Burns

Burn depth, TBSA, fluid resuscitation, inhalation injury, special burns and ABA referral criteria for exam review

BURN DEPTH AND FIRST CARE

Fourth degree reaches muscle or bone.

DEPTH	LOOK AND FEEL	HEALING
Superficial (1st)	Red, tender, no blisters	Quickly, no scar
Superficial partial (2nd)	Blisters on a wet pink base; blanches; very painful	1 to 2 weeks; little scarring
Deep partial (2nd)	Pale or blotchy, drier; slow or no blanching; less pain	Over 2 weeks; often grafted
Full thickness (3rd)	White, tan or charred; leathery; no blanching; numb	Excision and grafting

SAFETY Stop the burning; remove rings and jewelry early. Cool small burns under running water for about 20 minutes, never ice. Keep large burns covered, dry and warm.

- Pain: IV opioids, not IM. Tetanus prophylaxis.
- Large burns: expect an NG tube for ileus.

ESTIMATING TBSA

Rule of nines. Count partial and full thickness only, not red unblistered skin.

AREA	ADULT	INFANT
Head and neck	9%	18%
Each arm	9%	9%
Trunk, front or back	18% each	18% each
Each leg	18%	14%
Perineum	1%	Not separate

- Patchy burns: the patient's palm with fingers is about 1%.
- Lund-Browder is most accurate for children.

FLUID RESUSCITATION

- Before TBSA is known (ABLS): LR 125 mL/h (age 5 or under), 250 (6 to 13), 500 (14 and up).
- Adults, 20% TBSA or more: 2 mL × kg × %TBSA (ABLS since 2011, ABA 2024). Parkland's 4 mL is the classic exam formula.
- Children: 3 mL × kg × %TBSA, plus maintenance D5LR if under 30 kg. Electrical: 4 mL.
- Half in the first 8 h from the burn, half over 16 h; titrate hourly to urine output. No boluses unless hypotensive.

PATIENT	URINE OUTPUT GOAL
Adult	0.5 mL/kg/h (about 30 to 50 mL/h)
Child under 30 kg	1 mL/kg/h
Adult, high voltage, dark urine	75 to 100 mL/h until clear

EXAM TIP Count from the burn and subtract fluid already given. 80 kg, 50%, burned 0800, arrives 1000 with 500 mL in: 2 × 80 × 50 = 8,000 mL; half minus 500 = 3,500 mL by 1600, about 583 mL/h (Parkland: about 1,250 mL/h).

SAFETY Fluid creep causes compartment syndromes (abdomen, limbs, eyes) and pulmonary edema. Typical adult ranges for exam study; follow your institution's or agency's protocols.

INHALATION INJURY, CO AND CYANIDE

- Clues: enclosed space, facial burns, singed nasal hair, soot, hoarseness, stridor.
- Edema worsens with fluids: expect early intubation for stridor, voice change, deep face or neck burns; 8.0 tube or larger in adults.
- CO: 100% O2. COHb half-life about 4 to 6 h on room air, 1 h on 100% O2, 20 to 40 min hyperbaric.
- Hyperbaric O2: consider for loss of consciousness, neuro deficits, cardiac ischemia, severe acidosis or COHb over 25%.
- Cyanide (plastics, foam): altered mental status, seizures, hypotension, lactate over 8 mmol/L.
- Hydroxocobalamin 5 g IV over 15 min, may repeat once; own line; red skin and urine. Follow your institution's or agency's protocols.
- Avoid nitrites with CO: methemoglobin worsens hypoxia.

SAFETY SpO2 counts COHb as oxyhemoglobin and can look normal in CO poisoning: check COHb by co-oximetry.

CIRCUMFERENTIAL BURNS AND ESCHAROTOMY

- Limbs: circumferential eschar acts as a tourniquet. Elevate; check Doppler pulses hourly. Fading pulses without hypovolemia call for escharotomy.
- Chest: poor chest rise or rising airway pressures call for chest escharotomy.
- The cut goes through eschar into fat, not fascia. The need usually appears within 48 h.

EXAM TIP Escharotomy frees the skin. Muscle swelling after electrical injury needs fasciotomy.

ELECTRICAL AND CHEMICAL BURNS

- Electrical (high voltage is 1,000 V or more): small skin wounds hide deep muscle damage.
- Monitor ECG: VF or asystole can occur at once. Watch for dark urine (rhabdomyolysis), high potassium, compartment syndrome.
- Lightning: reverse triage. Treat those without pulse or breathing first; many survive.
- Chemical: PPE, remove clothing, brush off powder, flush with water at least 20 minutes after it seems gone. Do not neutralize.
- Alkalis (liquefactive necrosis) penetrate deeper than acids (coagulation). Eyes: irrigate until pH is normal.
- Hydrofluoric acid: pain out of proportion, often delayed. Calcium gluconate gel; watch calcium, magnesium, potassium and QT.

BURN CENTER REFERRAL (ABA)

Immediate consultation, transfer considered:

- Full thickness, any size
- Partial thickness 10% TBSA or more
- Deep partial or full thickness: face, hands, feet, genitalia, perineum, joints
- Inhalation, chemical, high-voltage or lightning injury
- Comorbidities, other trauma, poorly controlled pain
- Children 14 or under, or under 30 kg: all may benefit

Consult for partial thickness under 10%, possibly deep burns, possible inhalation and low-voltage injury.

SAFETY Suspect abuse: immersion scalds with sharp margins, symmetry, glove or stocking pattern and even depth; punched-out cigarette burns.

Sources (19) are listed with links at icubasics.com/sheets/burns.html. For education and exam preparation only. Not medical advice; follow current guidelines and your institution's protocols. ICU Basics is an independent study aid not affiliated with any certifying body.