Turning up the Heat on Burns

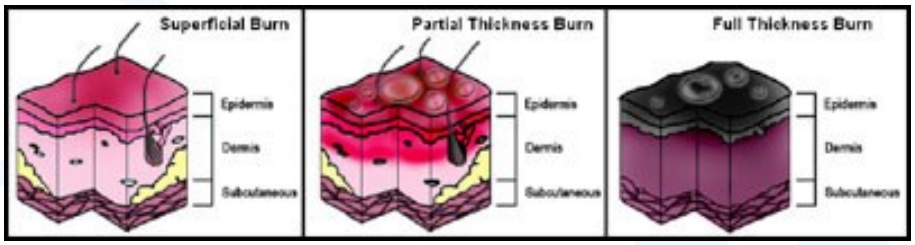
Burns remain a significant cause of death in both adult and paediatric patients in South Africa. Globally, it is estimated that an average of 300 000 people die yearly from fire related injuries alone. Burns in children are reported to be amongst the most prevalent traumatic injuries around the world. In low income countries, and vulnerable populations, burn injuries are reported to be the third most common cause of death in children aged 5 to 14 years, with road traffic injuries and drowning being first and second respectively

Given the socio-economic climate in South Africa, more and more people are making use of non-electrical means of keeping warm during the winter months. Further to this, the large population of South Africans living in informal settlements and structurally unsound dwellings also contributes significantly to the potential for fire related accidents. Over-populated homes can easily result in the "bumping over" of a source of heat with devastating consequences.

Fire related incidents pose a threat to both the patient and the Emergency Care Provider. Compressed gas cylinders used to fuel cooking equipment are common place in both informal and formal settlements. With escalating electricity costs, more people are making use of gas for both cooking and as a source of warmth. These cylinders pose a huge threat to the Emergency Care Provider when performing search and recovery operations at the scene of a fire. I have personally witnessed a number of gas cylinders exploding at regular intervals during large multiple dwelling fires. Extreme caution should thus be used during these types of operations.

Classification of Burns

Burn injuries are classified according to the depth of tissue damage and response by the skin to the insult. They are classified into superficial (1st degree), partial thickness (2nd degree) and full thickness burns (3rd degree).



Superficial burns result in 'relatively' minor tissue damage to the outer portion of the Epidermis only. Even so, superficial burns result in a very intense and painful inflammatory response. Skin "reddening" is characteristic of superficial burns. The most commonly encountered aetiology is extended sun exposure, resulting in "sunburn".

In most cases, formal medical treatment is not required, although various topical medications can be applied to speed up recovery and reduce the painful inflammatory response associated with it. Burn-Eaz™ Gel (see product showcase column) manufactured and trademarked by Be Safe Paramedical has received excellent results and reviews and is particularly effective for superficial burns associated with "sunburn".

Partial-thickness burns cause tissue damage through the Epidermis layer and depending on the intensity and duration of the heat

source, to variable depths of the Dermis. Partial-thickness burns usually result in the formation of blisters which often weep. These burns usually heal without scaring, largely because the deeper hair follicles and sweat glands will multiply thereby growing new skin during the healing process.

Antibiotic creams and medicated dressings are often used to sooth the injured tissue and aid in the healing process. Burn-Eaz™ is available in 10cm X 10cm, 20cm X 20cm and 60cm X 40cm dressings and are extremely effective in initiating the cooling process during the acute phase of care. In addition to medicated dressings, analgesics should be titrated against effect with Morphine being one of the most effective and commonly administered medications in the field for burns.

Full-thickness burns result in damage to all layers of both the Epidermis and Dermis. Effectively all skin layers are damaged leaving none for regrowth during healing. As a result Full-thickness burns are associated with severe scaring which may contract and reduce movement. This is of particular concern when associated with burns to the chest.

Contracted scar tissue on the chest may reduce the ability for the chest to expand during respiration resulting in respiratory failure. Deeper Full-thickness burns cause skin protein to become denatured and board-like, resulting in a leather-like covering.

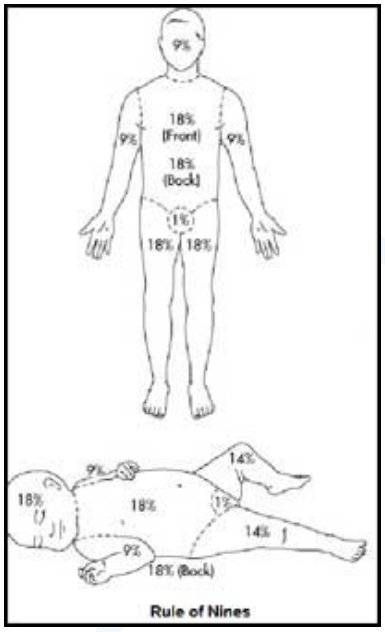
Full-thickness burns also result in extensive damage to nerve endings and microvasculature. In essence this means that pain sensation will be depressed, however analgesics should not be withheld and should once again be titrated to affect. The damage to microvasculature results in large plasma volume loss, infection and sepsis.

In the acute phase of care, focus should be on stopping the burning process (this includes removal of all clothing as some materials smoulder for long periods following removal from heat source causing further burns), cooling (with water), and application of medicated dressing such as Burn-Eaz™, supportive care to airway (pay special attention to the possibility of inhalation burns with oedema), breathing and circulation (including fluid replacement if required), pain management, and referral.

Assessing Burnt Surface Area

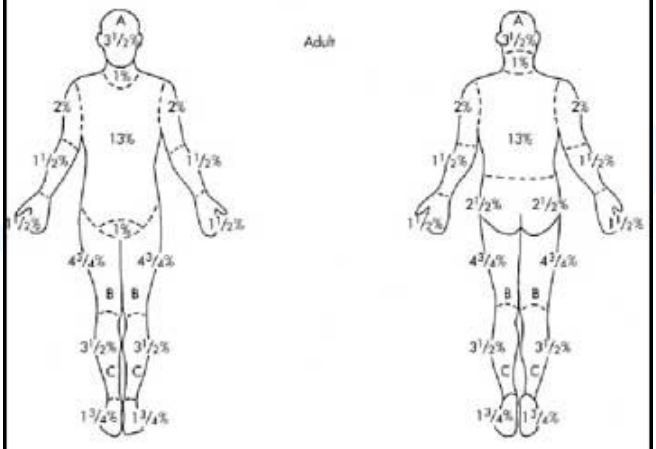
In the field, the Rule of Nines is commonly used to estimate burnt surface area in Partial-thickness and Full-thickness burns. In smaller children there are some differences in body-size proportions and a Lund and Browder chart may prove helpful.

In irregular surface area burns, using the patient's hand (relates to 1% Total Body Surface Area) to measure burnt surface area can be used as a very rough guide.



Rule of Nines

Age	0-1	1-4	5-9	10-14	15
A—½ of head	9½%	8½%	6½%	5½%	4½%
B—½ of one thigh	2¾%	3¼%	4%	4¼%	4½%
C—½ of one leg	2½%	2½%	2¾%	3%	3¼%



Lund and Browder Chart

Fluid Resuscitation in Burns

In the initial resuscitation phase of care, crystalloids are the fluids of choice over colloids. This is because burns are associated with an increase in capillary permeability which prevents the creation of an osmotic gradient between the intravascular and extravascular spaces. This results in colloids quickly equilibrating across the capillary barrier and into the interstitial space.

Crystalloids should be administered over the first 24-hours, by which time, capillary permeability moves towards normal and colloids can be considered in the second 24-hour period.

When transferring burns patients via air or road, it may be necessary to initiate and manage fluid replacement for the duration of the transfer. The Consensus Formula is a formula combining the Parkland Formula and the Modified Brooke Formula and allows for calculation of fluids to be administered within the first 24-hours following the burn.

Equation -First 24-hours:

2-4 ml Crystalloid multiplied by kg's (patient's mass) multiplied by percent Total Body Surface Area burn

- 50% of the calculated amount to be infused in the first 8-hours
- 25% of calculated amount to be infused in the second 8-hours
- 25% of the calculated amount to be infused in the third 8-hours

Fluid administration goes hand-in-hand with continuous assessment including vital signs, respiratory rate and quality (lung sounds) urine output and capillary refill. Fluid should never simply be 'poured' in. Careful planning, monitoring and adjustment to needs are paramount.

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