# INITIAL BURN CARE

# AN INTRODUCTION TO THE CARE OF BURN'S VICTIMS FOR FIREFIGHTERS

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# *INITIAL BURN CARE*

## OBJECTIVES

- **IDENTIFY THE DIFFERENT TYPES OF BURNS**
- **BE ABLE TO CALCULATE AND IDENTIFY EXTENT OF BURNS**
- **HAVE A KNOWLEDGE OF INITIAL BURN MANAGEMENT IN THE PRE-HOSPITAL ENVIROMENT.**

## INTRODUCTION

In considering a burn injury one must recognise it is a curious form of trauma in that every member of the public has at some time or other suffered it to some degree. Yet this type of injury can range from trivial and minor injuries, through to the most massive and complex.

Indeed a significant burn injury is one of the most devastating forms of trauma a firefighter can come across not just from the point of view of the victim, but of the physiological effects this can have on themselves.
A badly injured burns victim may be very coherent in his actions and feel very little pain but once removed to the hospital environment (dependant on the degree and depth of burn) may deteriorate dramatically.

## WHAT IS A BURN?

A burn is a disruption in the skin integrity.
A burn wound is significant as it interferes with all major functions of the skin.

THESE ARE:

- **TEMPERTURE REGULATION.**
- **SENSORY.**
- **IMUNE RESPONSE**
- **PROTECTION FROM BACTERIAL INVASION.**
- **CONTROL OF FLUID LOSS.**

## THE EFFECTS OF BURNS ON A CASUALTY.

When a casualty receives a burn, tissue fluid (oedema) leaks from the damaged tissues, and is replaced by fluid from the circulatory system. This and the combination of evaporation from the moist burn surface, results in significantly decreased blood plasma volume.
Shock is likely to develop.
If this is not corrected by the introduction of fluids by large bore cannulae, it leads to organ failure, especially renal.
Depending on the size of the burnt area, there is a high risk of infection, which increases according to the extent of the area and depth of damage to the skin. If the casualty has inhaled toxic smoke, hot gasses or corrosive chemicals, the tissue of the airway are likely to become swollen very quickly. This can become more serious than the burn injury presents.
Early recognition from the attending personnel should be aimed for, with high concentrations of o2 and assisted ventilation as necessary.

**SHOCK CAN BE DEFINED AS A DECREASE IN BODILY CIRCULATORY FLUID.**

1. Burns affect 0.5% of the population each year.
2. Burns are frequently linked to carelessness, drug and alcohol use.
3. The majority of injuries are scalds in children under 3 years old and occur in the home.

## CAUSES OF BURNS

- **FIRE.**
- **CORROSIVE CHEMICALS.**
- **ELECTRICAL.**
- **FRICTION AND CONTACT WITH HOT SURFACES.**
- **OVER EXPOSURE TO THE SUN.**
- **RADIOACTIVE SUBSTANCES.**
- **COLD OBJECTS, SUCH AS FREEZING METALS.**

## CAUSES OF SCALDS.

**HOT LIQUIDS SUCH AS:**
- **BOILING WATER.**
- **HOT FAT.**

**VAPOURS SUCH AS:**
- **STEAM OR SUPER HEATED STEAM.**

## PRIORITYS AT THE INCIDENT ABCDEF

Prior to the burn injury victim being seen by the paramedic or medical staff, rapid assessment and treatment can be life saving. Appropriate treatment at this stage can at the very least minimise the severity of the burn injury, and speed recovery times.

After removing the patient from danger a primary survey is carried out.
Due to the visual impact a burn injury presents, do not be distracted to treat the burn. Consider the **ABCDEF's** first. This may reveal a more life threatening condition.

**PRIMARY SURVEY.**

**A. AIRWAY MANAGEMENT WITH CONTROL OF THE SEVICAL SPINE.**

**B BREATHING AND VENTILATION.**

**C CIRCULATION WITH CONTROL OF BLEEDING.**

**D DISABILITY: I.E. NEURLOGICAL STATUS.**

**E EXPOSURE AND ENVIRONMENTAL CONTROL.**

**F FLUID RESUSITATION.**

## A AIRWAY MAINTENANCE AND CONTROL OF THE CERVICAL SPINE.

Clear the airway of foreign matter and maintain the airway open by means of a jaw thrust/chin lift. Keep movement of the cervical spine to a minimum and never hyperflex or hyperextend the head and neck.
At this point look for the tell tale signs of smoke inhalation.

**THESE ARE:**

- **BURNS TO MOUTH, NOSE AND PHARYNX**
- **PHLEGM CONTAINING SOOT**
- **CHANGE OF VOICE AND HOARSE COUGH**
- **BREATHING DIFICULTY**
- **SINGED NASEL HAIR**
- **NOISY BREATHING**

## B BREATHING AND VENTILATION

Expose the chest and ensure the chest expansion is adequate and equal, checking for circumferential chest burns witch may restrict the breathing.

Ventilate via a bag and mask and insert an airway if necessary, and always provide supplementary oxygen.

**C CICULATION WITH HAEMORRHAGE CONTROL**.

Stop the bleeding with direct pressure and elevate the effected part if possible.
Check the pulse –is it weak or strong?
Do a capillary refill test to determine if blood flow is present in the effected area.

**CAPILLARY REFILL TEST**. - Pinch the nail bed of a finger or toe for 5 seconds.
In a normal patient the colour should return within 2 seconds.
If not this may indicate that the patient is suffering from a reduced blood circulation (hypovalemia), or shock.

**D DISABILITY –NEUROLOGICAL STATUS**.

Establish the patients level of consciousness
This can be performed by the use of the pneumonic **A.V.P.U.**

| | |
|---|---|
| **A** | **IS THE PATIENT ALERT.** |
| **V** | **DOES THE PATIENT RESPOND TO A VOCAL STIMULI.** |
| **P** | **DOES THE PATIENT RESPOND TO A PAINFUL STIMULI.** |
| **U** | **IS THE PATIENT UNRESPONSIVE.** |

Note: painful stimuli can be achieved by pinching the eyelid.

Examine the pupilary response to light by shining a pencil torch into each eye. They should be brisk and equal
This can be represented by the pneumonic,
**P.E.A.R.L.**
**PUPILS EQUAL AND REACTIVE TO LIGHT.**

**E EXPOSURE AND ENVIROMENTAL CONTROL**.

Remove clothing that may be wet or contaminated (i.e. chemical).
Leave clothing on that has attached itself due to fire.
Remove all items of jewellery from the effected areas as this can cause problems witch will be discussed later.

**F FLUID RESUSITATION**

This is usually performed by trained personnel and in the hospital environment.
It is beyond the training of a firefighter and will not be discussed at this present time.

**STOPPING THE BURNING PROCESS**

The burn surface should be cooled with cold running water
The ideal temperature is 15 degrees centigrade, and the range that is useful is between 8 and 25 degrees centigrade.
The technique of application is by flowing cold water over the wound if that is possible.

Spraying or sponging over the wound is also quiet effective. Wet towels are less efficient as they are not in contact with the burn wound in all areas. They quickly heat up due to the proximity of them to the body. Wet towels should not be left in place when the casualty is transported.

There are different thoughts on the length of cooling.
These very from 5 to 20 minutes. It must be taken into consideration the ambient temperature at the time.
If the degree of burning is such that the dermis or subcutaneous tissue are damaged, very little pain or no pain will be experienced.
The effect of continuous amounts of water can have a detrimental effect. This being the constriction of blood vessels to the damaged areas. This in turn can cause irreversible damage and the effected part can die
Another concern is the onset of **hypothermia.**

**HYPOTHERMIA IS DEFINED AS THE COOLING DOWN OF THE CORE BODY TEMPERATURE. IF NOT CORRECTED IT CAN BE LIFE THREATENING.**

Although hypothermia is associated with cold climates it still can effect the patient who is exposed to warmer climes. A typical situation is a cool rainy day.
The onset of hypothermia can take place in moderate temperatures even at 15 degrees centigrade. In fact study's at major burn trauma centres have found that over cooling of burns victims presents a far greater problem than the injury itself.
A special case to consider is hypothermia in burns to small children.

**Hypothermia** in children is due to a number of factors:

- **THEY HAVE A LARGER SURFACE TO MASS RATIO.**
- **CHILDREN UNDER ONE HAVE NO SHIVERING REFLEX.**
- **OLDER CHILDREN HAVE A SMALL MUSCLE BULK SO SHIVERING IS LESS EFFICIENT.**
- **SMALLER BODY MASS MEANS A SMALLER HEAT CONTENT.**

This risk needs to be borne in mind during first aid (cooling) which should be applied to only that area that needs it.
Keep the rest of the body warm and dry.

## TREATMENT OF THE BURN

Infection is a significant cause of mortality in burns victims, and wound care should start as early as possible to reduce the risk of infection.

A recent development in the care of burns is to prevent the infection by laying non-PVC cling-film onto the effected parts.

This not only keeps the burn from the environment but it limits evaporation and thus heat lost. Is also painless to remove.

Do not apply lotions or creams to the burns.

Do not break blisters as this increases fluid loss and may increase the possibility of infection.

## RINGS AND WATCHES

Once a patient receives a burn injury, as an example a scald to a hand, swelling will quickly occur. The patient may be wearing jewellery such as rings or a metal strap of a watch.
Fingers can increase in size dramatically. If a ring is still being worn, this will cut of the blood supply to the finger and cause irreversible damage.
Theses must be removed as soon as possible, by means of a ring cutter.

## ASSESSING THE SEVERITY OF THE BURN.

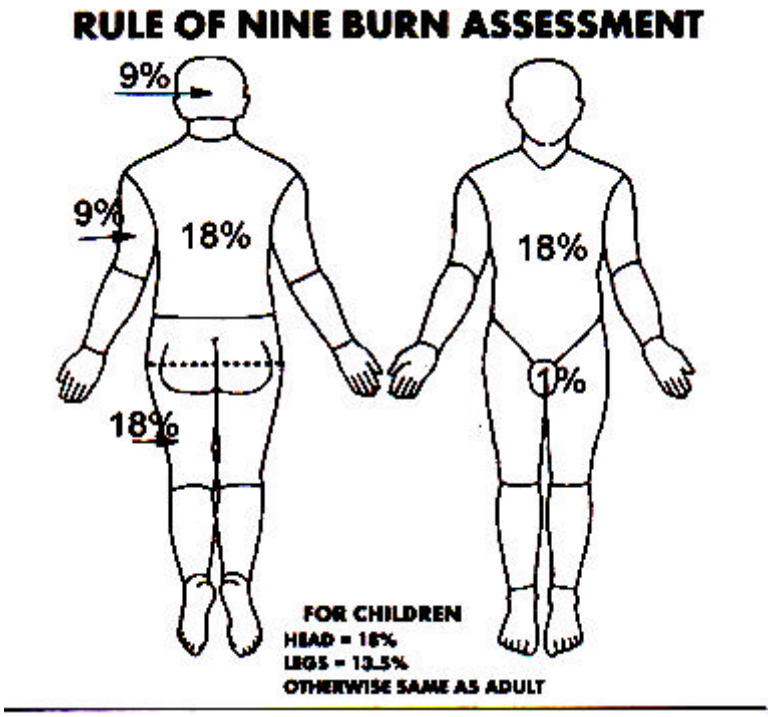
Whatever the cause of a burn, the amount of tissue damage must be assessed. To quantify this, one must calculate the total area of the body involved with the injury, and estimate the depth and damage to the skin. The history of the event will often give a very good idea to what degree of damage to expect.

**THIS IS BASED ON**:

- **TYPE OF INJURING AGENT.**
- **TIME OF EXPOSURE TO IT.**
- **THE FIRST AID RECEIVED**.

## ESTIMATION OF THE BURN AREA

Practical assessment of the burn area can be accomplished by using,
**"THE RULE OF NINE".**
This rule divides the body into areas of nine percent.




THE DIAGRAM SHOWS THE FOLLOWING FOR AN ADULT.

**9% FOR THE HEAD.**

**18% FOR THE FRONT TORSO.**

**18% FOR THE REAR TORSO INCLUDING THE BUTTOCKS.**

**18%  9% FOR EACH ARM.**

**36%  18%  FOR EACH LEG.**

**1%  FOR THE PERINEUM.**

**=100%  TOTAL BODY AREA.**

In the case of a child the amounts are slightly different.

Head represents 18% and the legs 14%.
A method for estimating small areas is to use the patients own hand palm area, which approximates 1% of their own body surface area.

**ESTIMATION OF THE DEPTH OF BURN**

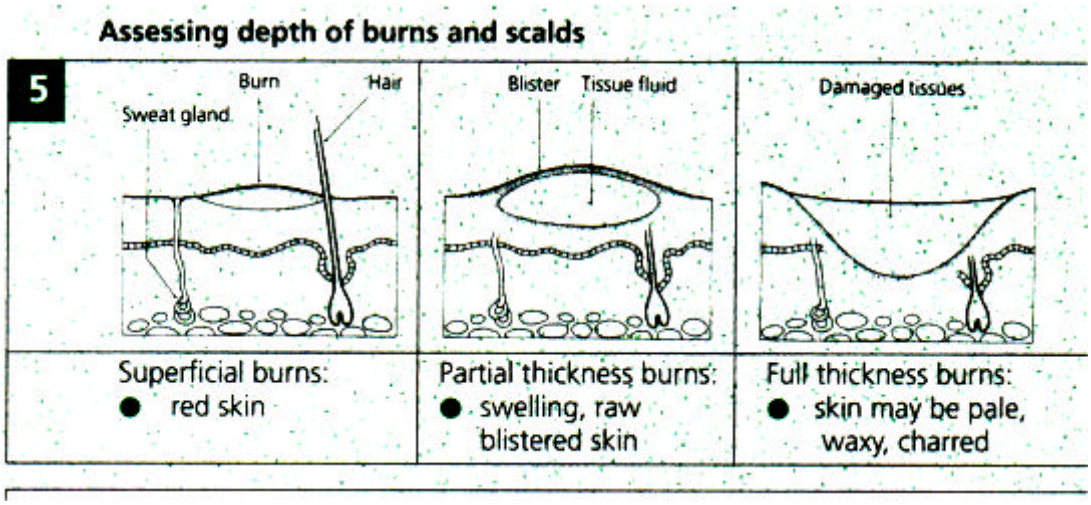
**STRUCTURE AND FUNCTION OF THE SKIN**

The skin consists of two parts, the **EPIDERMIS** and the **DERMIS.**

The epidermis is the superficial, thinner layer, that is responsible for limiting the evaporation of water from the body and is consistently being reproduced.

The dermis is the deeper, thicker layer that provides the strength and durability to the skin.
The dermis contains the blood supply and the sensory nerves of the skin. The dermis also contains the hair follicles and sebaceous glands and sweat glands.

Underneath the dermis lies the padding layers of subcutaneous fat, which separate the skin from the deeper muscular and bony structure.




## DEPTH OF A BURN

Burns are classified as being **superficial, partial thickness, or full thickness.**

### SUPERFICIAL

The skin injury is only to the epidermis and the skin appears red with no blister formation. Early on it can be difficult to distinguish these burns from partial thickness injuries. Superficial burns will heal with no scarring.

### PARTIAL THICKNESS

Partial thickness burns cause some damage to the dermis, blistering is usually seen and the skin is pink or mottled.
These burns are very painful and need regular dressing to prevent infection. They will heal with no scarring as long as infection does not intervene.

### FULL THICKNESS

Deeper full thickness burns damage both the epidermis and the dermis, and may cause injury to deeper structures as well. The skin looks white or charred, and is painless and leathery to the touch.

## SURVIVABILITY OF A BURN

Study of large populations of thermal burn injuries have shown the factors important in the prediction of survival as follows:

- **TOTAL BODY SURFACE AREA INJURED (TBSA).**
- **AGE OF THE PATIENT.**
- **PRESENCE OF AN INHALATION INJURY.**
- **PRE-EXISTING ILLNESS.**

**BODY SURFACE AREA** is only estimated in areas of partial or full thickness burns.

**AGE OF THE PATIENT** has a significant impact on survival.
The very old and the very young respond poorly to burn injury.
For patients that are more than 50 years old, there is a gradual increase in mortality from burns. This is due to the body's general inability to respond to massive trauma.
The gradual decrease in survival can be estimated by adding the patient's age to the total body surface area of partial and full thickness burns.
Example:

**50 (AGE ) + 40 (%TBSA)= 90% PROBABILITY OF MORTALITY**

**PULMONARY INJURY** (relating to or effecting the lungs) and **SEPSIS** (the destruction of tissue by disease-causing bacteria or their toxins) are the major components that effect the patients overall outcome.

**PRE-EXISTING MEDICAL CONDITIONS** usually increase with age and are a part of the reason that age is an important factor in determining how critical burn injuries are.

## SUMMARY

**BURNS AND RELATED INJURIES**

1} Do not become a victim yourself; address potential safety Threats to crews and patient immediately upon arrival at the incident.

2} Airway management is the most important consideration for the burnt patient.

3} All patients suspected of inhalation injuries must receive supplementary oxygen.

4} The primary cause of shock in the severely burnt patient is Hypovolemia (lack of blood circularly fluid).
This should be treated with proper fluid replacement.

5} Most chemical injuries should be irrigated with copious amounts of water.

6} Consider when cooling the possibility of the onset of Hypothermia and constriction of blood vessels.

7} Burns patients should be transported without delay to an appropriate specialist unit.

**IN THE SEVERELY INJURED PATIENT-** ***First treat the trauma and systemic effects of the burn, then treat the burn.***

## CONCLUSION

There has been a drop in serious injury and deaths in the home enviroment. This may be due to a better education of the population in fire prevention and safety, by consorted efforts by fire brigades, and press and television coverage.
Better methods of treatment have developed from the first responder to the hospital environment
But let's not get complacent in our efforts.