قال تعالى: ﴿ وَ اللَّهُ يَدْعُو إِلَىٰ دَارِ السَّلَامِ وَ يَهْدِي مَن يَشَاءُ إِلَىٰ صِرَاطٍ مُّسْتَقِيمٍ (25) ﴾ {يونس}

BURNS:

MANAGEMENT

Ehab Abdulkader, MD.

Lecturer of General Surgery,

School of Medicine, Helwan University.

Cairo, March, 2022.

“For the things we have to learn before we can do them, we learn by doing them”

Aristotle (384- 322 BC)

OBJECTIVES

- Overview.
- Classification.
- Pathophysiology.
- Management.
- Complications.

OVERVIEW

MAGNITUDE OF THE PROBLEM

- **Mortality:**

- Fire- related burns are responsible for 300 000 deaths in the world annually, the majority of which (96%) occurred in developing countries.

MAGNITUDE OF THE PROBLEM

- **Morbidity:**
- Each year 1.5 million burn injuries occur in the United States, resulting in 50 000 hospitalizations.

- **Global burden of disease:**
- Fire- related burns ranked ninth among the leading causes of global burden of disease (based on deaths and disability) among children aged 5-14 years.

MAGNITUDE OF THE PROBLEM

- **Who is affected?**

- Age.
- Sex.
- Geographical distribution.

MAGNITUDE OF THE PROBLEM

- **Where ?**

- Domestic.
- Workplace.

MAGNITUDE OF THE PROBLEM

- **Risk factors:**

- Alcohol and smoking
- Local cultural practices
- Socioeconomic status
- Gender inequality
- Violence
- Epilepsy

CLASSIFICATION

CLASSIFICATION

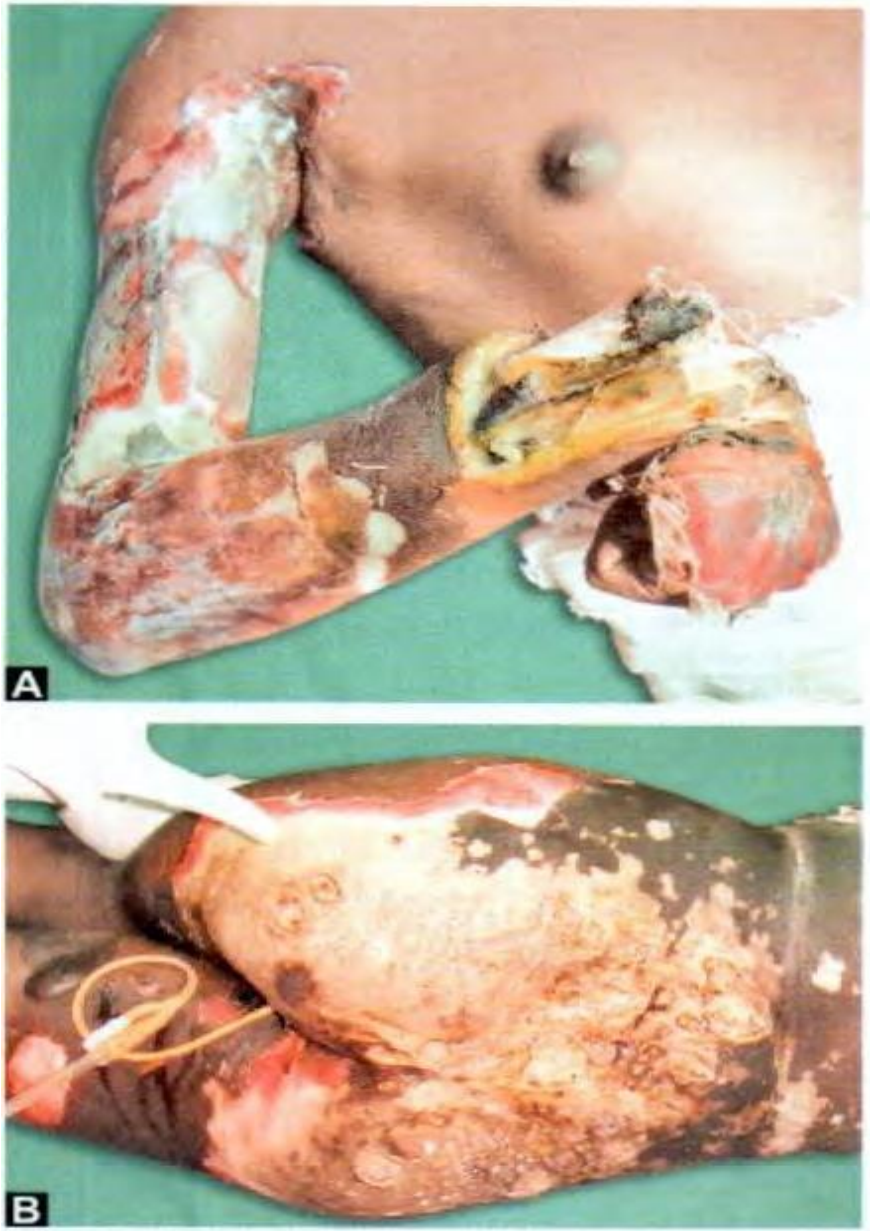
- **Etiological classification:**

- Thermal injury.
  - Scald- spillage of hot liquids.
  - Flame burns.
  - Flash burns due to exposure of natural gas, alcohol, combustible liquids.
  - Contact burns- contact with hot metals/objects/materials.
  - Inhalation, (irritation, or toxin).

CLASSIFICATION

- **Etiological classification:**

- Electrical injury.
- Chemical burns- acid/ alkali.
- Cold injury-frost bite.
- Ionizing radiation.
- Sun burns.


A
B

CLASSIFICATION

- **Based on the percentage of burns (Burn Severity Classification):**

- Mild (minor):
  - Partial thickness burns <15% in adult or <10% in children.
  - Full thickness burns less than 2%.
  - Can be treated on outpatient basis.

CLASSIFICATION

- **Based on the percentage of burns (Burn Severity Classification):**

- Moderate:
  - Second degree of 15- 25% burns (10-20% in children).
  - Third degree between 2-10% burns.
  - Burns which are not involving eyes, ears, face, hand, feet, perineum.

CLASSIFICATION

- **Based on the percentage of burns (Burn Severity Classification):**

- Severe (major):
  - Second degree burns more than 20% in adults, more than 10% in children.
  - All third degree burns of 10% or more.
  - Burns involving eyes, ears, feet, hands, perineum.
  - All inhalation and electrical burns.
  - Burns with fractures or major mechanical trauma.

CLASSIFICATION

- **Based on thickness of skin involved:**

- **First degree:**
  - The epidermis looks red and painful, no blisters, heals rapidly in 5- 7 days by epithelialization without scarring.
  - It shows capillary filling.

CLASSIFICATION

- **Based on thickness of skin involved:**

- **Second degree:**
  - The affected area is mottled, red, painful, with blisters, heals by epithelialization in 14- 21 days.
  - Superficial second degree burn heals, causing pigmentation (hypo or hyper).
  - Deep second degree burn heals by causing scarring, and pigmentation.
  - Sensation is present, no blanching.


alamy
Image ID: A02GA1
www.alamy.com

CLASSIFICATION

- **Based on thickness of skin involved:**

- **Third degree:**
  - The affected area is charred, parchment like, painless and insensitive, with thrombosis of superficial vessels.
  - It requires grafting.
  - Charred, denatured , insensitive, contracted full thickness burn is called as eschar.

CLASSIFICATION

- **Based on thickness of skin involved:**

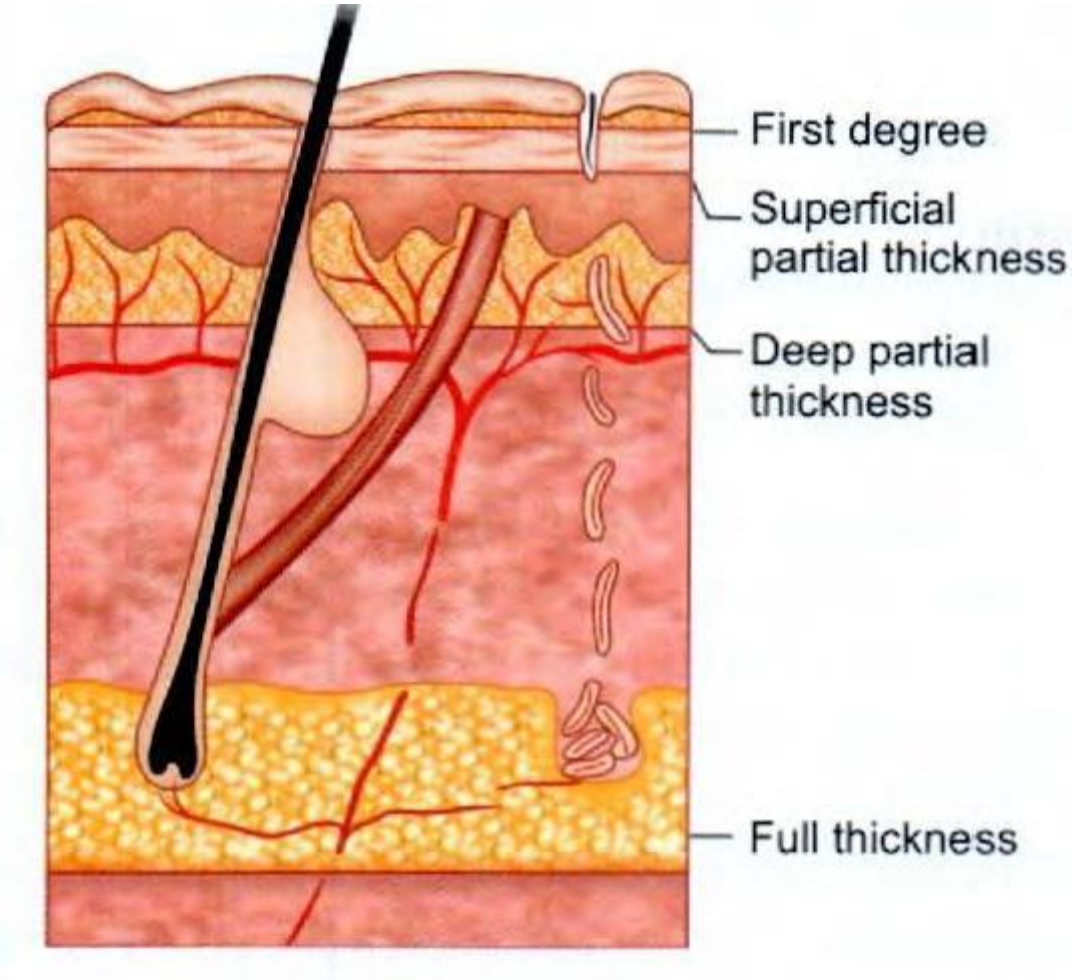
- **Fourth degree:**
  - Involves the underlying tissues- muscles, bones.

CLASSIFICATION

- **Based on thickness of skin involved:**

- Partial thickness burns: (first or second degree).

- Full thickness burns: (third or fourth degree).

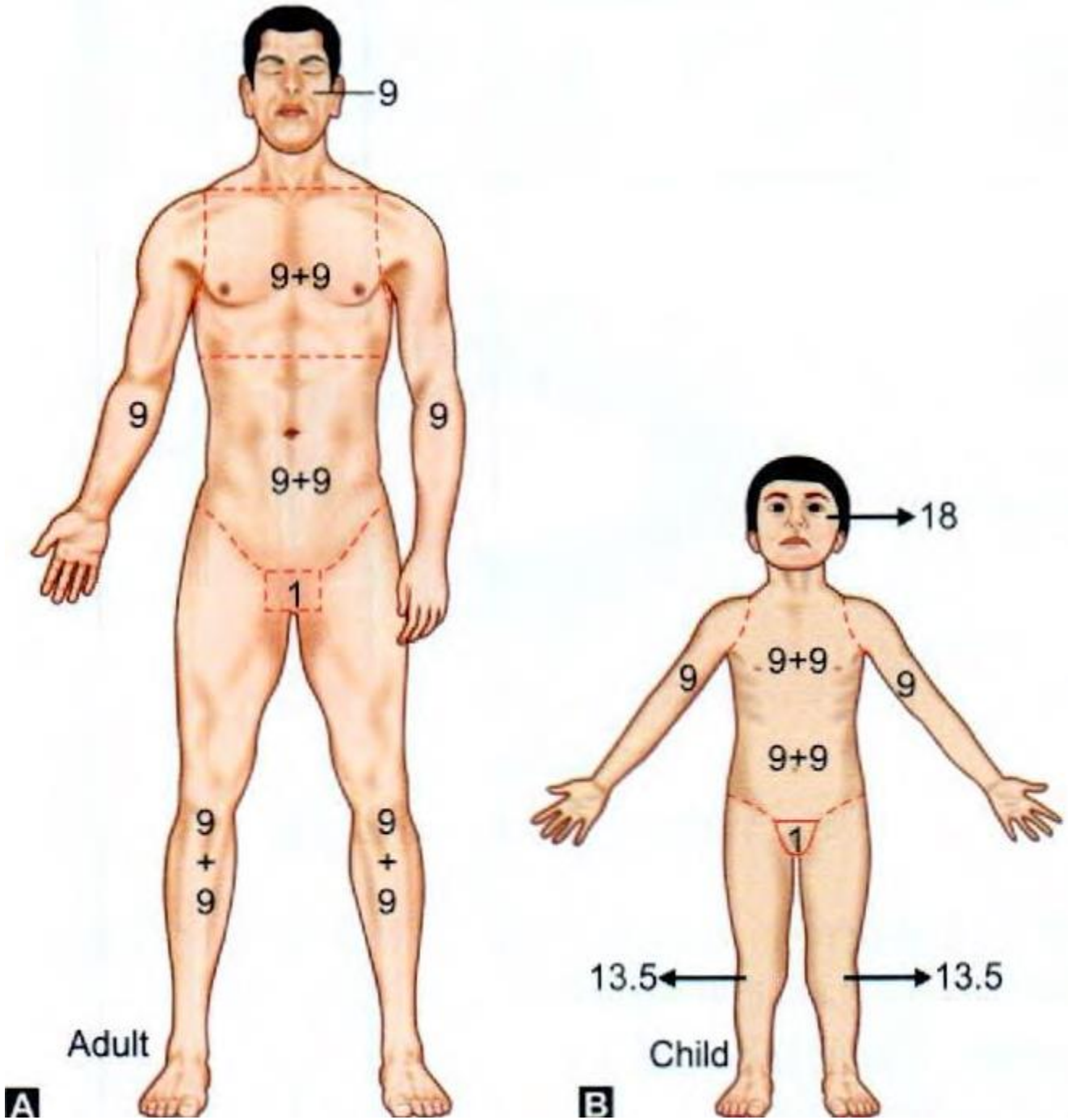

First degree
Superficial partial thickness
Deep partial thickness
Full thickness

CLASSIFICATION

- **Pathological classification, (TBSA %):**

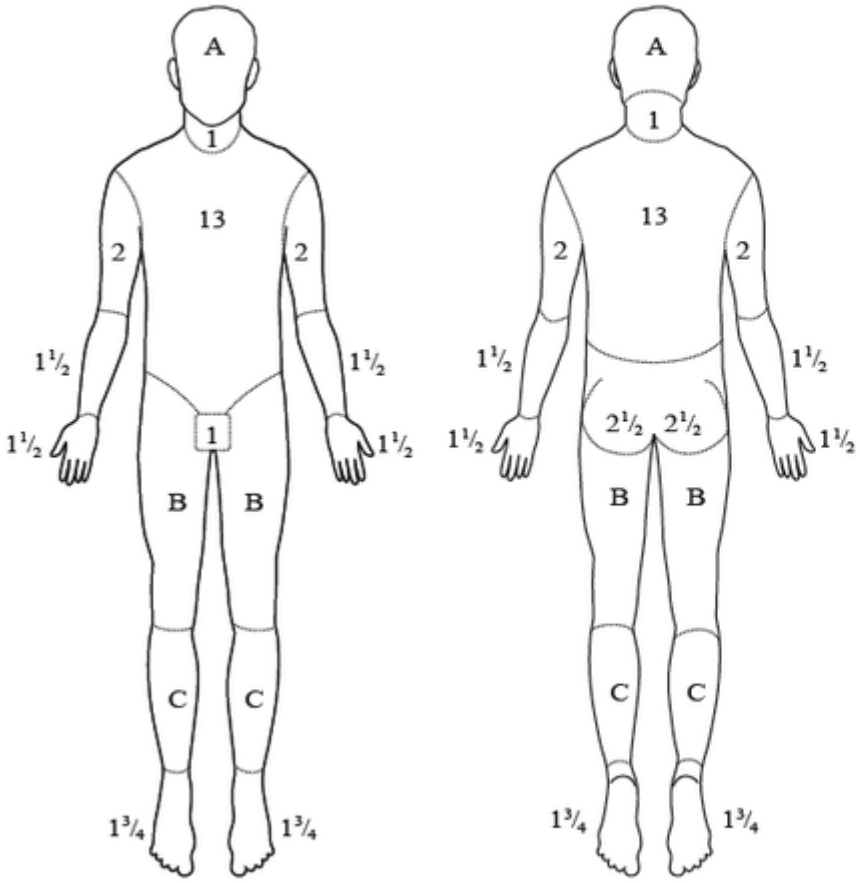
T Rule of Nine (Wallace's rule of "9") 1951

	Adults	*Children*	*Infants*
Head and neck	9%	18%	20%
Front of chest and abdominal wall	9 × 2 = 18%	18%	10 × 2 = 20%
Back of chest and abdominal wall	9 × 2 = 18%	18%	10 × 2 = 20%
Lower limb	18 × 2 = 36%	13.5 × 2 = 27%	10 × 2 = 20%
Upper limb	9 × 2 = 18%	18%	10 × 2 = 20%
Perineum	01%	01%	
	100%	**100%**	**100%**


9
9+9
9
9
9+9
1
9
+
9
9
+
9
Adult
A
18
9
9+9
9
9+9
1
13.5
13.5
Child
B

Therapeutic Guidelines

Lund and Browder chart for calculating the percentage of total body surface area burnt

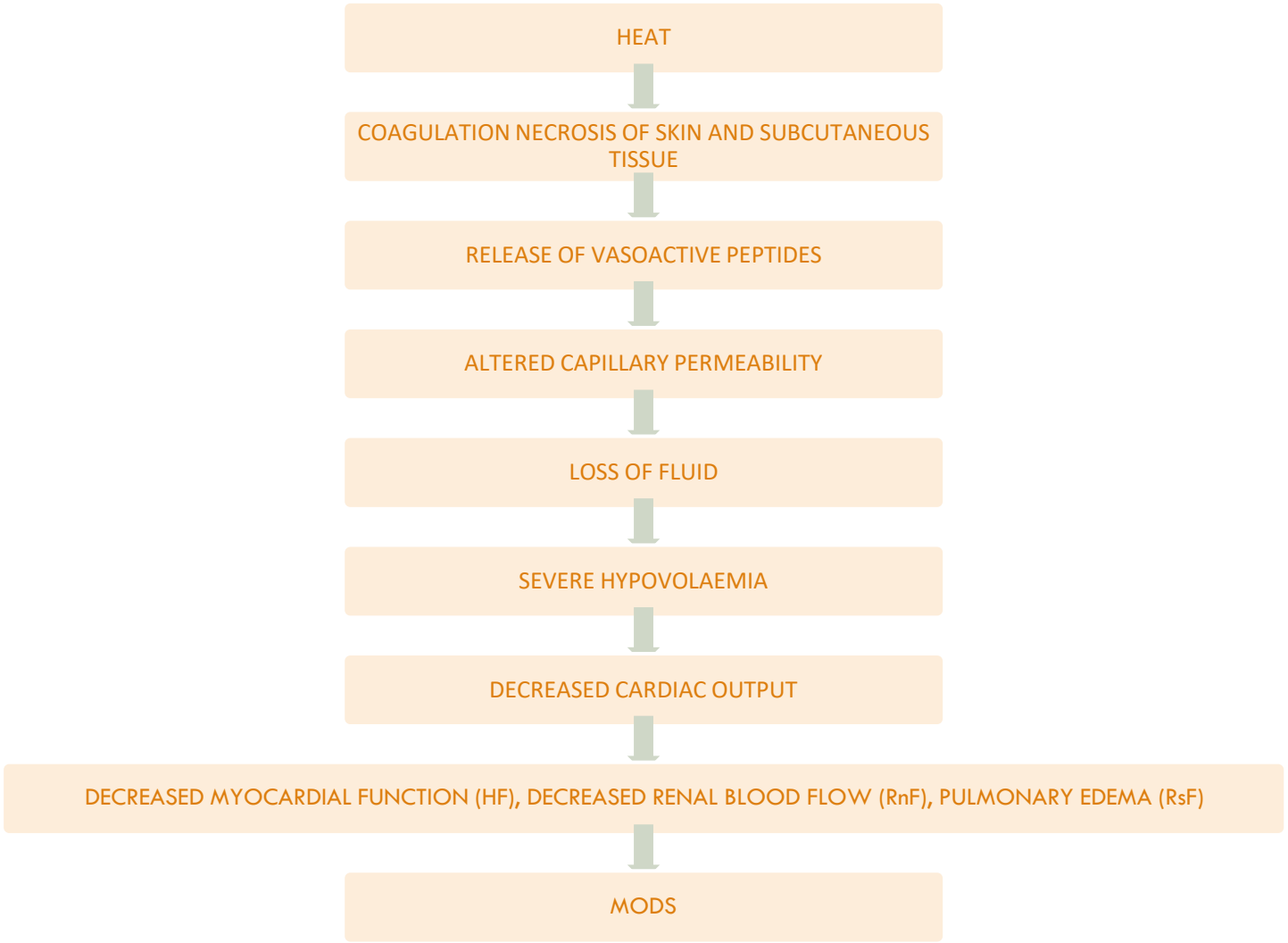


Region	Partial thickness (%) [NB1]	Full thickness (%)
head		
neck		
anterior trunk		
posterior trunk		
right arm		
left arm		
buttocks		
genitalia		
right leg		
left leg		
Total burn		
NB1: Do not include erythema		

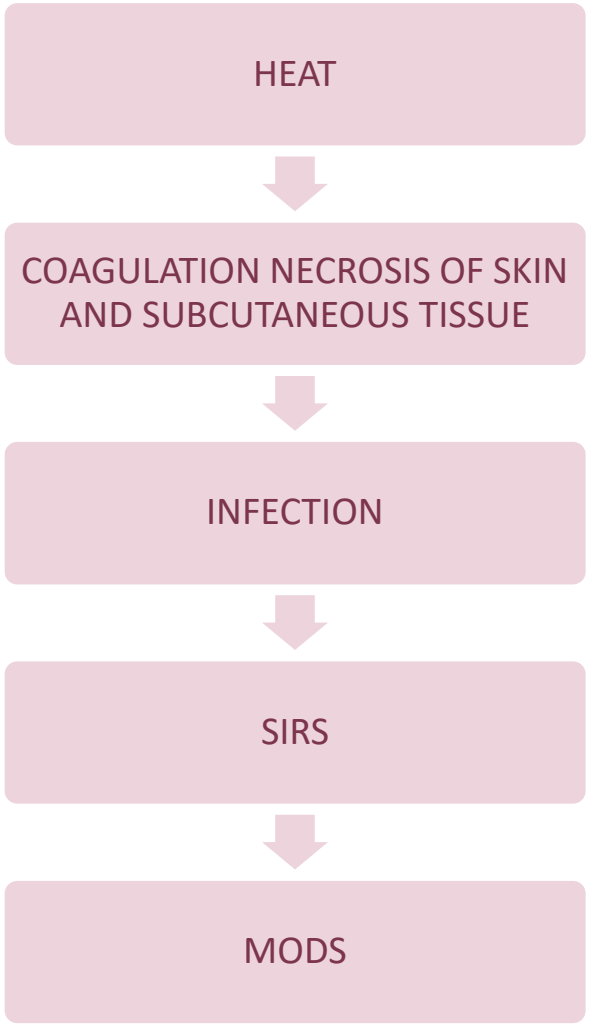
Area	Age 0	1	5	10	15	Adult
A = half of head	9½	8½	6½	5½	4½	3½
B = half of one thigh	2¾	3¼	4	4½	4½	4¾
C = half of one lower leg	2½	2½	2¾	3	3¼	3½

PATHOPHYSIOLOGY OF BURN

PATHOPHYSIOLOGY OF BURN



PATHOPHYSIOLOGY OF BURN



PATHOPHYSIOLOGY OF BURN

- **Massive oedema:**
- altered pressure gradient, because of the injury to basement membrane.

- **Cardiac dysfunction:**
- Hypovolaemia.
- Release of cardiac depressants.
- Hormonal causes like catecholamines, vasopressin, angiotensins.

PATHOPHYSIOLOGY OF BURN

- **Renal changes:**
- Release of ADH from posterior pituitary to cause maximum water reabsorption .
- Release of aldosterone from adrenals to cause maximum sodium reabsorption.
- Toxins released from the wound along with sepsis causes acute tubular necrosis.
- Myoglobin released from muscles (in case of electric injury or often from eschar) is most injurious to kidneys.

PATHOPHYSIOLOGY OF BURN

- **Pulmonary changes:**
- Altered ventilation/ perfusion ratio.
- Pulmonary oedema due to burn injury, fluid overload, inhalation injury.
- ARDS; Aspiration; Septicaemia.
- Possible physical restriction of chest movement.

PATHOPHYSIOLOGY OF BURN

- **GIT changes:**
- Acute gastric dilatation.
- Paralytic ileus,
- Curling's ulcer (due to decreased mucosal defence; not due to increased HCl).
- Cholestasis, acute acalculous cholecystitis.
- Acute pancreatitis.
- Hepatic damage.
- Bowel mucosal ischaemia, poor motility, reduced food digestion and absorption with increased bacterial translocation.
- Abdominal compartment syndrome.

PATHOPHYSIOLOGY OF BURN

- **Metabolic Changes:**
- Increased metabolic rate.
- Negative nitrogen balance.
- Electrolyte imbalance.
- Deficiencies of vitamins and essential elements.
- Metabolic acidosis due to hypoxia and lactic acid.

PATHOPHYSIOLOGY OF BURN

- **Sepsis in Burn Patient:**
- At the burn site, catheter site, cannula, CVP line site, or respiratory infection.
- Low immunity, loss of proteins and immunoglobulins, loss of
- barrier causes opportunistic infection.
- Associated conditions and old age, respiratory diseases worsen the sepsis.
- Burns itself causes immunosuppression.

PATHOPHYSIOLOGY OF BURN

B **CAUSES OF DEATH IN BURNS**

- Hypovolaemia (refractory and uncontrolled) and shock
- Renal failure
- Pulmonary oedema and ARDS
- Septicaemia
- Multiorgan failure
- Acute airway block in head and neck burns

MANAGEMENT

MANAGEMENT

- **Clinical presentation:**

- Symptoms.
- Signs.
- Investigations, (MODS).

MANAGEMENT

- **Prehospital care (first aid) :**
- Ensure rescuer safety.
- Stop the burning process.
- Check for other injuries.
- Apply standard ABC protocol.
- Cool the burn wound.
- Give oxygen.
- Transport.

MANAGEMENT

- **Hospital care : (burn unit)**
- Admission, Indications:

  - Moderate or severe burns.
  - Airway burns of any type.
  - Burns in extremes of age.
  - Associated injury, or major co- morbidity.
  - All electrical/deep chemical burns.

MANAGEMENT

- **Hospital care :**
- **A,** Airway control, (laryngeal edema).
- **B,** Breathing and ventilation, (lung injury).
- **C,** Circulation, (hypovolemia).
- **D,** Disability – neurological status.
- **E,** Exposure with environmental control.
- **F,** Fluid resuscitation.

MANAGEMENT

- **Hospital care :**
- **C**lothing should be removed.
- **C**ooling of the part by running water, local antiseptics.
- **C**leaning the part to remove dust, mud, etc.
- **C**hemoprophylaxis, (antibiotics and tetanus prophylaxis).
- **C**overing with dressings by different methods.
- **C**omforting with sedation and pain killer.

MANAGEMENT

- **Fluid Resuscitation:**

- **Parkland regime:**
  - 4 ml/ % burn/kg body weight/24 hours.
  - Maximum percentage considered is 50%.
  - Half the volume is given in first 8 hours, rest given in 16 hours.
  - The fluid of choice is Ringer lactate solution (Hartmann solution).

MANAGEMENT

- **Specific treatment:**

- Debridement.
- Dressing.
- Antiseptics.
- Vacuum assisted closure (VAC) therapy.
- Grafting.

MANAGEMENT

- **Nursing care:**
- Burns patients require particularly intensive nursing care.
- Nurses are the primary effectors of many decisions that directly affect healing.
- Bandaged hands and joints which are stiff and painful need careful coaxing.
- Personal hygiene, baths and showers all become time-consuming and painful, but are vital parts of the
- patient’s physiotherapy.
- Their success or failure has a powerful psychological impact on the patient and his or her family.

COMPLICATIONS

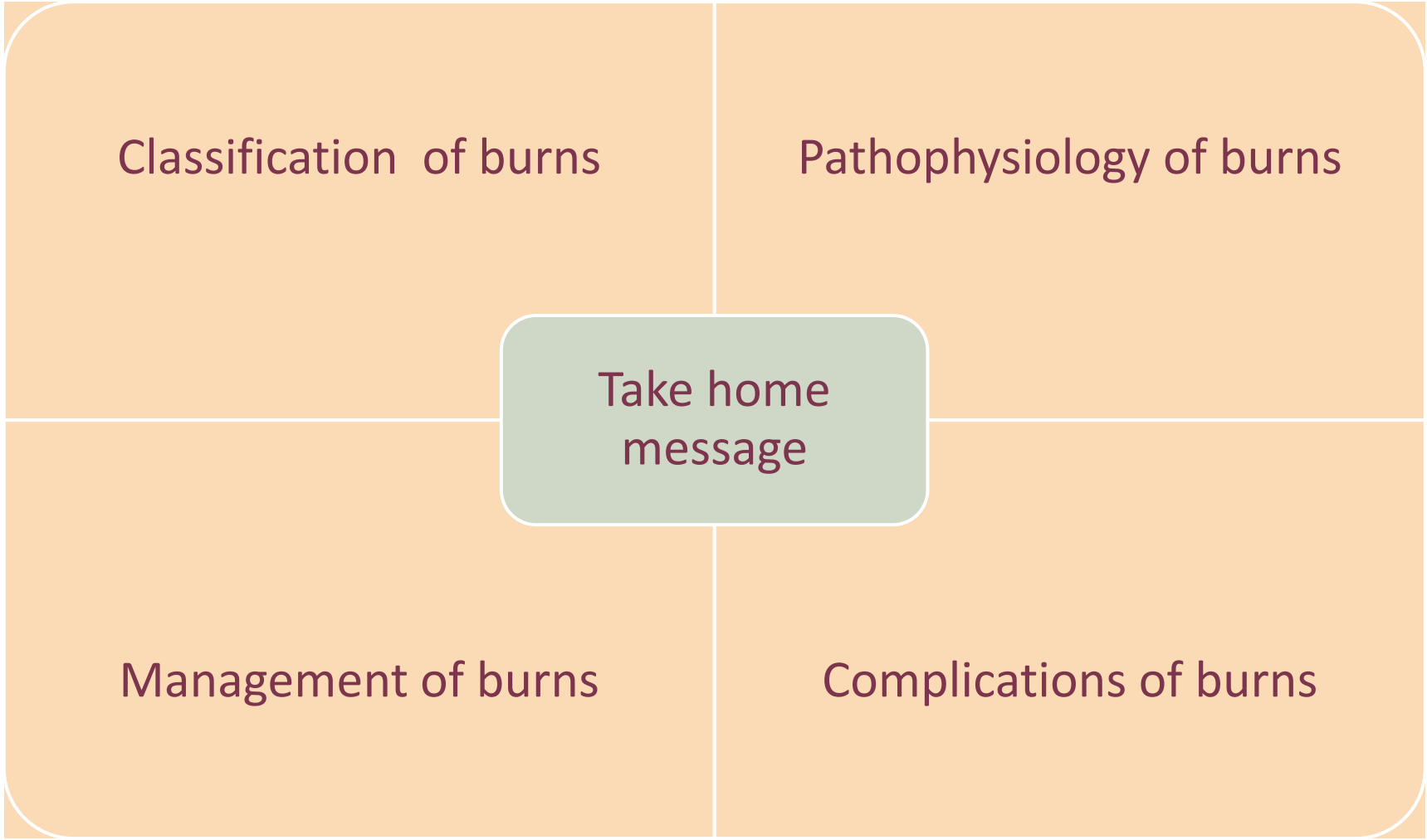
COMPLICATIONS

- **General complications:**
- Sepsis.

- **Local complications:**
- Scars.
- Delayed and non- healing.
- Infection.


A
B
C

TAKE HOME MESSAGE



DISCUSSION

Questions

Thank you