equipped the reader with the necessary knowledge and skills to perform a structured and effective burns assessment.

Key Points

- Burn assessment is a critical component of patient management, influencing decisions on fluid resuscitation, surgical intervention and overall treatment plans.
- A structured approach using ATLS/EMSB principles ensures the airway, breathing, circulation and fluid resuscitation are properly managed before assessing burn extent and depth.
- Available methods to estimate the TBSA% include the Lund and Browder chart, Wallace's Rule of Nines and the Mersey Burns App.
- Superficial burns involve only the epidermis, partial burns extend into the dermis and full third-degree burns penetrate into the hypodermis and may go even further.
- Burns should be debrided and irrigated and may require covering with a gauze and antimicrobial (partial thickness) or skin grafting (deep dermal and full thickness).
- Facial burns require anaesthetic and ophthalmology review, hand burns require immediate physiotherapy input, electric burns require mannitol and sodium bicarbonate in addition to fluids and chemical burns have different managements based on the individual agents.

Curriculum Checklist

This article addresses the following requirements of the ISCP plastic surgery and general surgery curricula:

- Burns classification, primary management, and transfer
- Burns resuscitation and critical care
- Burns early surgery
- Burns infection and other complications

Availability of Data and Materials

All data generated or analyzed during this study are included in this published article.

Author Contributions

OK, SH, CE and YH designed the study. OK, SH and YH performed the research. CE and YH provided advice on clinical relevance. All authors contributed to writing and referencing this study. All authors contributed to revising the manuscript critically for important intellectual content. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

Not applicable.

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Conflict of Interest

The authors declare no conflict of interest.

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