
“First Aid for Fires”

Tania Duratovic

FIRE FIRST AID FOR FAUNA

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ABSTRACT

With bushfires becoming more frequent in some parts of Australia, wildlife carers will increasingly be involved in rescuing animal victims. Whilst all animals sustaining burn injuries should receive medical attention from a veterinarian, providing first aid as soon as the animal is rescued will make a significant difference to the patient and their recovery. As with any victim of trauma, the general principles of first aid apply, that is, danger, response, airway, breathing, and circulation. Life threatening injuries must be tended to first. Subsequently the burn and other injuries can be initially dealt with. Wildlife carers and first responders should not underestimate the effect they can have on the outcome of an animal affected by fire.

INTRODUCTION

Any animals affected by fire should be given first aid then assessed by a veterinary surgeon as soon as possible. Any delay to treatment will compromise the patient and lead to a worse outcome.

Burns are complicated injuries which require specific medical treatment and management. Whilst the treatment of burns will always require veterinary attention, there is much a carer can do beforehand that will go a long way towards the recovery of the patient.

A first responder's priorities in a bushfire are:

- Check that it is safe to approach the animal (whilst you are wearing PPE)
- Capture the animal and remove to a safe area
- Apply first aid
- Stop the burning and cool the burn wound
- Treat for shock
- Transport patient for veterinary treatment

BURNS TO THE SKIN

In order to understand burns and what happens when skin is damaged, one needs to understand the role of the skin, the largest organ in the body. There are five functions of the skin which make it so important:

1. Protection
2. Fluid balance
3. Thermo-regulation
4. Sensory organ
5. Produces vitamins

The body is continuously replacing the skin.

The skin has three layers:

Epidermis	the outermost layer. It does not have a blood supply
Dermis	middle layer of skin with nerves and blood supply
Subcutaneous	tissues underneath the skin above the muscles

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BURN DEPTH & EXTENT

The depth of a burn is used to determine the long-term prognosis as well as the treatment and management of the burn injury.

The depth of the burn is ascertained by making a subjective assessment of the characteristics of the injury. Each veterinary surgeon will vary on what they decide.

Burns are evolving wounds and hence need to be frequently reassessed by a veterinarian as oedema and exudate changes. This is particularly the case with intermediate or mid-dermal burns which are difficult to assess in the first few days after injury.

Burns are generally classified into three types:

- superficial/epidermal burns,
- partial thickness burns, and
- full thickness burns (see Table 1 below).

The depth of most burn wounds, particularly those likely to be encountered in bushfire victims, is not homogenous. Frequently all three types of burn will occur with the same burn wound. The depth may change with time especially if infection occurs (which it commonly does in wildlife since they don't come into care until quite some time after injury was sustained so the wound becomes dirty).

Table 1: Characteristics of different burn types according to depth

	Superficial epidermal (1st degree)	Superficial dermal (superficial partial thickness)	Mid dermal partial thickness	Deep dermal (deep partial thickness)	Full thickness (3rd degree)
Pathology	Epidermis only	Epidermis & upper dermis, most adnexal structures intact	Epidermis & part of the dermis. superficial adnexal structures affected.	Epidermis & significant part of dermis, only deeper adnexal structures intact.	Epidermis, dermis & cell adnexal structures destroyed
Appearance	Dry, red (erythema), glistening, moist	red, pale pink	dark pink to red	dry, blotchy/ mottled & cherry red or white	dry, leathery, white, black (charred) or yellow. Eschar may be present.
Blisters	none	large within hours	may be	sometimes	none
Capillary refill	quick	quick but slower return	sluggish	severely delayed or absent	absent
Sensation	painful	very painful	less painful	decreased	absent

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As well as depth of burn, timely and accurate estimation of the extent of the burn needs to be assessed by a veterinarian in order to determine appropriate management, promote rapid healing and avoid complications.

The extent of a burn is expressed in terms of the percentage of total body surface area affected.

FACIAL & RESPIRATORY BURNS

Many more animals will die from pulmonary insufficiency caused by the inhalation of heat and smoke than directly from the bushfire itself. Hence, management of the airway is a priority. One should suspect damage to the mouth, nasal cavity, airways, lungs and oesophagus if there is evidence of facial burns, even if minor, or even just soot in the nose and mouth or singed facial hairs. This can be life threatening early or progressively as facial swelling worsens. Upper airway obstruction may result due to smoke inhalation even if there are no visible burns on the face.

PROVIDING FIRST AID

Any animals affected by fire should be given first aid, including pain relief, then assessed by a veterinarian as soon as possible. Any delay to treatment will compromise the patient and lead to a worse outcome.

The main objectives in providing first aid are to:

- Keep the animal alive
- Make the animal comfortable
- Provide pain relief
- Prevent the condition becoming worse

First aid is only the initial actions that a rescuer can provide. It does not provide diagnosis or medical treatment, which is something that the veterinary surgeon will do.

Burns patients should be initially assessed in the same way all trauma patients are. The aim is to identify life threatening injuries with particular attention in a burns victim to the airway and breathing. In order to provide effective first aid, a responder must know what is 'normal' for a particular species and recognise an emergency.

The basis for all first aid is DRABC – that is, Danger, Response, Airway, Breathing, and Circulation. Airway, breathing, and circulation are assessed consecutively. This is followed by an examination for sources of haemorrhage, and then an assessment of the level of consciousness and level of pain the patient is experiencing. The golden rule of emergency medicine is to treat the most life-threatening problems first.

Danger

Before attempting to capture the animal for assessment and treatment, you must check that it is safe to do so – to you, to others, and to the animal. Assess the scene - hazards on the fireground are many from falling trees and powerlines to changes in wind direction; the animal will be frightened and may react in a way that causes you injury or further injuries to itself; and it also may be of a species that requires a specialist handler.

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Response

There are two responses to consider:

1) Your response as the rescuer.

Plan how you will approach the situation and what assistance you require. How will you reduce the likelihood of getting bitten, scratched or kicked? Is there a risk of zoonosis or envenomation? Assess how you will actually capture the animal, lift it and transport it.

2) The animal's response. Check the animal's level of consciousness – it may be conscious, semi-conscious, or unconscious. This may be assessed later - after airway, breathing, circulation and an examination for sources of haemorrhage are assessed.

Airway

Make sure that the airway is clear and that the animal is able to breathe. If the animal is unconscious, check the mouth and remove any obstructions, pull out the tongue and extend the head. Observe the breathing pattern.

In all animal patients that come in (either conscious or unconscious), assess for respiratory distress, black/sooty sputum, singed facial hair/fur, facial swelling, cough, open mouth breathing, increased respiratory rate, nasal discharge, panic/irritability, upper airway oedema.

If any of the above are present, the airway is at risk. Intubation by a veterinarian may be necessary.

Breathing

Breathing should be assessed and support provided as necessary. Escharotomy (a surgical procedure) may be required where there are circumferential burns on the chest wall.

Compromised breathing develops with increased respiratory rate and effort. A change in respiratory pattern immediately follows. Those involved in the rescue and treatment of bushfire victims should familiarise themselves beforehand with what signs indicate compromised breathing in various animals. Later signs of breathing distress are open-mouth breathing, changes in mucous membrane colour (grey and/or blue, ie, cyanosis). By this stage, there has been significant loss of pulmonary function and pulmonary arrest is imminent without veterinary intervention.

If the animal is not breathing but there is a heart beat or a pulse, artificial respiration should be commenced.

Circulation

Check for circulation as well as heartbeat, pulse rate and quality, mucous membrane colour and capillary refill time. Check if there is any bleeding and if so, establish where it is coming from and attempt to control it.

If the animal is not breathing and there is no pulse/heart beat, then cardiopulmonary resuscitation (CPR) should commence immediately.

Haemorrhage

If there is any bleeding, control it. Generally pressure applied to the bleeding area is effective. Use a sterile clean non-stick pad and a bandage. Do not apply cotton wool directly onto the wound as it will stick and present complications. If possible and appropriate, elevate and immobilize the affected area.

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Cool the burn wound

Cooling a thermal burn wound with tepid, running water (12-18°C) removes heat and thereby minimises the progression of the burn and tissue damage. It also decreases pain, cleans the wound, and minimises swelling.

The evidence on the duration of cooling is unclear, however, the current general consensus is that it should be done for up to 30 minutes. This is useful up to 3 hours post injury. In the case of wildlife rescue in bushfires, in most situations, it is unlikely a responder will be there within 3 hours of the injury occurring. Nevertheless, flushing the wound with tepid running water will still provide relief and clean the wound. Wildlife coming into care will have dirty wounds and hence flushing will also assist in removing debris.

If running water is not available, the affected area can be immersed in water or wet towels/compresses or hydrogels can be used. These should also only be left on for up to 20-30 minutes.

Cooling is most beneficial for minor partial thickness burns. Prolonged cooling of large burns can lead to hypothermia. And prolonged cooling of deep burns is unlikely to be useful.

Ice or very cold water should not be used on burns as it can cause vasoconstriction and can worsen the injury by reducing blood supply.

Be aware of the risk of hypothermia. It is important to keep the patient warm. Cool the burn and not the patient.

Do not use butter, ointments, oil, salves, or creams as they may retain heat and worsen the injury also.

Ocular burns

Eyes require urgent attention. If it is suspected that the patient has suffered facial burns, there is crusting around the eyelids, weeping, the eyes are closed, squinting, or appear blinded, then assume the eyes have been affected. Eyes can be affected by the fire itself, from the heat, smoke or debris. Immediate first aid is needed and can make a tremendous difference to the patient's outcome.

Flush the eyes with copious amounts of saline or clean tepid water immediately. Continue to flush for up to 15 minutes. As with the effects of cooling, the flushing will prevent progression of further damage and provide instant relief to the patient.

Cover the burn

Generally, after cooling a burn, it should be covered, particularly where the wound surface is blistered and/or raw. Covering the burn helps to prevent bacterial colonisation as well as desiccation, and relieves pain from exposed nerve endings.

Cover the burn wound with a sterile non-stick dressing or clean cloth if no dressing is available until definitive management by a veterinarian can be given. The preferred initial dressing until a veterinarian is available, is Acticoat moistened with sterile water followed with sterile water compresses and dry gauze.

If no sterile non-stick dressing is available, an excellent emergency dressing to use is clean plastic film wrap (ie, cling wrap, Glad Wrap etc). This should be applied in strips over the wound rather than circumferentially as this can cause constriction (ie, can have a tourniquet effect as oedema worsens).

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This covering is suitable for several hours assuming the burn has already been cooled (as retains heat). Additionally, a layer of padding such as Sofspan is recommended followed by a crepe bandage and outer layer such as Vetwrap.

Do not apply any creams or ointments at this stage. This may hinder burns assessment.

Note that in hot, humid subtropical climates burn dressings become rapidly saturated and infected so burn wounds should be left uncovered.

PAIN RELIEF

Pain can be severe in burns victims and is often managed inadequately, particularly in animals. Early and adequate pain relief is not only compassionate, but will assist in the healing process. It helps prevent neuropathic pain syndrome, improves healing of all tissues, makes the patient feel better, precludes self-harm, and avoids other potential problems.

There are many ways to manage or control pain. The method depends on what is appropriate for the situation and for the patient. Factors influencing this will include the experience of those involved and available techniques, the patient (eg, species, age, degree of injury), and access to nearest veterinarian.

Physical Pain Management

As a first response in a bushfire situation when rescuing animals, physical pain management would be undertaken. This may include:

- Manual restraint – eg holding wings, legs, neck, tail
- Flushing of eyes – cooling effect plus flushes foreign matter
- Cooling of burns
- Application of splints, bandages, to reduce mobility if injured
- Calming devices – bag, towel, box
- Stress management – minimising noises, handling

Whilst some animals may be sedated for capture/transport, be aware that sedation is not analgesia. It does not provide pain relief.

Chemical Pain Management

On the fire ground, rescuers can provide initial pain relief to wildlife via drugs available to them/the veterinarian. For example, for mammals only, giving paracetamol in the form of ‘Painstop Daytime’ oral liquid will provide mild to moderate pain relief for the animal (the dose rate is 10mg per kg of bodyweight). It acts by centrally and peripherally inhibiting pain. Contrary to popular belief, paracetamol can be safely given to mammalian wildlife fauna and has been used successfully by the author under veterinary direction for many years.

Should a veterinarian be with the response team, other drugs can be used. Many people use the non-steroidal anti-inflammatory drug, Meloxicam, in animal patients. Whilst this drug has its uses, it is not an analgesic and not recommended for pain relief in bushfire burns victims as it may result in complications particularly in animals suffering from dehydration. Rather than wait several hours until the animal is hydrated, it is much more appropriate and kinder to give immediate pain relief with a product more suitable for the situation at hand.

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SHOCK

It can be assumed that most wildlife rescued from fires will be suffering from shock and dehydration. Hence, after providing first aid and initial assessment, the animal should be kept warm somewhere dark and quiet whilst awaiting veterinary attention.

It is tempting to think that because the animal has been a victim of fire and perhaps the weather outside is still hot, it needs to be kept in a cool environment. This is not true. An animal suffering from shock needs to be kept warm.

Clinical shock can be fatal if left untreated. Shock is an emergency situation and the patient must see a veterinarian for treatment.

On the fireground, administering an initial amount of fluid will not only help to address shock, but will make the animal feel better.

FLUIDS

Bushfire victims will always benefit from fluid therapy. A major burn can result in major fluid and nutrient loss. Large fluid loss from burns can result in hypovolaemia, thrombosis, tissue death, poor circulation, protein loss, renal failure and even death.

Burns victims are always stressed, dehydrated and usually in shock. Their situation can be life threatening. Fluids are essential and parenteral (by injection) fluids in this situation are better than oral. Giving fluids will also help to make the animal feel better.

Fluid therapy should be initiated as soon as possible. The appropriate administration of fluids directly improves the survival of burns patients.

A general formula for fluid therapy in wildlife burns victims is:

2-5ml x body weight (kg) x % burn plus maintenance fluid
(normal maintenance fluid in wildlife varies from 20ml to 200ml/kg/day).

Rather than delaying transportation of the animal to a veterinarian, it is quickest to assume the animal is 10% dehydrated and has not had any food or drink for 12 to 24 hours. An estimation will need to be made of the animal's weight (assuming there are no scales available). You would not give all the fluid needed in 24 hours at this initial stage. But a portion would be greatly beneficial.

Some animals such as koalas, may drink freely when provided with water. Oral fluids should initially be offered. If the animal is not interested or resists, instead of forcing liquid which can cause aspirational pneumonia, subcutaneous fluid should be administered if someone present knows how to do this. Normal saline or paediatric fluids are the best to give in this situation. Do not give Hartmann's fluid since this contains both lactate and potassium (unless you have done tests to determine these levels in the patient) and can be dangerous when given to animals suffering from myopathy or dehydration.

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OTHER INJURIES

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Once the primary survey has been completed and any life threatening conditions have been dealt with, other injuries not related to burns, may be attended to. These may be incurred as an indirect result from the fire such as whilst fleeing the fire or from being displaced and so more vulnerable to predation in an exposed environment.

Whilst it is critical to get a burns victim to veterinary care as soon as possible, there may be some injuries which should at least be given initial first aid. These include fractures.

Any apparent fracture should be stabilized to avoid all possible movement. This is particularly the case with fractures of the limbs and tail, carapace or plastron in chelonians, and spine in some patients such as snakes. This may involve splinting (including the joints above and below the fracture site), padding and bandaging, a stretcher, or immobilizing by hand.

Stabilizing the fracture will reduce pain and help prevent further damage.

CONCLUSION

Any animals affected by fire should be given first aid then assessed by a veterinary surgeon as soon as possible. Any delay to treatment will compromise the patient and lead to a worse outcome.

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