RAMA UNIVERSITY

www.ramauniversity.ac.in

FACULTY OF NURSING

RAMA UNIVERSITY

BURNS

Definition

A burn occurs where there is injury to the tissues of the body caused by heat, chemicals, electric current or radiation.

The majority of burn cases in India are due to domestic causes and very small percentage accounts for occupational burns.

Types

- Thermal Burns
- Chemical Burns
- Smoke and Inhalation Injury
  - Carbon monoxide Poisoning
  - Inhalation Injury above the Glottis
  - Inhalation Injury below the Glottis
- Electrical Burns
- Cold Thermal Injury

Thermal Burns

Which can be caused by flames, flash, scalds o
contact with hot objects are more common type o
thermal burns.

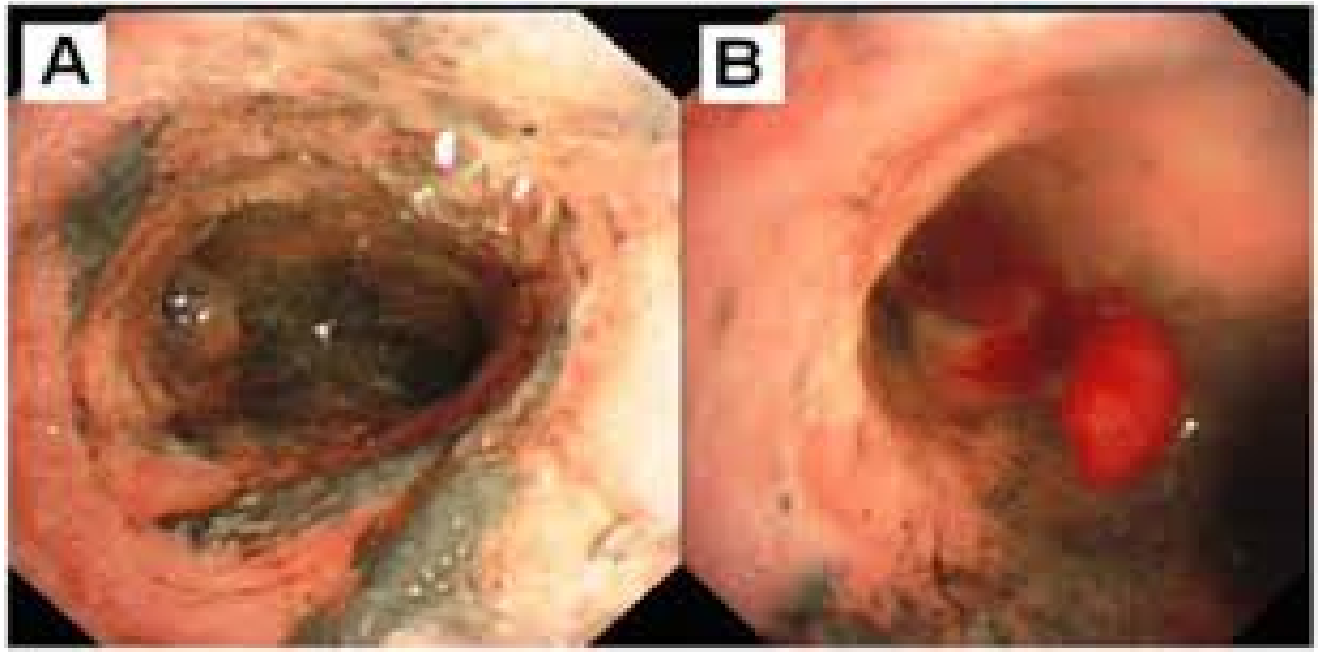
Chemical Burns

They are result from tissue injury and destruction fro
acids, alkali and organic compounds

Smoke and Inhalation Injury

They are result from inhalation of hot air or noxious chemicals and can cause damage to the tissues of respiratory tract.

It is of 3 types



Cont…

Carbon monoxide Poisoning:

CO is produced by the incomplete combustion
rning materials. It is subsequently inhaled and displac
ygen on the hemoglobin molecule causing hypoxia a
imately death.

Inhalation Injury above the Glottis:

It may be caused by inhalation of hot air, steam
oke. It is manifested by Redness, Blistering and Edema

Cont…

nhalation Injury below the Glottis:

Tissue injury below lower respiratory trac
ated to duration of exposure to smoke and toxic fumes.

Electrical Burns

They are the result of intense heat generated from electric current. Direct damage to nerves and vesse causing tissue anoxia and death.

Cold Thermal Injury

They are the result of intense cold eg: Frost Bite.

Classification

he treatment of the burns is related to the severity o
njury. Severity is determined by

- Depth of Burns
- Extent of Burns calculated in percent of Total Bod
  Surface Area
- Location of Burns
- Patient Risk factors

Depth of Burns

tial Thickness skin destruction:

uperficial (First Degree): Superficial Epidermal dama
ith hyperemia, tactile and pain sensation impact.

Cont…

Deep (Second Degree): Epidermis and derm
involved, varying depth, Skin elements from whic
pithelial regeneration occurs.

Cont…

ll Thickness burns:

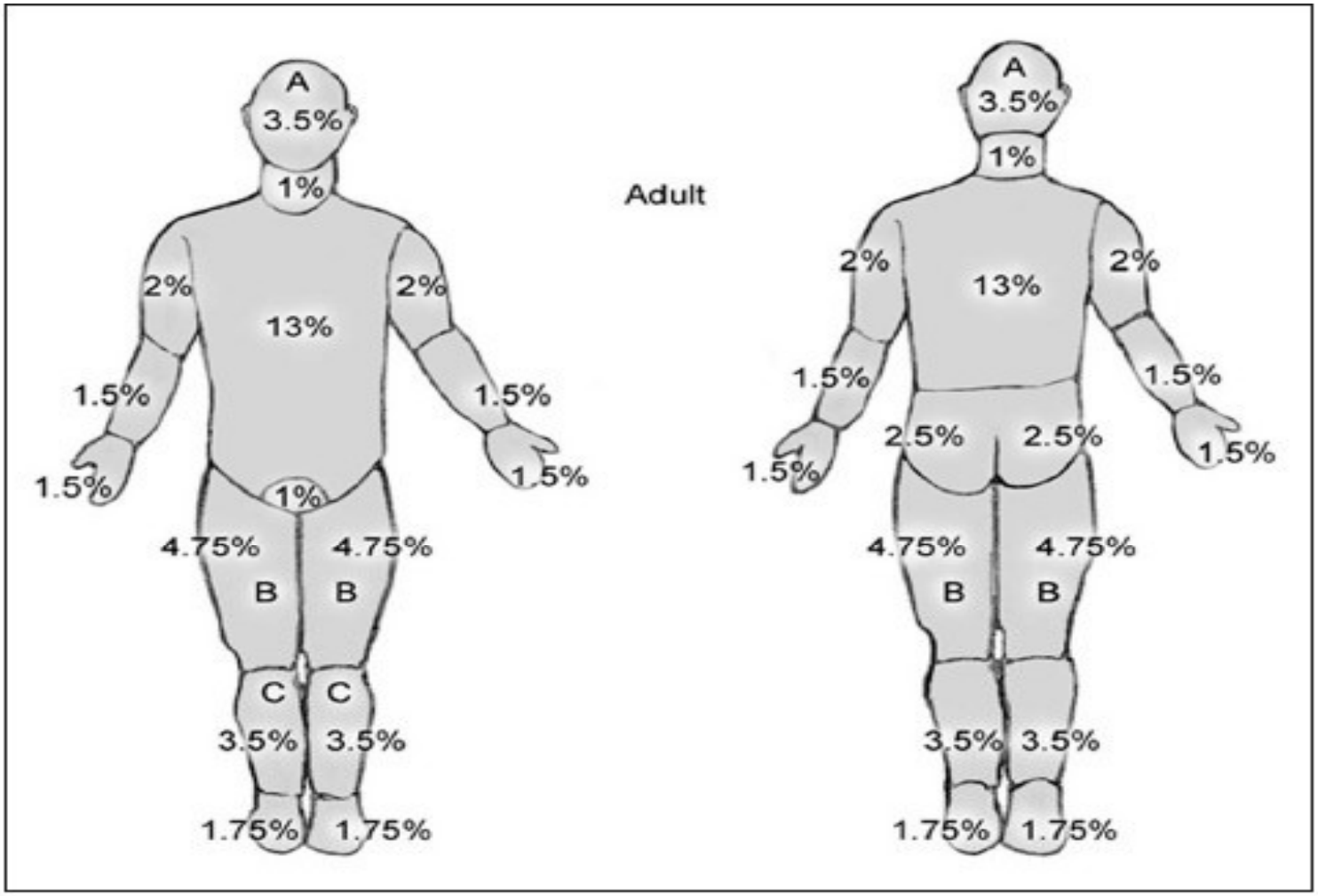
Third and Fourth Degree: All skin elements and loc
erve endings destroyed. Coagulation necrosis prese
urgical intervention required for healing.

Extent of Burns

Two commonly used guides for determining the TBS
affected or the extent of a burn wound are the Lund
Browder Chart and Wallace Rule of Nine.

Lund – Browder Chart is considered more accura
because the patient's age in proportion to relative bod
area size, it is taken into account.

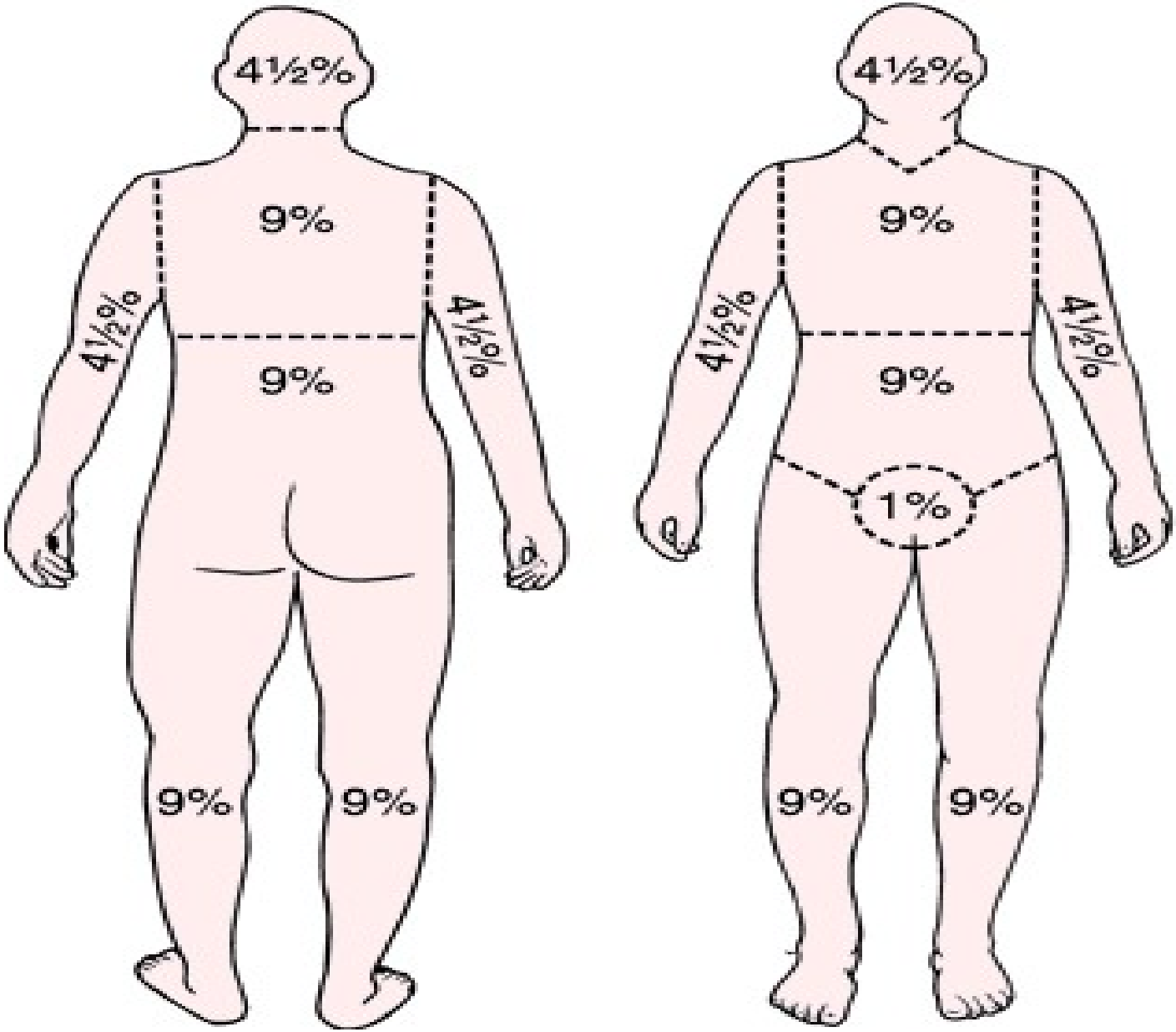
Part of Body	Percentage
Head	7
Neck	2
Anterior Trunk	13
Posterior Trunk	13
Right Buttock and Left Buttock	2.5 each
Genitalia	1
Right and Left Upper Arm	4 each
Right and Left Lower Arm	3 each
Right and Left Hand	2.5 each
Right and Left Thigh	9.5 each
Right and Left Leg	7 each
Right and Left Foot	3.5 each
Total	100



Age	*0-1*	*1-4*	*5-9*	*10-14*	*15*
A- 5 of head	9.5%	8.5%	6.5%	5.5%	4.5%
B- 5 of one thigh	2.75%	3.25%	4%	4.25%	4.55
C- 5 of one leg	2.5%	2.5%	2.75%	3%	3.75%

Wallace Rule of Nine

Part of Body	Percentage
Head & Neck	9
Arms	9 each
Anterior & Posterior Trunk	18 each
Legs	18 each
Genitalia	1
Total	100


4½%
9%
4½%
4½%
9%
9%
9%
4½%
9%
4½%
4½%
9%
1%
9%
9%

Cont…

For irregular and odd shaped burns the palmer surface of the patient hand considered approximately 1% of TBSA.

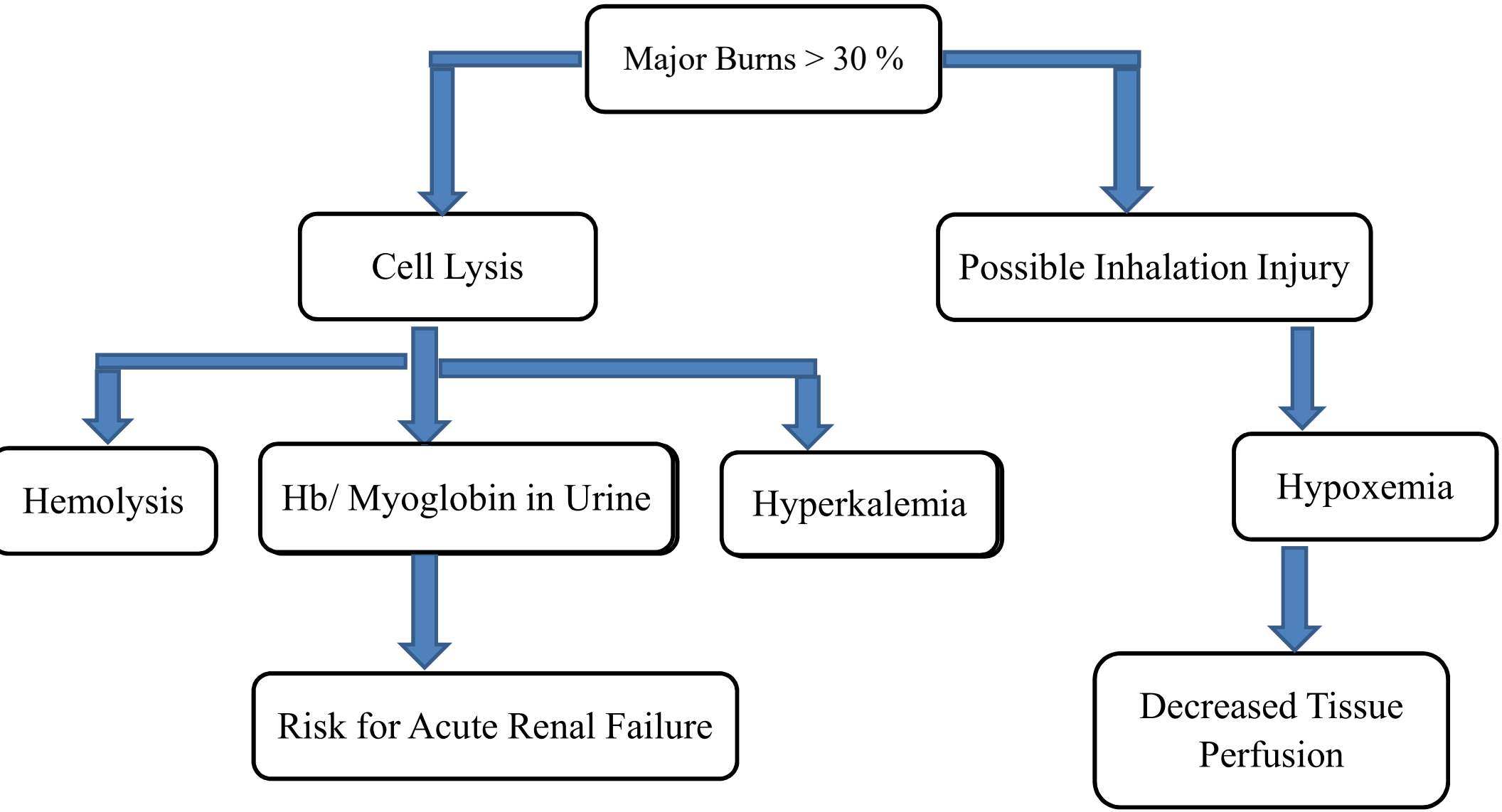
Location of Burn

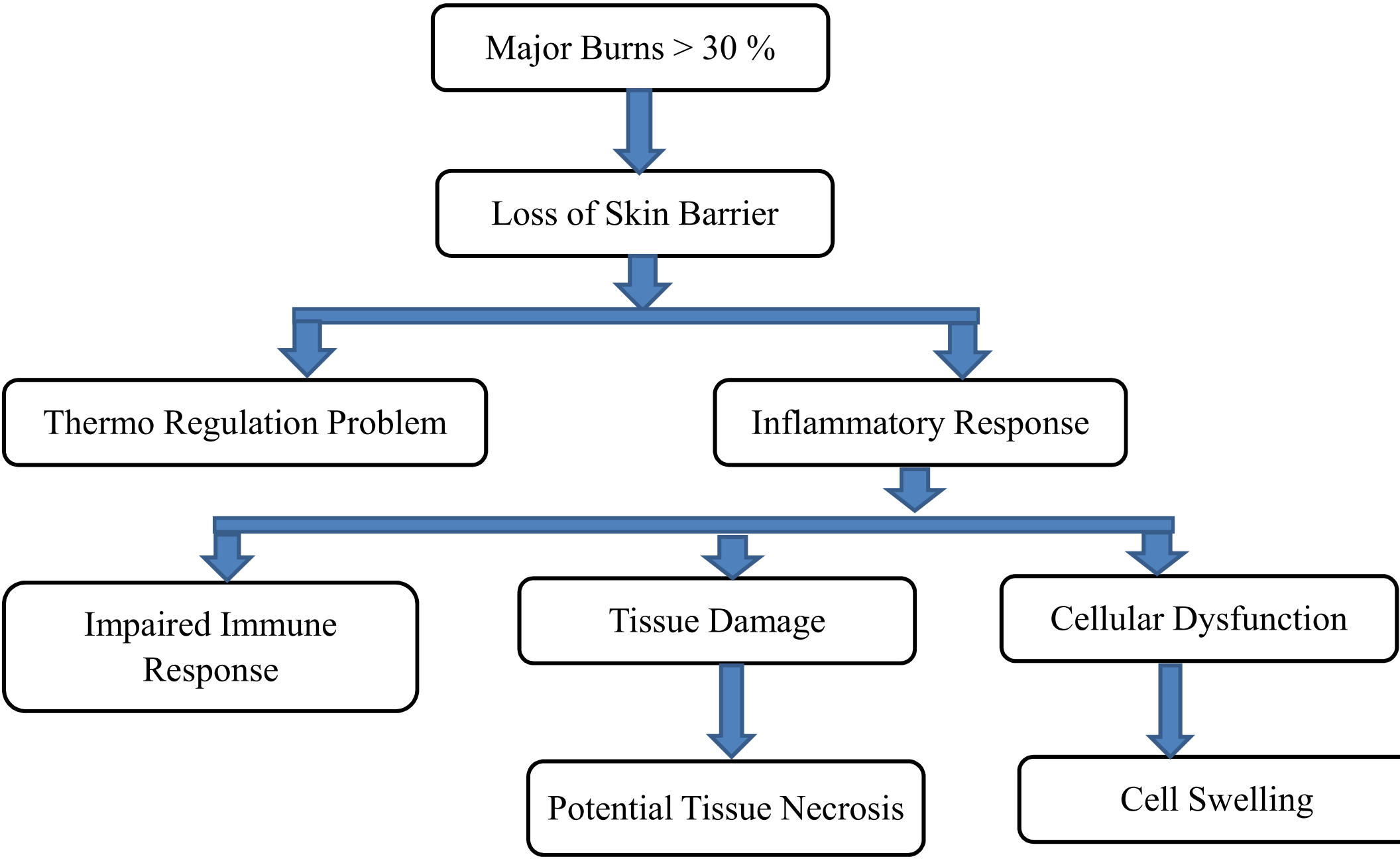
The severity of burn injury is related to the location of the burn wound. Burns to face, neck and circumferential burns to the chest and back may inhibit respiratory function due to mechanical obstruction.

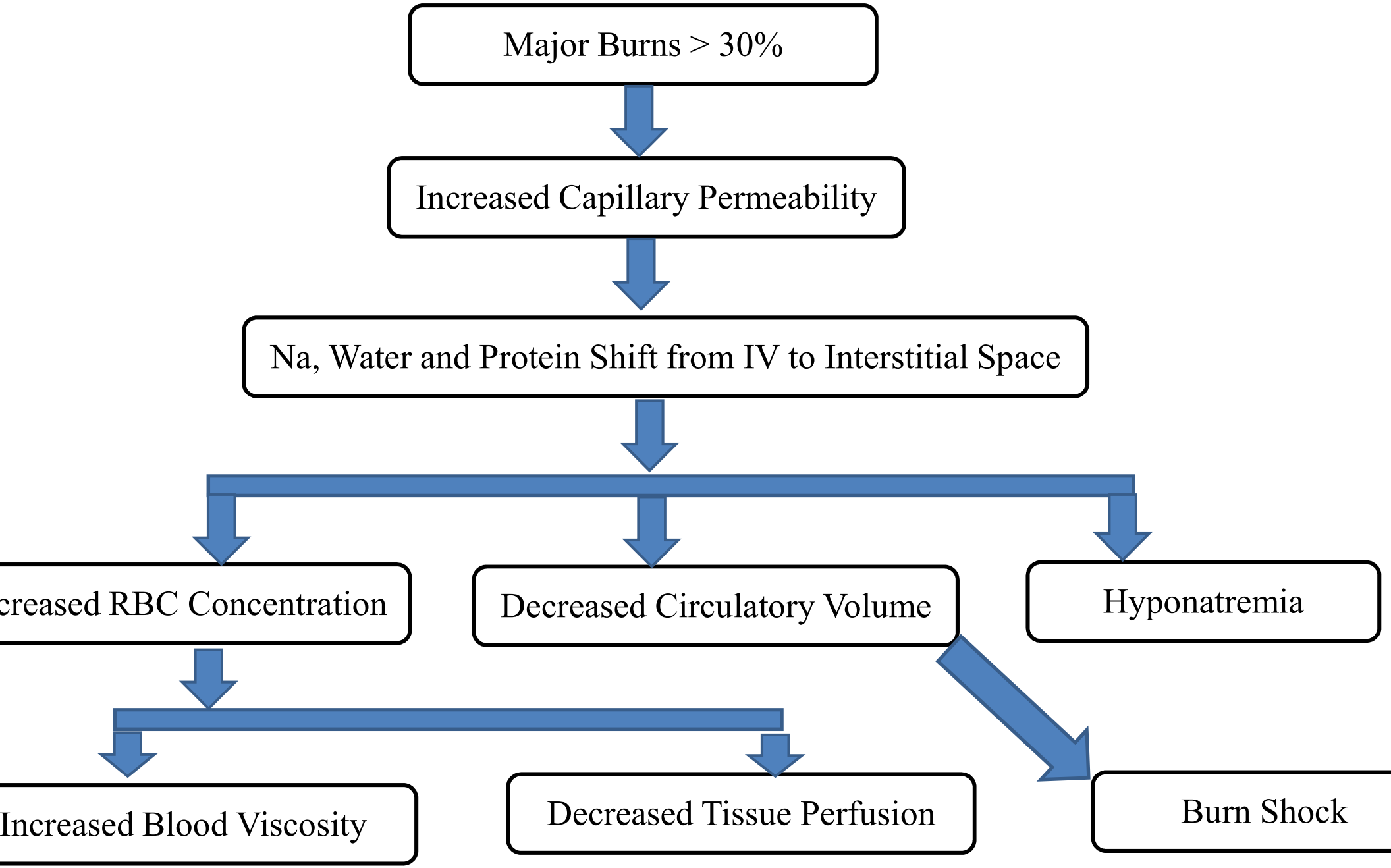
Patient Risk Factor

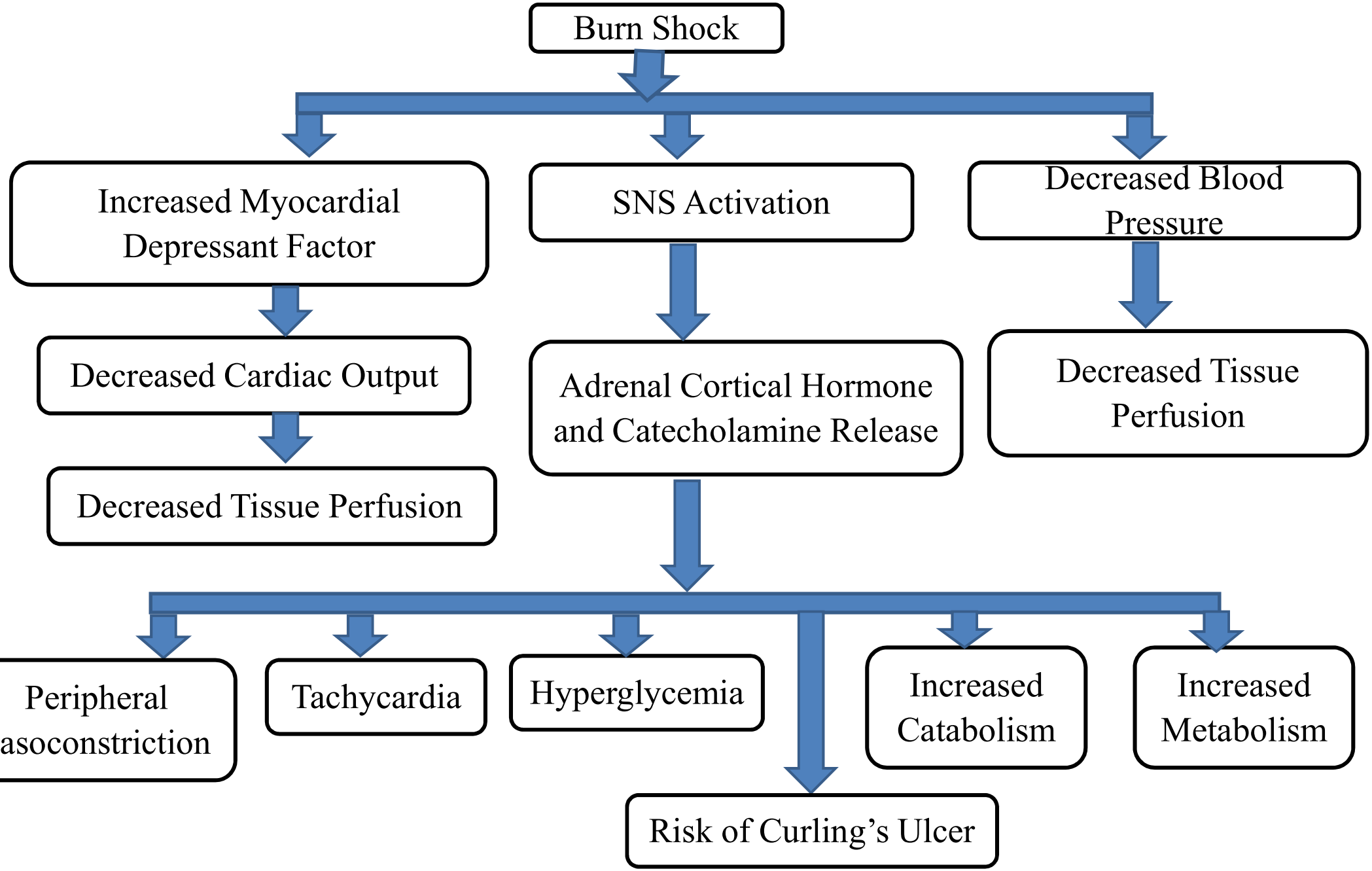
The older adult heals more slowly and usuall
experiences more difficulty with rehabilitation than
younger adult. Any patient with preexistin
cardiovascular, respiratory or renal diseases has a poore
prognosis for recovery.

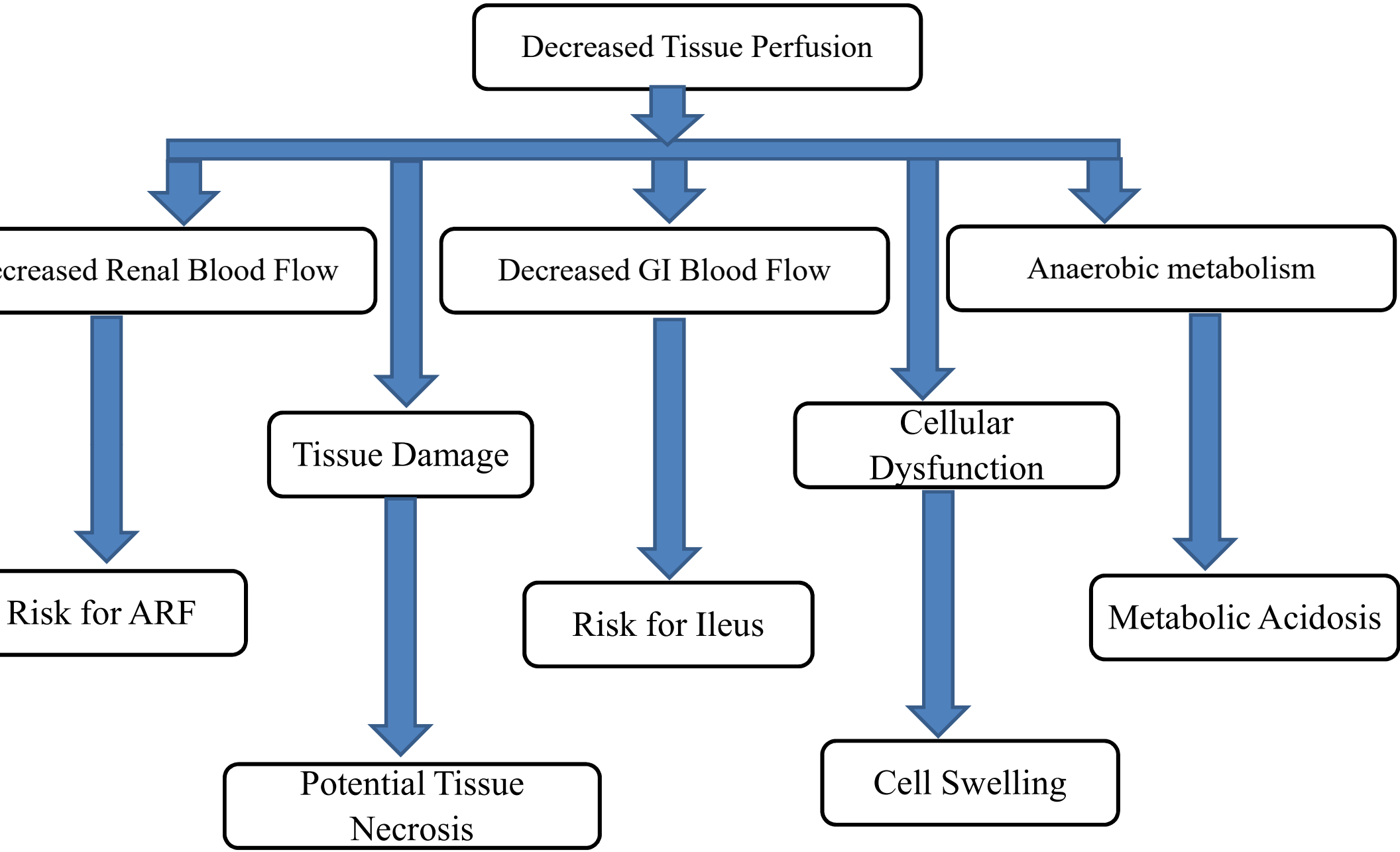
PATHOPHYSIOLOGY


Major Burns > 30 %
Cell Lysis
Possible Inhalation Injury
Hemolysis
Hb/ Myoglobin in Urine
Hyperkalemia
Hypoxemia
Risk for Acute Renal Failure
Decreased Tissue Perfusion


Major Burns > 30 %
Loss of Skin Barrier
Thermo Regulation Problem
Inflammatory Response
Impaired Immune Response
Tissue Damage
Cellular Dysfunction
Potential Tissue Necrosis
Cell Swelling


Major Burns > 30%
Increased Capillary Permeability
Na, Water and Protein Shift from IV to Interstitial Space
creased RBC Concentration
Decreased Circulatory Volume
Hyponatremia
Increased Blood Viscosity
Decreased Tissue Perfusion
Burn Shock


Burn Shock
Increased Myocardial Depressant Factor
SNS Activation
Decreased Blood Pressure
Decreased Cardiac Output
Adrenal Cortical Hormone and Catecholamine Release
Decreased Tissue Perfusion
Decreased Tissue Perfusion
asoconstriction
Tachycardia
Hyperglycemia
Risk of Curling's Ulcer
Increased Catabolism
Increased Metabolism


Decreased Tissue Perfusion
ecreased Renal Blood Flow
Decreased GI Blood Flow
Anaerobic metabolism
Tissue Damage
Cellular Dysfunction
Risk for ARF
Risk for Ileus
Metabolic Acidosis
Potential Tissue Necrosis
Cell Swelling

Clinical Manifestations

Chemical Burns:

Burning, Redness, Swelling in injured tissu
Discoloration, localized pain, edema, Respirato
Distress if chemical inhaled, Decreased musc
coordination.

Cont…

- *Inhalation Injury*:

Rapid, Shallow respirations, Increas
hoarseness, coughing, smoky breath, productive cou
irritation of upper airway, difficulty swallowi
restlessness, anxiety, dysrhythmias.

Cont…

Electrical Burns:

Leathery white or charred skin, Burn Odo
mpaired touch sensation, Dysrhythmias, Cardiac arres
hermal burns, fractures, head or neck injury.

Cont…

Thermal Burns:

Partial Thickness (Superficial): Redness, Pai
Moderate to severe tenderness, minimal odem
blanching with pressure.

Partial Thickness (Deep): Blisters - Mottled re
hypersensitive to touch, moderate to severe pain.

Cont…

Full Thickness: white waxy, dark brown appearan
strong burn odor, impaired sensation when touch
absence of pain with severe pain in surrounding tissues.

Some Common Clinical Manifestations

Blister formation, Dehydration, Absent or decrease
Bowel sounds, shivering caused by heat lost.

Complications

The three major organ system most susceptible t
complications during the emergent phase of burn injur
are Cardiovascular, Respiratory and Urinary systems.

Cardiovascular Complications Include Dysrhythmia
Hypovolemic Shock, Ischemia, Parasthesia

Cont…

Respiratory Complications Include edema formation a
Obstruction of the airway due to upper airway burns a
Inhalation Injury leads to direct insult at the alveolar le
Secondary to inhalation of chemical fumes.

Urinary Complications Include Renal Ischemia and Ac
Renal Failure.

Burns Management

- **Pre - Hospital Care**
- Remove the person from the area or source
- Stop the burning process
- If thermal burns area is large attention needs to be focused first on Airway, Breathing and Circulation.

Hospital Care

- Management of Burns
  - Emergent Phase
  - Acute Phase
  - Rehabilitation Phase

Emergent Phase

In this phase patient survival depends on rapid a thorough assessment and intervention

- Airway Management
- Fluid Therapy
- Wound Care
- Drug Therapy

Airway Management

Early Endotracheal Intubation eliminates the necessity o
racheostomy

Oxygen administration according to ABG Values

no intubation occurs

Administration of humidified oxygen

Cont…

- High Fowler's position, in spinal cord injury Trendlenberg position
- Encourage patient to cough and deep breath
- Give chest physiotherapy

Fluid Therapy

Assess the fluid needs

Begin IV Fluids as per formulae

Insert urinary catheter and monitor urinary output

Cont…

Brooke's Formulae:

First 24 Hours

Crystalloids: RL Soln; 2.0 ml/ kg/ %TBSA [½ to given firs
8 hours and next ½ in next 16 hours]

Second 24 hours

Colloids : 0.3 – 0.5 ml/ kg/ %TBSA

Glucose in water: Amount to replace estimated evaporativ
losses (If oral liquids are allowed)

Cont…

Parkland Formulae:

First 24 Hours

Crystalloids: RL Soln; 4.0 ml/ kg/ %TBSA [½ to given firs
hours and next ½ in next 16 hours]

Second 24 hours

Colloids : 20 – 60% of calculated plasma volume

Glucose in water: Amount to replace estimated evaporat
osses (If oral liquids are allowed)

Cont…

Assessment of adequacy of fluid replacement is best made by the us
parameter:

Urine output: 30 – 50 ml/ hr in adult

75 – 100ml/hr in electrical burn patient with evidence
hemoglobinuria.

Cardio pulmonary Factors:

Blood pressure: (Systolic >90 mm hg), Pulse rate (<120 b
min)

Blood Pressure is appropriately measured by arterial line.

Wound Care

It should be delayed until patent airway, adequate circulation and adequate fluid replacement have been established.

Cleansing and gentle debridement using scissors and forceps can done in hydrotherapy tub or cart shower.

Extensive, Surgical debridement should be performed in operating room

Cont…

- In debridement, necrotic skin is removed.
- Immersion in a tank for longer than 20 to 30 min can cause electrolyte loss from open burned areas.
- The water does not need to be sterile, tap water not exceeding 104 F is acceptable.

Cont…

- Debridement can be done by two method:
- Open method: Wound is covered with topical antibiotics
- Debridement with use of multiple dressing changes: Steril guaze dressing impregnated with or laid over the topica antimicrobial
- If possible wound graft may be done

Cont…

- Nursing Care in Open Wound:
- Staffs must wear disposable mask, cap, gown and gloves
- Room should be kept at 29.4 c or 85 F
- Avoid cross infection and apply ointment using sterile gloves

Cont…

Other care Measures include:

Facial care is given by open method

Eye care is given by antibiotic ointments

Hands and Legs should be extended and elevated on pillow
or in slings to minimize odema

Cont…

- Patients with ear burns should not use pillows because pressure on the cartilage may cause chondritis and the ear may stick on the pillow case and cause pain and bleeding. In these patients head can be elevated with rolled towel.

Drug Therapy

Analgesics and Sedatives:

Analgesics: Morphine, Fentanyl, Hydromorphon Metherdone, Oxycodone, NSAID's etc

Sedatives: Haloperidol, Lorazepam and Midazolam etc

Tetanus Immunization

Antimicrobial Agents

Silver sulfadiazine and Mafenide acetate can be used.

Nutritional Therapy

- Nutritional support within several hours of the burn injury can decrease mortality and complications optimize healing of the burn wound and minimize the negative effect of hyper metabolism and catabolism.

Acute Phase

- The acute phase begins with the mobilization of extracellular fluid and subsequent diuresis. This phase is concluded when the burned area is completely covered by skin graft or when the wounds are healed.

Complications

- Infection
- Cardio vascular and Respiratory complications
- Neurological system – Dementia
- Musculo Skeletal System – Limited ROM due to scar tissue formation
- Gastro Intestinal System – Paralytic Ileus, Curling's Ulcer
- Endocrine System – Increased Blood Glucose level because of stress mediated cortisol and catecholamine release

Management

- Predominant therapeutic interventions in the acute phase are Wound care, Excision and Grafting, Pain management, Physical and Occupational therapy, Nutritional therapy and Psychosocial care.

Wound care

e goals of wound care are to

Cleanse and debride the area of necrotic tissue and debris that would promote bacterial growth.

Promote wound re epithelialization and/ or successful skin grafting.

Wound care consists of daily observation, assessment, cleansin debridement and dressing reapplication.

Cont…

- Non surgical debridement, dressing changes, topical antibiotic therapy, graft care and donor site care may be performed from 2 time daily to once every few days.

Excision and Grafting

- Early removal of necrotic tissues and application of autograft skin.
- During the procedure, Eschar is removed down to the subcutaneous tissue or fascia, depending on the degree of injury.

Graft

Grafting refers to a surgical procedure to move tissue from one site to another on the body, or from another person, without bringing its own blood supply with it.

Classification

Autograft: graft taken from one part of the body of an individual and transplanted onto another site in the same individual, e.g., skin graft.

Isograft: graft taken from one individual and placed on another individual of the same genetic constitution, e.g., grafts between identical twins.

Cont…

- *Allograft*: graft taken from one individual placed on genetically non-identical member of the same species, e.g., the majority of grafts are allografts.
- *Xenograft*: graft taken from one individual placed on an individual belonging to another species, e.g., animal to man.

Skin Graft

Skin grafting is a type of graft surgery involving t
transplantation of skin. The transplanted tissue is called a sk
graft.

Indications

- Extensive wounding or trauma
- Burns
- Areas of extensive skin loss due to infection such as necrotising fasciitis or purpura fulminans
- Specific surgeries that may require skin grafts for healing to occur - most commonly removal of skin cancers

Cont…

There are two types of skin grafts, the more common type is where a thin layer is removed from a healthy part of the body (the donor section) like peeling a potato, or a full thickness skin graft, which involves pitching and cutting skin away from the donor section.

Cont…

- A full thickness skin graft is more risky, in terms of the body accepting the skin, yet it leaves only a scar line on the donor section, similar to a Cesarean section scar. For full thickness skin grafts, the donor section will often heal much more quickly than the injury and is less painful than a partial thickness skin graft.

Types

- **Autologous**: The donor skin is taken from a different site on the same individual's body (also known as an autograft).
- **Isogeneic**: The donor and recipient individuals are genetically identical (e.g., Monozygotic Twins, animals of a single inbred strain; isograft or syngraft).
- **Allogeneic**: The donor and recipient are of the same species (human→human, dog→dog; allograft).

Cont…

Xenogeneic: The donor and recipient are of different speci
(e.g., bovine cartilage; Xenograft or heterograft)

Prosthetic: Lost tissue is replaced with synthetic materials su
as metal, plastic, or ceramic (prosthetic implants).

Complications

Bleeding

Infection

Loss of grafted skin

Nerve Damage

Graft Versus Host Diseases

Rejection may occur in xenografts. To prevent this, the patie
usually must be treated with lon
term immunosuppresant drugs.

Source of Graft

Source	Graft Name	Coverage
ine skin	Heterograft or Xenograft	Temporary (3 days to 2 we
veric Skin	Homograft or Allograft	Temporary (3 days to 2 we
nt Own Skin	Autograft	Permanent
ine Collagen bonded to one membrane	Biobrane	Temporary (10 days to days)
ne collagen and samino glycan bonded to ne membrane	Integra	Permanent

ont…

Cultured epithelial autograft is a method of obtaining perma
skin from a person with limited available skin for harvesting
this biopsied keratinocytes are grown in culture medi
containing epidermal growth factors.

After approximately 18 to 25 days the keratinocytes h
expanded upto 10,000 times and form confluent sheet that can
used as skin graft.

Pain Management

- Burns patients experience two kinds of pain
  - Continuous background pain that exists throughout the day a night.
  - Treatment induced pain associated with dressing chang ambulation and rehabilitation activities.
- I.V infusion of inj. Morphine or Hydromorphone will allow for t steady therapeutic level of medication.

Cont…

utritional Therapy:

The goal of therapy during the acute burn phase is to provide adequate calories and protein to promote healing.

sychosocial Care:

The most important care which is to be given for the patient and the family to meet their demands in the community.

Rehabilitation Phase

It begins when the patient's burn wounds have healed and the person is able to resume a level of self-care activity.

This can be started as early as 2 weeks or as long as 7- 8 months.

Complication

Contracture: is an abnormal condition of a joint characterized by flexion and fixation. It is happened not only due to skin but the underlying tissues such as ligaments and tendons also have a tendency to shorten during the healing process.

Hypertrophic Scarring


Keloid scar
Hypertrophic

Exercise for Burns Patient

Exercising several times throughout the day helps to counte
the decreased strength and decreased joint range of motion tha
may occur from scar contracture.

Purposes

Increase strength

Increase endurance

Increase range of motion in the involved regions

Promote functional independence

Promote return to work.

Exercises

Stretching

Strengthening

Endurance

Coordination

Fine Motor Skills

Scar Management

- Burn Reconstruction:
- Most burn reconstructive procedures can be performed using a combination of some basic techniques: incisional release and grafting, excisional release and grafting, Z-plasty, and random flaps. Tissue expansion and free flaps are needed less commonly

Incisional versus Excisional Release

- Most burn reconstructive operations can be effective with an incisional, excisional, or the common combined release, closing the resulting wound with split thickness autograft. The contracture is placed under tension, and the release is performed sharply.

Z-plasty in burn reconstruction

lthough simple in concept, properly planned and executed Z-plasties are power
econstructive tools.

he basic steps involved in constructing a Z-plasty include the following:

- Defining the line(s) of tension that need to be modified
- Planning the central limb of the Z-plasty(s) on this line
- Designing the lateral lines, if possible, so that they fall along natural skin lir
  (Langer lines) after transposition
- Designing the angle between the central and lateral lines of the Z-plasty to
  less than 90° with the lateral limbs curved and no longer than the central limb

Reconstructive Surgery for Burns

Skin Graft: It is when healthy skin is taken from one part of th
body and transplanted to another part. This may involv
transplanting a few layers of deep skin or all the dermis.

Micro Surgery: it refers to any procedure in which the surgeo
uses a microscope for assistance in reconstructive procedures.

Cont…

- *Free Flap Procedures*: Like skin graft, Free Flap Procedures takes healthy tissues from one part of body and moves it to another part of body. During this procedure, muscle, skin or bone is transplanted with the original blood supply. This procedure requires a longer recovery time.

Cont…

Tissue Expansion: This is used to encourage the body to grow new healthy skin. A balloon expander is inserted under the area where the skin should grow. This balloon is filled with saline solution over time, which causes the skin to slowly stretch and grow. Once new skin is formed it has been used in reconstructive procedures. Growing takes upto 4 months.