burn injury

Ruby Riana A
FKUMM

first aid - thermal burn

- Rescuing the victim from the burning premises:
    - STOP and DROP “policy” should be followed.
        - Prevent the victim from running which would only fan the flames and make them burn faster.
            - The victim should be instructed to lie down on the floor with the burning side uppermost.
- The casualty should not be rolled on the ground
- If the victim is unable to walk or is unconscious, make him/her lie supine on floor with both upper limbs placed extended by the side, above the head and then drag the victim out of the room holding his/her legs.

first aid - thermal burn

- Put out the fire in an expeditious manner: Stopping the burning process is mandatory to prevent further damage.
    - The flames should be doused with water. Smouldering clothing should be removed. If water is not available: Any other non-flammable “clear” liquid such as milk, canned drink can be used.
    - The victim should be put on the ground with the burning side uppermost and then wrapped in a heavy cotton cloth (blanket/rug/dari/coat or any other heavy fabric).
    - Fire extinguishers are extremely useful in putting out the fire.
    - Don’t throw/apply mud/sand over the victim’s body to put out the fire.
- Make the victim lie supine. Watch for the response and assess for ABC (Airway, Breathing, Circulation). If there is no response and there are no chest movements, cardiopulmonary resuscitation (CPR) should be instituted urgently.

first aid - thermal burn

- Cooling the burn: The first objective in the burn wound care is to dissipate the heat. The subcutaneous temperature continues to rise for a while even after the heat source has been removed. Thereafter, it takes about 3 minutes for the tissues to return to body temperature

- Immediate active cooling of burn wounds with cool tap water (lavage, soaks, compress or immersion) is effective. Continuous cooling for the first 10 minutes dissipates heat, reduces pain, delays onset and minimises the extent of burn oedema by decreasing the histamine release from the skin mast cells

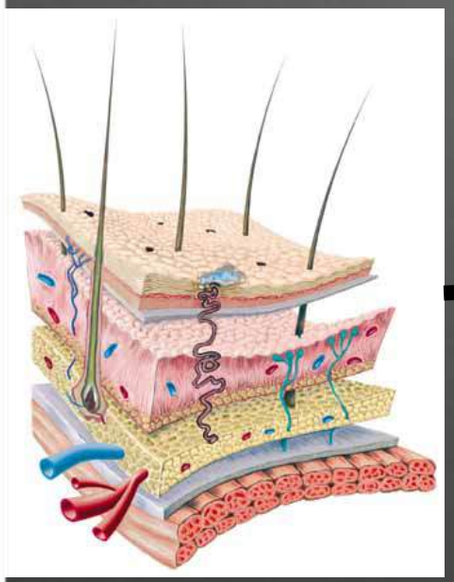
Pembagian

- Berdasarkan kedalaman
- Berdasarkan luas
- Berdasarkan keparahan

Berdasarkan kedalaman

	Partial thickness		
	First degree	Second degree	Full thickness, third degree
Cause	Sun or minor flash	Higher intensity or longer exposure to flash Relatively brief exposure to hot liquids, flames	Higher intensity or longer exposure to flash Longer exposure to flames or "hot" liquids Contact with steam or hot metal High-voltage electricity Chemicals
Color	Bright red	Mottled red	Pearly white Translucent and parchment-like Charred
Surface	Dry No bullae	Moist Bullae present	Dry, leathery, and stiff Remnants of burned skin present Liquefaction of tissue
Sensation	Hyperaesthetic	Pain to pin prick inversely proportional to depth of injury	Surface insensate Deep pressure sense retained
Healing	3–6 days	Time proportional to depth of burns: 10–35 days	Requires grafting

Grade I



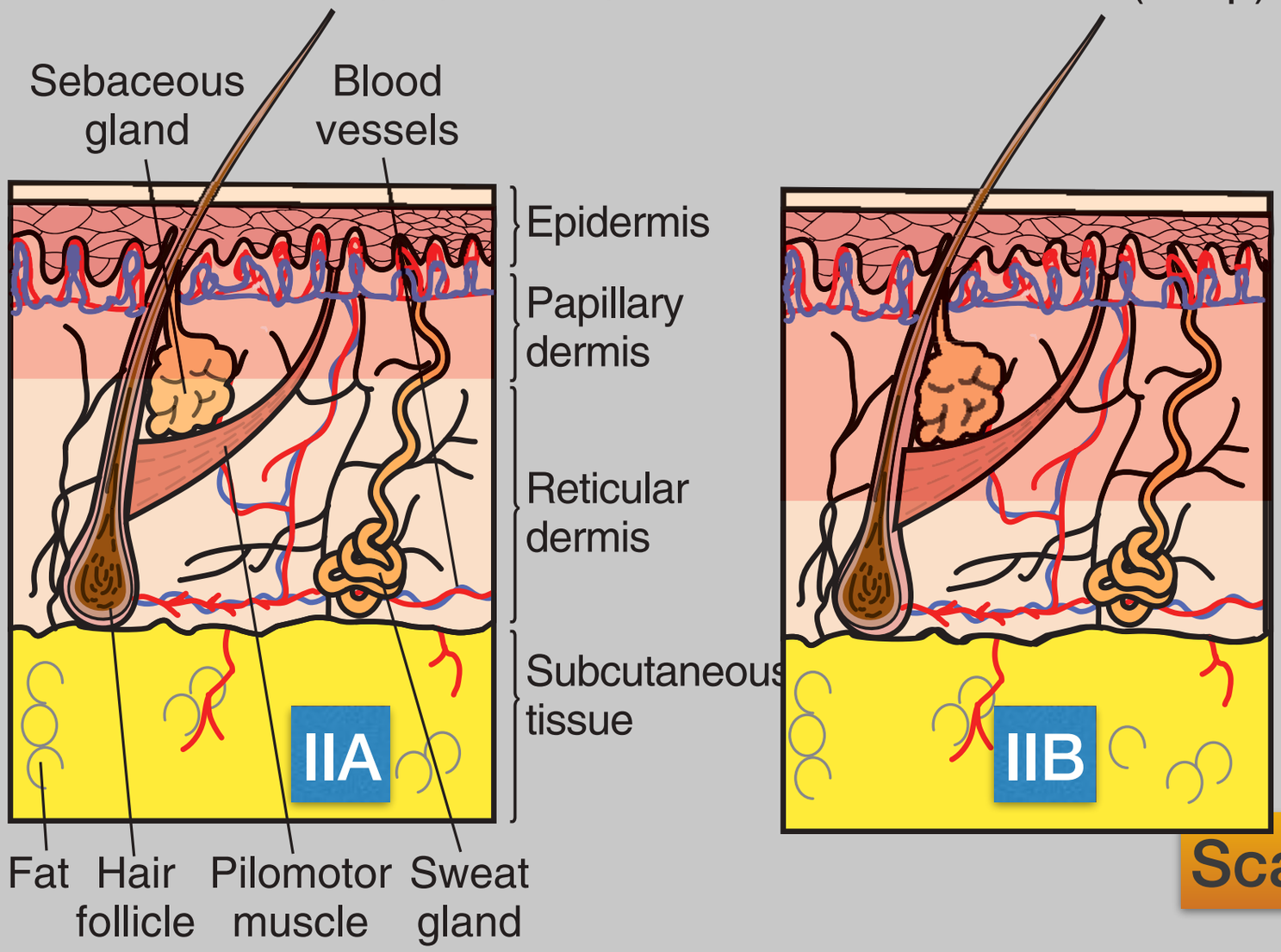
TIDAK DIHITUNG DALAM PERHITUNGAN LUAS LUKA BAKAR

Sunburn

Grade II

Partial thickness (superficial)

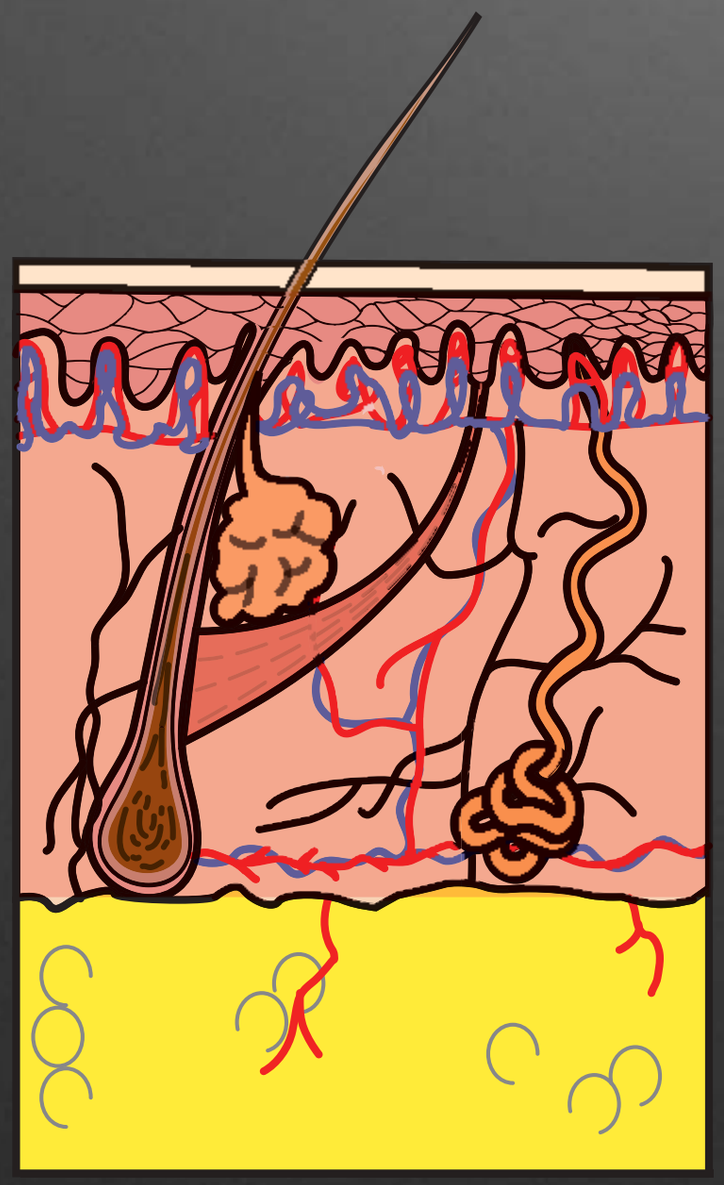
Partial thickness (deep)

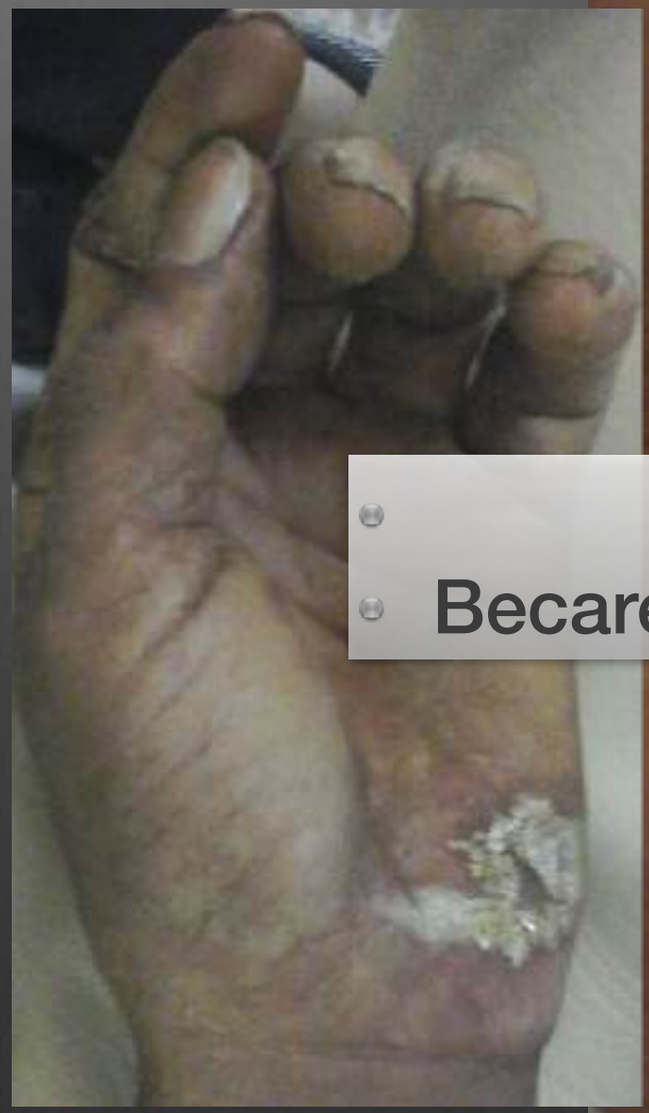


Scald injury=luka bakar air panas

Grade III

Full thickness



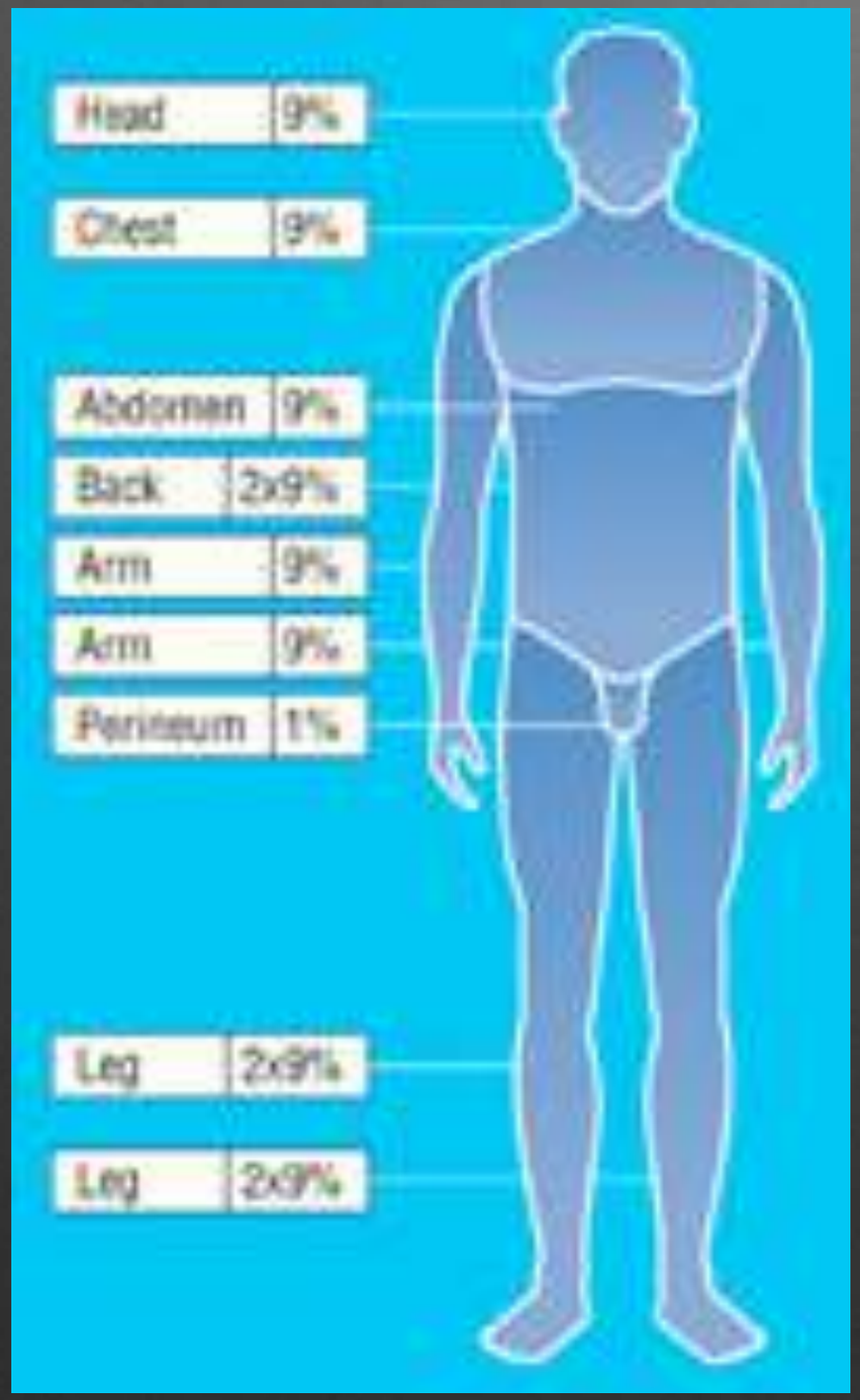


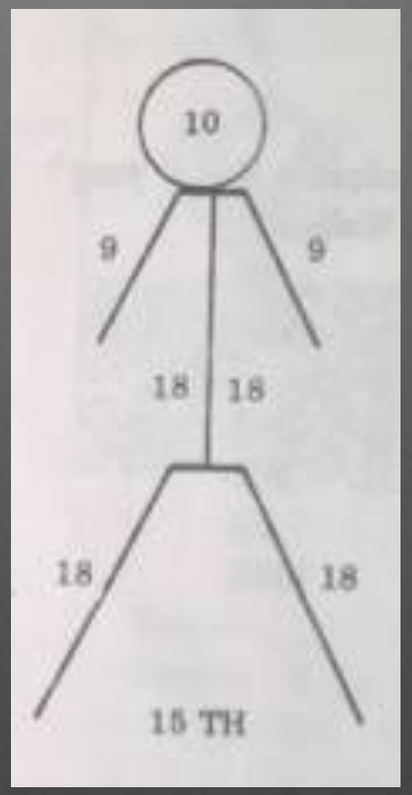
- AC/DC
- Becareful of ARITMIA

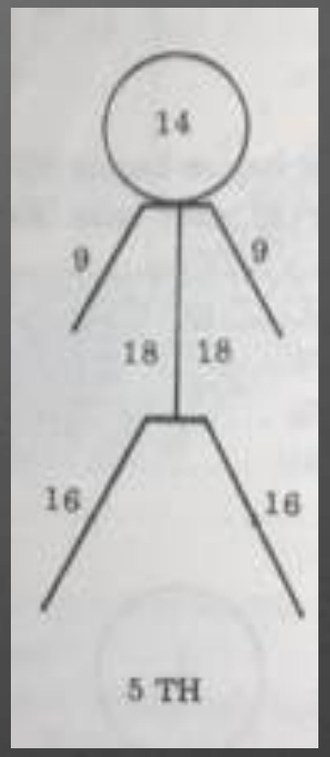
Electric injury

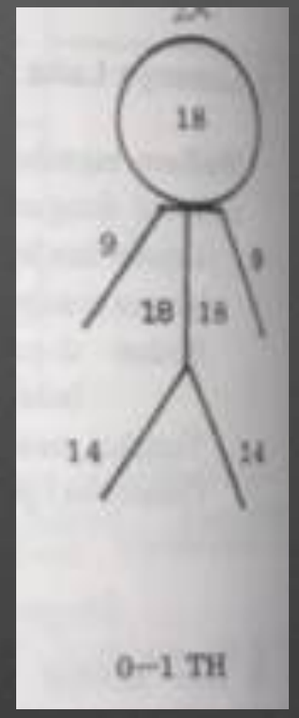
Full thickness circular burn

Berdasarkan luas









Berdasarkan keparahan

- Parah – critical.
  - Tingkat II 30% atau lebih
  - Tingkat III 10% atau lebih
  - Tingkat III pada tangan, kaki, muka
    - Dengan adanya komplikasi pernapasan, jantung, fraktur, soft tissue yang luas.
- Sedang – moderate.
  - Tingkat II 15-30%
  - Tingkat III 5-10%
- Ringan – minor.
  - Tingkat II kurang 15%
  - Tingkat III kurang 1%

Diagnosis

- Combustion grade IIA-B …% (area)

tata laksana

- Primary Survey : ABCDE (include initial assessment and initial tx)
- Secundary Survey ➜ physical examination
- Treatment
  - Intravenous Access ➜ Insert two large-bore intravenous (IV) lines, avoiding burned skin if possible. Central venous access may be needed.

Parkland Formula

- Parkland : hospital. Baxter : the founder

- *First 24 hours:* lactated Ringer's 4 mL/kg/percent burn (rst half given in rst 8 hours, second half given in next 16 hours). Time is measured from the onset time of burn.

- *Second 24 hours:* colloid 0.5 mL/kg/percent burn + 2000 mL of 5% dextrose in water (given over second 24 hours).

Catatan Modifikasi

Resusitasi cairan Baxter (pada LB>20%)
4CC/kg BB/%LB
terhitung dari saat kejadian maka :

8 jam I ➜ ½ (4 cc x kg BB x % LB) RL
16 jam II ➜ ½ (4 ccx kg BB x % LB) RL
(pada jam 18 + 500-1000 cc colloid)
Selesai dalam 24 jam sejak kejadian

Formula resusitasi anak

- Di Surabaya formula Baxter untuk anak dimodifikasi sbb :
  - Replacement 2 c/kgBB/% luka bakar
  - Ditambah Kebutuhan faal
    - Umur sampai 1 tahun 100 cc/kgBB
    - Umur 1-5 tahun 75 cc/kgBB
    - Umur 5-15 tahun 50 cc/kgBB
  - = Total cairan

- Moncrief ➜ 17/20 Kristaloid (RL) + 3/20 Koloid (Dextran) ➜ botol yang sama
- dibagi 2 ➜ dalam 8 jam pertama dan 16 jam berikutnya

- Luka bakar listrik
  - high voltage atau low voltage
  - awasi aritmia
  - menunggu demarkasi jaringan

AMERICAN BURN ASSOCIATION PRACTICE GUIDELINES FOR BURN SHOCK RESUSCITATION

- Guidelines
  - Adults and children with burns greater than 20% TBSA should undergo formal fluid resuscitation using estimates based on body size and surface area burned.
  - Common formulas used to initiate resuscitation estimate a crystalloid need for 2–4 ml/kg body weight/% TBSA during the first 24 hours.
  - Fluid resuscitation, regardless of solution type or estimated need, should be titrated to maintain a urine output of approximately 0.5–1.0 ml/kg/hour in adults and 1.0–1.5 ml/kg/hour in children.
  - Maintenance fluids should be administered to children in addition to their calculated fluid requirements caused by injury.
  - Increased volume requirements can be anticipated in patients with full-thickness injuries, inhalation injury and a delay in resuscitation.

- Options

- The addition of colloid-containing fluid following burn injury, especially after the first 12–24 hours postburn, may decrease the overall fluid requirements.

- Oral resuscitation should be considered in awake and alert patients with moderately sized burns and is worthy of further study.

- Hypertonic saline should be reserved for providers experienced in this approach. Plasma sodium concentrations should be closely monitored to avoid excessive hypernatraemia.

- Administration of high-dose ascorbic acid may decrease the overall fluid requirements, and is worthy of further study.

Fase subakut

- Fase setelah fase resusitasi.
- Rentang waktunya tidak selalu sama tergantung dari
  - Jenis trauma
  - Derajat luka bakar
  - Keadaan umum pasien
- Komplikasi pada fase ini meliputi; SIRS, infeksi, sepsis, MODS

prinsip penanganan fase subakut

- Supportif sistemik, meliputi
  - Respiratory maintenance
  - Keseimbangan cairan dan elektrolit
  - Nutrisi
- Wound care management
  - Management Bakterial
  - Management jaringan nekrotik
  - Skin coverage management

respiratory maintenance

- Improve airway clearance; artifisial, pengenceran dahak, terapi batuk, chest physical theraphy, bronchial washing
- Oksigenasi; nasal, masker, jacksen rees, ventilator.
- Improve respiratory muscle

KESEIMBANGAN CAIRAN DAN ELEKTROLIT

- **Total cairan tubuh~60% BB**
  1. ICF 2/3TBW
  2. ECF 1/3 TBW
     - Intravascular ¼
     - intertitial 3/4

prinsip penatalaksanaan cairan

- Keseimbangan Cairan
  - input = output
  - output = sensible + insensible water lost
  - Evaporative water lost in mL/hour : [25 + % of TBS burned] x TBS in m^2
- albumin (>2,5g/dL)
- Monitor nadi dan tekanan darah
- Monitor electrolit dan keseimbangan asam-basa
- Hct~ 30-40%
- CVP di pertahankan 7 – 12 cm H2O
- Mempertahankan produksi urine
  - Dewasa 0,5-1 mL/kg/h
  - Anak 1-2 mL/kg/h

contoh

- Laki-laki 20 tahun dengan luka bakar 40%. Berat 50 kg, tinggi 160 cm, hari kedua post baxter resuscitation.

Berapa cairan yang dibutuhkan?

Keb fisiologis 30cc x 50 = 1500 cc

IWL / 24 jam (25 + 40) x TBS x 24 = 2350 cc

Total 3850 cc

electrolyte imbalance

- Na 130-145mmol/L
  2-4 meq /kg/d
  Na defisit : (0,6 x bw) x (130 – current Na) mmol Na
  3% Nacl/L : 513 mmol
  0,9% Nacl/L : 154 mmol

- K 3,5 – 5,0 mmol/L
  1-2 meq/kg/d

- Hypokalemia
  - 7,45% Kcl : 1 meq
  - 20-40 meq/h diluted in 100-200 NS
  - given in 3-4 h, at rate 10 meq/h
- Hyperkalemia
  - Ca glukonas, D40, and insulin

nutrisi

- Prinsip pemberian nutrisi
- "Go Slow"
- Memperkirakan kebutuhan kalori
- Memperkirakan kebutuhan protein
- Memperkirakan kebutuhan lemak
- Memperkirakan kebutuhan cairan

kebutuhan kalori

- Sutherland (1959)
  Dewasa 20 kcal/kgBB + (70 kcal x luas LB)
  Anak 60 kcal/kgBB + (35 kcal x luas LB)

Curreri (1974)
25 kcal/kgBB + (40 kcal x luas LB)

Perhitungan berdasarkan BMR dari Harris-Benedict (1919)

- TEE = Predicted BMR X injury factor X activity factor
  Injury factor = 1 + [32+ (0,3x%burn) – (0,4 x day post burn)]
  100
  LB 0 - 20% 1 - 1,5
  LB 20-40% 1,5 - 1,8
  LB >40% 1,8 – 2

  Activity factor 1,25
  BMR
  Male: 66 + (13,7 x WT) + (5 x HT) – (6,8 x age)
  Female: 66 + (9,6 x WT) + (1,7 x HT) – (4,7 x age)

contoh

- Laki-laki 63 th combus 20%. BB =75 kg, TB = 170 cm, berapa kira-kira kalori yang dibutuhkan?

BMR = 1500

TEE = BMR x 1,5 x 1,25

= 2700 kcal

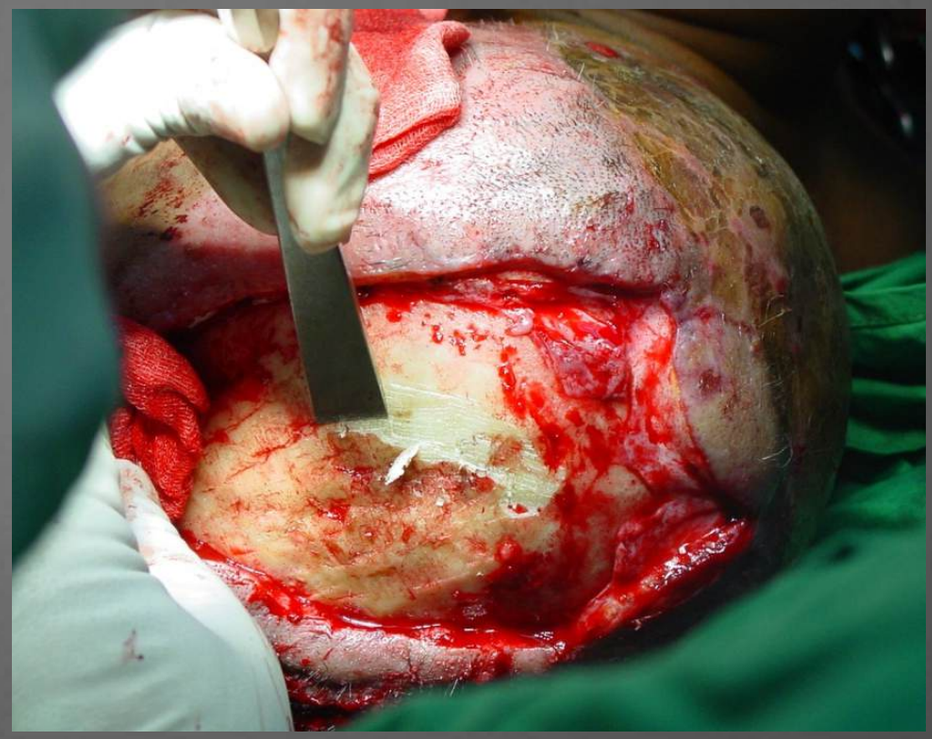
wound care

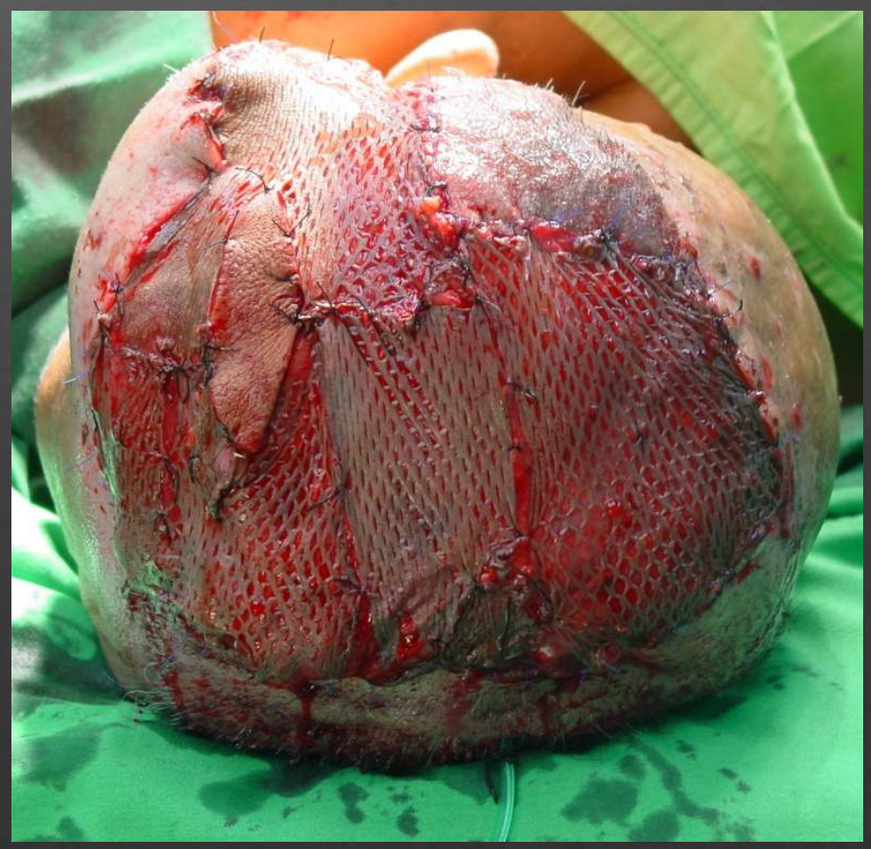
- Manajemen eksudat dan bakteri
  - Mandi/cuci luka 3-7 hari sekali (tergantung kondisi luka)
  - Antibiotik Topical, SSD
  - Antibiotik sistemik sesuai kultur
  - Absorben dressing

Management nekrotik
  - Tangensial eksisi
  - autolitik atau enzimatik debridement

skin coverage

- Self epitelization
  - Skin Grafting, bisa sebelum 4 hari atau setelah 2 minggu
  - Kultur kulit
  - Flap





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T31 Burns classified according to extent of body surface involved
T31.0 Burns involving less than 10% of body surface
T31.1 Burns involving 10-19% of body surface
T31.10 ..... with 0% to 9% third degree burns
T31.11 ..... with 10-19% third degree burns
T31.2 Burns involving 20-29% of body surface
T31.20 ..... with 0% to 9% third degree burns
T31.21 ..... with 10-19% third degree burns
T31.22 ..... with 20-29% third degree burns
T31.3 Burns involving 30-39% of body surface
T31.30 ..... with 0% to 9% third degree burns
T31.31 ..... with 10-19% third degree burns
T31.32 ..... with 20-29% third degree burns
T31.33 ..... with 30-39% third degree burns
T31.4 Burns involving 40-49% of body surface
T31.40 ..... with 0% to 9% third degree burns
T31.41 ..... with 10-19% third degree burns
T31.42 ..... with 20-29% third degree burns
T31.43 ..... with 30-39% third degree burns
T31.44 ..... with 40-49% third degree burns
T31.5 Burns involving 50-59% of body surface
T31.50 ..... with 0% to 9% third degree burns
T31.51 ..... with 10-19% third degree burns
T31.52 ..... with 20-29% third degree burns
T31.53 ..... with 30-39% third degree burns
T31.54 ..... with 40-49% third degree burns
T31.55 ..... with 50-59% third degree burns
T31.6 Burns involving 60-69% of body surface
T31.60 ..... with 0% to 9% third degree burns
T31.61 ..... with 10-19% third degree burns
T31.62 ..... with 20-29% third degree burns
T31.63 ..... with 30-39% third degree burns
T31.64 ..... with 40-49% third degree burns
T31.65 ..... with 50-59% third degree burns
T31.66 ..... with 60-69% third degree burns
T31.7 Burns involving 70-79% of body surface
T31.70 ..... with 0% to 9% third degree burns
T31.71 ..... with 10-19% third degree burns
T31.72 ..... with 20-29% third degree burns
T31.73 ..... with 30-39% third degree burns
T31.74 ..... with 40-49% third degree burns
T31.75 ..... with 50-59% third degree burns
T31.76 ..... with 60-69% third degree burns
T31.77 ..... with 70-79% third degree burns
T31.8 Burns involving 80-89% of body surface
T31.80 ..... with 0% to 9% third degree burns
T31.81 ..... with 10-19% third degree burns
T31.82 ..... with 20-29% third degree burns
T31.83 ..... with 30-39% third degree burns
T31.84 ..... with 40-49% third degree burns
T31.85 ..... with 50-59% third degree burns
T31.86 ..... with 60-69% third degree burns
T31.87 ..... with 70-79% third degree burns
T31.88 ..... with 80-89% third degree burns
T31.9 Burns involving 90% or more of body surface
T31.90 ..... with 0% to 9% third degree burns
T31.91 ..... with 10-19% third degree burns
T31.92 ..... with 20-29% third degree burns
T31.93 ..... with 30-39% third degree burns
T31.94 ..... with 40-49% third degree burns
T31.95 ..... with 50-59% third degree burns
T31.96 ..... with 60-69% third degree burns
T31.97 ..... with 70-79% third degree burns
T31.98 ..... with 80-89% third degree burns
T31.99 ..... with 90% or more third degree burns

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The efficacy of aloe vera used for burn wound healing: A systematic review

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ABSTRACT

Aloe vera has been traditionally used for burn healing but clinical evidence remains unclear. We conducted a systematic review to determine the efficacy of topical aloe vera for the treatment of burn wounds. We electronically searched relevant studies in MEDLINE, CINAHL, Cochrane Library, HealthSTAR, DARE, South East Asia Database, Chinese Databases, and several Thai local Databases (1918–June 2004). Only controlled clinical trials for burn healing were included. There were no restrictions on any language of publication. Two reviewers independently extracted data on study characteristics, patient characteristics, intervention, and outcome measure.

Four studies with a total of 371 patients were included in this review. Based on a meta-analysis using duration of wound healing as an outcome measure, the summary weighted mean difference in healing time of the aloe vera group was 8.79 days shorter than those in the control group ($P = 0.006$). Due to the differences of products and outcome measures, there is paucity to draw a specific conclusion regarding the effect of aloe vera for burn wound healing. However, cumulative evidence tends to support that aloe vera might be an effective interventions used in burn wound healing for first to second degree burns. Further, well-designed trials with sufficient details of the contents of aloe vera products should be carried out to determine the effectiveness of aloe vera.

THANK YOU