BURN MANAGEMENT

World Health Organization

The burn patient has the same priorities as all other trauma patients

Assess:	Considerations:
AIRWAY	Rapid airway compromise
BREATHING	Beware of inhalational injury
CIRCULATION	Fluid replacement
DISABILITY	Compartment Syndrome
EXPOSURE	Percentage area of burn

Burn severity is determined by

- Surface area
- Depth
- Other considerations

Essential Management Points

Stop the burning
ABCDE
Rule of 9s
Obtain good IV access
Early fluid replacement

Morbidity and mortality rises with increasing burned surface area and the patient's age. Even small burns may be fatal in elderly people.

Burns greater than 15% surface area (adult), greater than 10% (child) or any burn occurring in the extremes of age are considered serious

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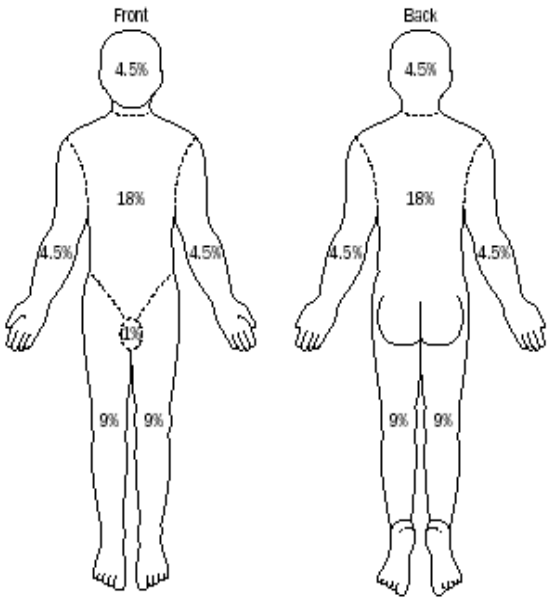
Adults

The Rule of 9s is commonly used to estimate the burned surface area in adults.

The body is divided into anatomical regions that represent 9% (or multiples of 9%) of the total body surface area.

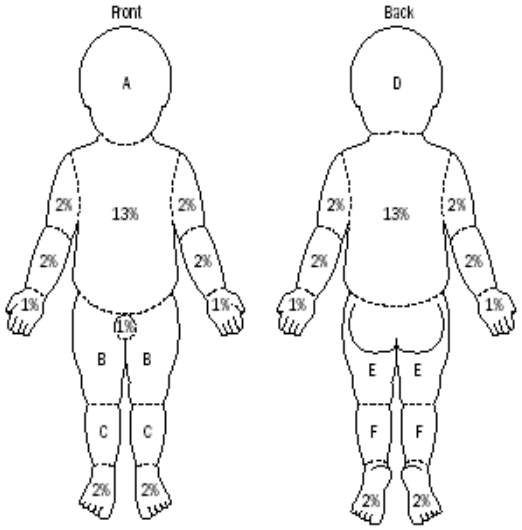
The outstretched palm and fingers approximate to 1%.

If the burned area is small, assess how many times your hand covers the area



Children

The Rule of 9s is modified for infants and children since their heads and lower extremities represent different proportions of body surface area.



Area	By age in years			
	0	1	5	10
Head (A/D)	10%	9%	7%	6%
Thigh (B/E)	3%	3%	4%	5%
Leg (C/F)	2%	3%	3%	3%

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Depth of Burn

It is important to estimate the depth of the burn to assess its severity and to plan future wound care.

Depth of Burn	Appearance	Sensation
First degree	Red Blanches with pressure Dry **No** blisters	Painful
Second degree ***Partial thickness*** - **superficial**	Red Blanches with pressure Moist, weeping Blisters	Painful to temperature and air
Second degree ***Partial thickness*** - **deep**	Variable colour **No** blanching with pressure Wet, waxy or dry Blisters (easily unroofed)	Perceptive of pressure only
Third degree ***Full thickness***	Waxy white, leathery gray, charred or black **No** blanching with pressure Dry, inelastic	Deep pressure only
Fourth degree	As with Third degree, but extends into fascia and/or muscle	Deep pressure

It is common to find all types of burns within the same wound and the depth may change with time, especially if infection occurs.

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Serious burns requiring hospitalization include the following:

- Adult: greater than 15% burn
- Pediatric: greater than 10% burn
- Any burn in the very young, elderly or the infirm
- Any full thickness burn
- Specific regions: face, ears, eyes, hands, feet, perineum
- Circumferential burns
- High-voltage electrical burns
- Inhalational injury
- Associated trauma or significant pre-burn illness, e.g. diabetes

Wound Care

If the patient arrives at the health care facility without first aid given yet, do the following

First Aid
Drench the burn with cool water to prevent further damage
Remove all burned clothing, if easily removable
If burn area is limited, immerse the site in cold water for 30 minutes to reduce pain, edema and tissue damage
If burn area is large, apply clean wraps around the burned area (or the whole patient) to prevent systemic heat loss and hypothermia

Hypothermia is a particular risk in young children.

The first 6 hours following injury are critical; transport the patient with severe burns to a hospital as soon as possible.

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Wound Care

Initially, burns are sterile. Focus the treatment on speedy healing and prevention of infection.

Initial Treatment
In all cases, administer tetanus prophylaxis
Except in very small burns, debride bullae. Excise adherent necrotic (dead) tissue initially and debride all necrotic tissue over the first few days. Gentle scrubbing will remove loose necrotic tissue.
After debridement, gently cleanse the burn with 0.25% (2.5 gm/L) chlorhexidine solution, 0.1% (1 gm/L) cetrimide solution or another mild water-based antiseptic
Do NOT use alcohol-based solutions
Apply a thin layer of antibiotic cream (silver sulfadiazine)
Dress the burn with petroleum gauze and dry gauze thick enough to prevent seepage to the outer layers

Fever is not a useful sign of infection as it may persist until the burn wound is closed.
Cellulitis in the surrounding tissue is a better indicator of infection.

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Daily Treatment

Change the dressing daily (twice daily, if possible) or as often as necessary to prevent seepage through the dressing. Remove any loose tissue with each dressing change.

Inspect the wounds for discoloration or hemorrhage; this could indicate infection.

Give systemic antibiotics in cases of hemolytic streptococcal wound infection or septicemia.
***Pseudomonas aeruginosa* infection often results in septicemia and death. Treat with systemic aminoglycosides.**

Administer topical antibiotic chemotherapy daily. Silver nitrate (0.5% aqueous) is the cheapest, is applied with occlusive dressings but does not penetrate eschar. It depletes electrolytes and stains the local environment.

Use silver sulfadiazine (1% miscible ointment) with a single layer dressing. It has limited eschar penetration and may cause neutropenia.

Mafenide acetate (11% in a miscible ointment) is used without dressings. It penetrates eschar but causes acidosis. Alternating these agents is an appropriate strategy.

Treat burned hands with special care to preserve function.

- Cover the hands with silver sulfadiazine and place them in loose polythene gloves or bags secured at the wrist with a crepe bandage.
- Elevate the hands for the first 48 hours, and then start the patient on hand exercises.
- At least once a day, remove the gloves, bathe the hands, inspect the burn and then reapply silver sulfadiazine and the gloves.

If skin grafting is necessary, consider treatment by a specialist after healthy granulation tissue appears.

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Healing Phase

The depth of the burn and the surface involved influence the duration of the healing phase. Without infection, superficial burns heal rapidly.

Apply split thickness skin grafts to full-thickness burns after wound excision or the appearance of healthy granulation tissue.

Plan to provide long term care to the patient.

Burn scars undergo maturation, at first being red, raised and uncomfortable. They frequently become hypertrophic and form keloids. They flatten, soften and fade with time, but the process is unpredictable and can take up to two years.

In children

The scars cannot expand to keep pace with the growth of the child and may lead to contractures.

Arrange for early surgical release of contractures before they interfere with growth.

Burn scars on the face lead to cosmetic deformity, ectropion and contractures about the lips. Ectropion can lead to exposure keratitis and blindness and lip deformity restricts eating and mouth care.

Consider specialized care for these patients as skin grafting is often not sufficient to correct facial deformity.

Nutrition

Patient's energy and protein requirements will be extremely high due to the catabolism of trauma, heat loss, infection and demands of tissue regeneration. If necessary, feed the patient through a nasogastric tube to ensure an adequate energy intake (up to 6000 kcal a day).

Anemia and malnutrition prevent burn wound healing and result in failure of skin grafts. Eggs and peanut oil are good, locally available supplements.