BURNS

Chapter outline

Introduction

Primary Survey and Resuscitation of Patients with Burns
- Stop the Burning Process
- Establish Airway Control
- Ensure Adequate Ventilation
- Manage Circulation with Burn Shock Resuscitation

Patient Assessment
- History
- Body Surface Area
- Depth of Burn

Secondary Survey and Related Adjuncts
- Documentation
- Baseline Determinations for Patients with Major Burns
- Peripheral Circulation in Circumferential Extremity Burns
- Gastric Tube Insertion
- Narcotics, Analgesics, and Sedatives
- Wound Care
- Antibiotics
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- Burn Patterns Indicating Abuse

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- Types of Cold Injury
- Management of Frostbite and Nonfreezing Cold Injuries

Cold Injury: Systemic Hypothermia

Teamwork

Introduction

Burn injuries to emergency department appear as minor or major injuries. Both types are treated surgically or non surgically. Proper diagnosis of the burn depth and treatment or resuscitation starts at the emergency department. Burn care pathways are needed to achieve these goals.

Minor burns
These do not need to proceed to resuscitation. However, symptomatic treatment, supportive dressings, tetanus toxoid and referral for surgical or burns team for debridement and possible skin grafting may need to be started at the emergency department.

Major burns
These can be life threatening due to severity or coexisting other injuries. Hence the care pathway starts by excluding or managing such conditions. This starts by following SBEMC protocol ™ primary survey. Once excluded or managed, fluid calculations, analgesic administration, insertion of urinary catheters urgent tests are done. If the first aid has not been given it can be given before the secondary survey. However, the effectiveness of first aid is limited if done beyond three hours after thermal burns. Exception to this would be chemical burns that can either require specific antidote or simple irrigation with running water. This should only be done in a controlled environment since inducing hypothermia is very harmful to the patient. Thermal burns require minimum of 20 minutes for cooling the burn while keeping the patient warm.

Secondary survey follows the similar assessment given by the ATLS / SBEMC protocols. Remember to reassess for any deterioration of the patient before proceeding to this step. The careful documentation will ensure that non of the essential steps are missed by the attending team.

The attending teams function better if they have had synchronised training models of SBEMC are given to them. The teams are encouraged follow all the global safety standards when dealing with burns since they get heavily contaminated with body fluids.
The following chart can be used as a quick reference to navigate the trauma team. This could be printed and kept at the emergency department as a laminated flip card.

Introduction

	Observation	Perform
Primary survey	Airway	C spine protection
	Breathing	Oxygen
	Circulation	Arrest hemorrhage & IV access
	Disability	AVPU Pupil - size/ reaction
	Exposure	Environmental controls
	Fluids **Analgesia** **Tests(Fast scan)** **Tubes**	**First aid effective up to 3 hours from burn**
Secondary survey	**AMPLE history** **Head to toe Examination** **Tetanus** **Documentation** **Transfer** **Support**	

Introduction

First Aid

This is the provision of initial care to a victim with a burn injury. In Sri Lanka this is usually given by a relative or a lay person.

Goal:
Preserve life and alleviate suffering, prevent further illness or injury and promote recovery.

Rationale:
Good first aid improves the outcome of the burn patient. Knowledge on first aid is extremely patchy in Sri Lanka. A burn cave provider would need to assess the adequacy of first aid, provide first aid in hospital setting and educate the public in every opportunity to do so.

As a general rule first responders need to make sure their own personal safety. Depending on the source of injury the victim must be removed from further injury as soon as possible.

If the victim on fire is, running stop, drop roll (while covering the face) must be advised. Removal of tight garments, jewellery, and hot water containing cloths should be removed. If clothing is firmly adhere to skin (e.g.: synthetic garments) they should be left on skin and proceed with cooling.

Cooling the burn for 20 minutes is beneficial up to 3 hours from the time of burn. In Sri Lanka exact
temperature various from 15-30 Celsius. This range is always within the advocated lower limit. Ice or ice cold water should not be used due to several reasons.

At A & E, there should be an area that can effectively utilized for cooling after primary survey. Even if the patient has not received adequate first aid the medical officers / nursing officers in the units must ensure first aid given after primary survey.

Once the first aid is given the burn wound needs to be covered with a clean cloth till transfer to hospital. The patient must be kept warm to prevent hypothermia at all cost even during cooling of the burn.

Primary survey

Primary survey team will have a lead and three to four trained staff. Lead will guide along the SBEMC protocol. ABC could be simultaneously attempted getting the team to assess the airway, providing oxygen, clipping pulseoxymeter, applying blood pressure cuff, inserting cannulae, drawing blood, setting up drips. However, if there is only one or two present it is recommended to follow the ABCDE

A. Airway Maintenance with Cervical Spine Protection

• Observe for patency of the airway.

Patient is talking or answering in a clear voice?
In cases of obvious obstruction, clear the mouth by manually removing foreign materials.

Chin lift and jaw thrust can be used to open the mouth.
However, chin lift needs to be performed carefully in patients, suspected of cervical spine injury.

• In-line stabilization followed by a rigid collar is recommended for patients, suspected to have cervical spine injury.

E.g.: Facial injuries
Neck injuries
Unconscious patients

B. Breathing and Ventilation

• Observe for symmetrical chest wall movements.
• A non-rebreathing mask to provide supplementary oxygen.
• In cases of poor breathing effort proceed with bag and mask respiratory support or be ready to intubate.
• Alarming signs
-Cherry pink colour tongue in CO poisoning
-Tachypnoea or lower respiratory rate
-Full thickness circumferential burns on the chest (especially in children)

C. Circulation with Arresting Haemorrhage

• Feel for pulse ⟶Radial pulse ⟶Femoral pulse⟶ Carotid pulse on both sides.
• Non-invasive blood pressure.
• Capillary re-fill time, checked on the nail plates.
• IV lines in two large veins (large bore 18G). Take blood for investigations
Start two units of Ringers Lactate.

D. Disability: Neurological Deficit

Assess the level of consciousness:

A - Alert
V - Responds to Vocal stimuli
P - Responds to Painful stimuli
U - Unresponsive

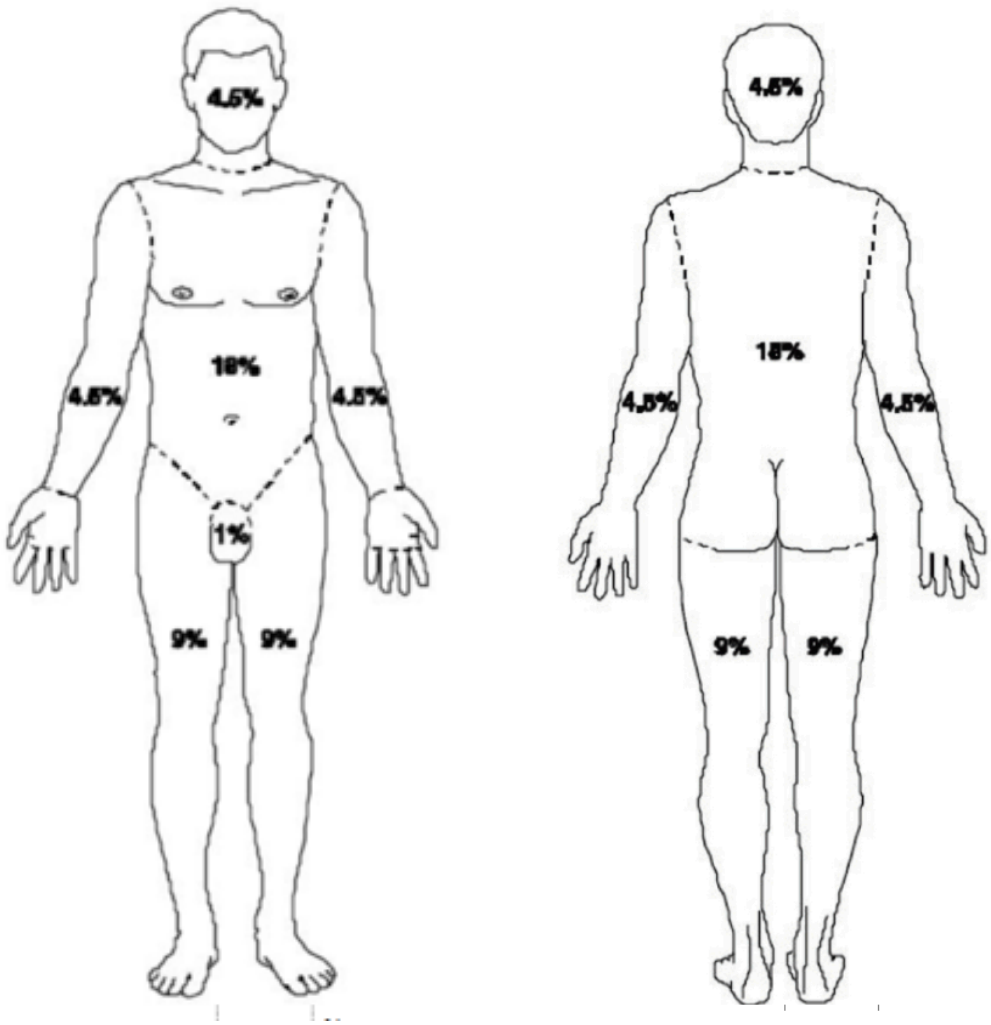
• Pupillary responsiveness, size, light reflex (direct and indirect)

Burn shock may influence the conscious level.

Primary survey

E .Exposure with Environmental Control

- Assess the burn surface area – rule of nines assess the depth of the burn
- Remove rings, bangles, earrings
- Cover with a warm blanket
- Log roll the patient (do not forget the back)



Epidermal	
Superficial dermal	
Mid Derrmal	
Deep dermal	
Fullthickness	

FATT

Fluid Resuscitation

Modified Parkland formula:
Adult - 3 - 4mls x weight (kg) x % burn TBSA
Children - 3 - 4mls x weight (kg) x % burn TBSA + maintenance fluid for children.

• Ringers Lactate solution

• 50% of fluid in within the first 8 hours calculated from the time of burn
• Burns with significant blood loss need additional blood transfusion as per trauma protocol
• Urine output can be used to indirectly monitor the cardiac output. Indwelling urinary catheter is indicated in children with more than 10-15% burns and adults 15-20%.
• Fluid resuscitation volume can be adjusted depending on the urine output.
• Excessive over-hydration should also be avoided
• Fluid boluses can be used to improve output

Analgesia

• Intravenous morphine 0.05-0.1mg/kg→ Calculate to total dose
→ give the total amount in divided doses as slow IV boluses

Tests

• X-Ray (Can be done once the patient is stable, if not available at the resuscitation area)
Lateral cervical spine
Chest
Pelvis

The patient who needs x ray could preferably continue the primary survey till mobile x-ray unit arrives or finish the first aid/secondary survey and be sent to radiology department.

• Focused Assessment with Sonography for Trauma (FAST)-This Is more appropriate in Sri Lankan setting to exclude abdominal trauma. However, it may need clinical correlation and repeat examination to avoid missing slowly progressing abdominal injuries.

Tubes

-Nasogastric tube
-Urinary bladder catheter preferably with a uro-meter

First aid can now be given if the burn occurred less than three hours ago.

Cool the burn and keep the patient warm for minimum of 20 minutes

Secondary survey

Secondary Survey

Once the primary survey is completed the A, B, C needs to be quickly reassessed again before proceeding to secondary survey.

This is the phase, where the patient will undergo a complete examination preceded by a brief, to the point history and followed by treatment of the wound before transferring if needed.

History of the burn injury

A - Allergies
M - Medications
P - Past illnesses
L - Last meal
E - Events/ Environment related to injury

Obtaining a reliable history may not be always possible. However, the basic information that is needed for the optimum care are given below.

- Time of burn
- Where the burn occurred (inside house etc...)
- who rescued
- how the burn was extinguished,
- Was adequate first aid given, any native remedies given?

History of abuse may not be easy to obtain. Better method is not to question repeatedly about the immediate preceding events at this stage. You may get hints from the smell of kerosene or petrol if an accelerant has been used on the body. (Document these findings)

Any other trauma, other than the burn may also need to be evaluated with regard to the mechanism of injury
Eg; Motor vehicle injury
Ejected from three wheeler?
Wearing helmet?
Type of clothing?
Duration of silencer contact?

Examination (some of the possible injuries)

Head and neck

Eyes - Vision, conjunctiva, lacerations, diplopia,
Ears - Bleeding, CSF leak
Nose - Lacerations, bleeding, CSF leak – double halo sign on blotting paper or a povidone iodine soaked swab
Scalp - lacerations, boggy masses
Mouth - Lip lacerations, missing, broken, loose teeth, and intra oral burns
Neck - Bleeding, lacerations, local tenderness

Chest

Deformity, fractures, changes in air entry, changes in heart sounds

Secondary survey

Abdomen and perineum

Abdomen should be examine to exclude intra-abdominal injuries in quadrants. Bowel sounds need to be listen to exclude paralytic ileus.

This may be difficult in severe burns since palpation is painful.
FAST scan is a useful tool to diagnose and can be repeated to reevaluate in this area. (A contrast enhanced CT scan could also be used to detect abdominal pathology).

Perineal contusions, urethral bleeding need to be excluded.
Per rectal examination and vaginal examination need to be performed after taking samples if indicated. (Sexual assault victims)

Limbs

Major fractures of long bones may need to be examined, photographed and X-rayed. Once the patient in safe to leave the resuscitation bay.
Viability of limbs needs to be evaluated with pulse, capillary re-fill, saturation and sensation. These may need to be compared with the unburned side.

All major fractures need to be splinted once the examination is done.
Small bone fractures also need to be evaluated clinically and radiologically.

Pelvis

Severe profound shock with pelvic fracture needs early stabilization. This may require additional blood transfusion to correct the hypovolemia.

Neurological

Now the conscious level can be assess with Glasgow Coma Scale

Assess peripheral nerves by examining all joint movements and muscle power.
An isolated sensory loss may be due to acute compartment syndrome.
May need an escharotomy.

• A low GCS could be due to head injury, hypovolaemic shock, hypoxia

Tetanus toxoid

0.5 ml is given.

→ Optional radiological evaluation

Documentation

Documentation is very important and the time and events should be clear and summarized in every occasion.

Re-evaluation

Re-evaluate the key points of primary and secondary survey. If facilities are available the ordered test results would be available by now. Make a note of any abnormal results.

Emergency Burn Wound Care

Once the wound is assess appropriate cleaning method should be decided. Depending on the extend and percentage of burn dressing can be done. This could be a temporary or permanent dressing.

- Small superficial burns → clean with soap and water proceed with proper dressing. E.g.: paraffin gauze, antibacterial dressing, collagen.

- Large superficial burns → clean with saline / soap and water
  Silversulpa diazine/ gauze.

- Deep burns → clean with soap and water → temporary dressing till patient is taken to operation theatre

All large superficial burns need a burn scrub under anaesthesia to scrub off the dead skin and allow keratinocytes to grow on to viable wound bed.

Smaller deep and full thickness burns can be placed on a routine theatre list to be debrided with or without skin grafting.

Social interactions with patient's family and relatives

You are expected to make a rapid analysis of the situation as a whole. In all instances healthcare workers' safety is mandatory.

All patients need a proper dignified approach despite any abnormal or antisocial behaviour in the apparent history. Eg Even a terror suspect needs to be cared in the usual treatment protocol.
Self-inflicted burns do not call for abusive remarks or neglecting proper care. The medical personnel are not there to judge personal character and deprive life-saving treatment.

Always be careful when talking to family members and relatives. The initial impression of patient receiving proper care is important. Assuring that you have given the best of care that any person will receive in the situation will build trust and cooperation of both patient and the family .

Non salvageable burns

Current national burn centre level of non salvageable burn injury can be inquired through the burn care hot line.
Currently it is 80% TBSA with more than 50 % being mid dermal or deep for adults.
The common request from relatives to transfer such patients to NBC needs to be handled with caution. The attending doctor can call up the NBC for help in explaining to relatives that the situation and transfer is not in the best interest of the patient.
If further explanation is required a video call to the consultant plastic surgeon in-charge of the NBC

Admission and transfer criteria

Admission criteria on arrival

All major burns

All severe burns

Superficial burns with severe pain

Deep burns >5%

Transfer criteria to National Burns Centre

Resuscitated severe burns with less than 70% TBSA

Electrical burns that cannot be treated at the closest plastic surgery unit.

Chemical burns that cannot be treated at the closest plastic surgery unit.

Burn Patent Care (summary)

- Prevention
- First aid on site / on early presentation
- OPD Management – Minor burns / Need no admission
- Acute admissions – Major / With chronic complications

  Resuscitation / ICU
  Document – TBSA, IP/OP, BWt, Temp, dying declaration
  Wound Dressing /Excision & SSG / Escharotomy
  Nutrition –NG
  Shave / Catheterise
  Antibiotics
  Splinting / OT / Physiotherapy
  JMO / Police
  Psychotherapy
- Discharge & follow-up - Burns - Plastic Surgery Clinic / OT
- Chronic Complications - Hypertrophied scars
  Keloids
  Contractures
  Ectropian, Microstomia, Chrondritis, Jt / nail deformities
- Back to the society /Family