

Management of Wounds

HOT TIPS	2
GENERAL INFORMATION	3
PROTOCOL FOR WOUND CARE	4
METHODS OF PRIMARY WOUND CLOSURE	5
SPECIFIC SITUATIONS	5
Animal and Human Bites	5
Penetrating/Puncture Wounds	5
Pretibial Flaps	5
Superficial Degloving Injuries	6
Lips and Mucous Membrane	6
Ophthalmic Injuries	6
Ear Injures	6
MANAGEMENT OF BURNS	7
Types of Burning Agents	7
Depth of Burn	7
Extent of Burn	8
MANAGEMENT OF MAJOR AND SERIOUS BURNS	8
MANAGEMENT OF SPECIFIC BURNS.	9
Hand Burns	9
Minor Facial Burns	10
Minor Peripheral Burns	10
Blister Treatment	10
FOLLOW-UP	10
TETANUS PREVENTION	11

Hot Tips

Many patients attending ED with injuries have wounds. Careful, competent and confident management of the wounds could have a life long effect on the patient; remember that they will carry that scar (and the story behind it) for life.

Beware of all retained foreign bodies- especially after accidents with broken china and glass. X-ray all possible radio-opaque FBs especially glass. Glass should always show up although wood is rarely shown in the X-ray. Teeth - remove fragments from lips to prevent sepsis

Severed nerves and tendons must be excluded even in apparently minor or superficial wounds. Examine all wounds carefully. Remember anatomy. Learn to examine the hand and examine it in the position it lay in when the injury occurred.

Puncture wounds may appear superficial but can be far deeper and heavily contaminated. They may need exploration under anaesthetic.

Antibiotics do not prevent infection. Adequate wound toilet and debridement does.

Wounds in the knuckles are human bites until proven otherwise. Don't ignore these wounds in punch injuries

Do not use Flamazine on any burn you are planning to refer to plastics for follow-up unless you have discussed it with them first

Do not forget [tetanus immune status](#).

General Information

A clear accurate history and mechanism of injury is essential to aid examination and consequent management of wounds.

Type	Appearance	Suggested Mechanism
Incision	Clean cut	Surgical wound, Stanley knife, glass
Laceration	Irregular breach of skin	Tear with barbed wire/nail, body being hit/hitting – punch (i.e. blunt injury)
Penetration	Deeper aspect of wound bigger than surface suggests	Stab wound, gunshot
Puncture	Wound surface area suggests depth, often ragged edges	Animal bites, trodden nail.
Abrasion	Friction of skin rubbed against harder/rougher surface, tangential shear.	Cyclist on gravel, children's knees.
Contusion	Crush injury with bruising (bleeding into skin from damaged vessels), often with laceration	Blunt object, punch blows
Burns	Blisters, erythema or necrotic damage caused by chemical, electrical, thermal or radiation sources	Scalds with kettles, battery acid splashes, electrocution, ultraviolet light - arc eye
Degloving	Skin rolled off bone	Trapped limb between printing rollers
Avulsion	Skin removed from underlying tissue attachments by friction	Fingernails caught in machinery
Amputation	Complete/partial severing of tissue.	Finger tips in door hinges, circular saw injury

Additional factors which will affect the healing of the wound include:

1. Haemostats at the wound site
2. Absence of foreign bodies
3. Adequate debridement of dead or devitalised tissue
4. Correct wound apposition
5. Adequate dietary intake
6. Prevention of micro-organism invasion
7. Prevention of further injury

Many of these factors will be influenced by the psychosocial circumstances of the patient (and their relatives), which must always be taken into consideration.

Amputations

Wrap amputated part in moist saline swabs. Place in a sealed plastic bag surrounded by ice.

Refer to orthopaedics if digit/limb or ENT/plastics if ear, nose etc

Protocol for Wound Care

All patients must be made comfortable, couches/trolleys are preferable, and have procedures thoroughly explained and be reassured before wound care is commenced.

All wounds, except those which are less than 1.5cm and where the patient prefers, will be appropriately and effectively anaesthetised using lignocaine 1% or 2%. Bupivacaine 0.25% and 0.5% are also available.

Digital nerve blocks should be performed on patients who are lying on couches, except in the case of small children.

Antibiotics are not a substitute for thorough wound toilet and should never be used in situations where wound toilet is sufficient. All wounds must be thoroughly irrigated either under a running tap or with normal saline, using a 10ml syringe and green needle. All devitalised tissue must be debrided and consideration given to trimming of wound edges where appropriate. The bottom of the wound must be explored in order that the involvement of deeper structures can be excluded. If in any doubt regarding deeper structures please refer to a more senior colleague or nurse practitioner.

If x-raying a wound for foreign bodies or fractures, please ensure adequate pain relief has been provided prior to x-ray and that the wound is covered and elevated where necessary.

All wounds that have been sustained on smashed glass or ceramic must be X-rayed for retained foreign body

Remember to check [tetanus immune status](#).

Methods of primary wound closure

This Department does not use staples. The following methods are available:

- **Steristrips** are good for superficial, dry wounds, away from joints. Care must be taken not to put underlying tissues under tension, especially in flap lacerations. Advise the patient to leave in situ 7-10 days and remove carefully or soak off.
- **Glue** is good for superficial, small dry wounds with no tension especially in children and in cosmetically important areas. Not suitable for flap lacerations or any situation where there is a danger of the glue entering the wound. The glue will act as a scab and so does not need formal removal
- **Sutures** are used for most wounds that are not shallow and dry. Use 6'0 for face, 4'0 for upper limb and 3'0 for lower limb wounds.

Removal of sutures:

Scalp	7 days for small wounds, 10 days for large, deep wounds
Face	5 (consider scar support with Steristrips post removal)
Upper Limb	10 days
Lower Limb	10 - 14 days - take to limit when over joints
Trunk	10 - 14 days - extensor surfaces.

Specific Situations

Animal and Human Bites

Most bite wounds are crush injuries and some dogs (and humans) have powerful jaws, do not forget to rule out bony injury and tooth foreign body where appropriate.

Thorough cleaning is essential, cleaning the wound under a running tap is best; the patient will probably need local infiltration of anaesthetic before this.

We do not suture bite wounds; if there will be a resultant cosmetic problem, e.g. facial bites, refer to plastics.

Human bites need Augmentin, as do deep animal bites

Wounds in the knuckles are human bites until proven otherwise. Don't ignore these wounds in punch injuries

Penetrating/Puncture Wounds

Check for foreign bodies, Steristrip/stitch depending on depth and seepage, consider antibiotic cover.

Pretibial Flaps

Where greatest dimension is >2cm and there is complete loss of skin flap or doubtful viability of the flap discuss with ED senior.

Others - check blood supply to flap, ensure no haematomas under flap, oppose wound edges and Steristrip if this can be done without tension on the flap. If not lay the flap down as far as you are able and dress with Jelonet. Do not be tempted to pull on the flap in order to achieve opposition of wound edges.

If deep consider catgut sutures to subcutaneous layer for support. Encourage high elevation of limb for 10 - 14 days.

Significant wounds (as detailed above) should be followed up in Central Treatment Suite, next available appointment.

Other wounds should be seen by GP/DN in 3/7 to check blood supply to flap.

Superficial Degloving Injuries

- **Small:** Check blood supply to flap, ensure no haematomas under flap, oppose wound edges, check for skin loss. Steristrip, consider catgut support if deep, consider Jelonet if any skin loss, gauze and cotton bandage/Mefix. Central Treatment Suite review within 3 days to check flap or if hand injury, refer to Hand Clinic
- **Large:** Analgesia, refer to plastics or orthopaedics as appropriate

Lips and Mucous Membrane

- **Large:** refer to maxillofacial or plastics
- **Smaller:** if orbicularis oris intact, very careful alignment of vermilion and suture
- **Small:** clean and leave to heal with no intervention

Discharged patients should receive advice regarding oral and dental hygiene.

Ophthalmic Injuries

Large lacerations to lids or lacerations involving lachrymal apparatus - refer to ophthalmic team.

Ear Injuries

If involving pinnal cartilage – refer ENT

Management of Burns

Types of Burning Agents

Wet Heat

Scalds from hot water / drinks are usually superficial. Water straight from the kettle may cause full thickness loss. Steam especially if superheated and boiling fat will cause deeper burns.

Dry Heat

Flame burns from matches, cigarettes, irons, ovens etc are common but although deep are usually small.

Burning clothing and petrol burns are commonly serious.

Chemicals

All chemical must be removed by copious lavage

- **Cement:** Lime in cement causes severe alkaline burns when the dry powder reacts with moisture on the skin.
- **Hydrofluoric Acid:** This industrial chemical needs copious lavage and application of calcium gluconate gel / injection of calcium gluconate into the area.
- **Phenol:** If the area burned is large enough absorption may take place to cause renal failure.

Electrical Burns

The degree of damage increases with higher voltages. Most domestic supply burns give a localised deep burn at the point of entry but occasionally the skin is relatively spared with major damage present to underlying structures.

Depth of Burn

Erythema: Simple redness which causes no skin loss and doesn't scar.

Superficial Partial Thickness: The skin is red, weeping and tender with thin-walled blisters. Heals quickly with little scarring.

Deep Partial Thickness: Whiter than superficial partial thickness with thicker walled blisters. Follicles may appear as red puncta. Will heal with scarring and if extensive will need grafting.

Full Thickness: Hard, leathery and insensitive, white and waxy in appearance. Coagulated vessels may be noted. These will require grafting.

Extent of Burn

There is a tendency to overestimate % Body Surface Area (BSA) burned.
Simple erythema should not be included in calculation of % BSA burned.

Estimation of BSA burned is done by one of two methods:

- Body charts (e.g. Lund & Browder). Draw the extent of the burn on the chart and add the percentages. Special charts apply to children as their relative body proportions vary at different ages.
- "Rule of Nines". This cannot be used in children for the above reasons. The patient's hand (palm of the hand excluding digits) equates to 1% BSA.

Please note that our Plastic Surgery Department does not manage children with significant burns. These are normally transferred to Birmingham Children's Hospital. If a child appears to have more than 2% burns then the Plastics team should be informed. Do not accept their verbal instruction to transfer the patient. One of their team must come and assess the child and arrange the transfer if necessary.

Management of Major and Serious Burns

- >15% BSA in adult or 10% in a child.
- >5% BSA if full thickness.
- Burns involving the airway.
- Deep Burns in especially important areas (e.g. eyes, hands, perineum).

N.B. Remember burns may not be the only major trauma suffered by the patient e.g. explosion, jumping from a window to escape fire, etc.

Removal of Burning Agent

This is especially important in chemical burns. All clothing must be removed.

Primary Survey.

Airway - Look for signs of airway burns i.e. coughing, hoarseness, pain on breathing or swallowing, singeing of nasal hair, erythema or blistering of the mouth, soot in the nose or mouth. Stridor is a very late sign. If airway burns are present, early intubation is likely to be necessary. High Flow Oxygen is required.

Breathing - Lung damage may occur because of chemical pneumonitis or direct thermal injury, hypoventilation may be induced by CO or cyanide poisoning - house fires produce all these conditions. Full-thickness chest wall burns may severely limit chest excursion and may require escharotomy.

Circulation - Look for and treat shock in the normal way. Two large bore IV cannulae in an unburned area are required. Non shocked patients with significant burns (in whom one large bore IV line will suffice) will also require fluid replacement - use the Parkland formula:-

$\%BSA \times \text{weight(kg)} \times 4 = \text{total crystalloid required for 1}^{\text{st}} \text{ 24 hours (not including maintenance)}$

Half to be given in first 8 hours from time of burn

Half to be given in next 16 hours

Maintenance fluids must be added to this volume

Disability -) Similar to major trauma bearing in mind the enormous potential for

Exposure -) heat loss from burnt areas

Secondary Survey

As in Major Trauma a full secondary survey is required including log-rolling. Specifically remember to check the eyes (if necessary stain with fluorescein) and measure and chart the % BSA burned and whether partial or full thickness.

Investigations

- ABG including Carboxyhaemoglobin,
- FBC including haematocrit,
- U&E, Group & Crossmatch
- Urine Haemoglobin & Myoglobin
- CXR
- PEFR, if feasible

Analgesia, Tetanus and Dressing

IV opiates should be given, carefully titrated. Tetanus status should be assessed and immunoglobulin +/- vaccine should be given. The burn should be appropriately dressed. High % BSA burns can be wrapped in cling film.

Management of specific burns.

Hand Burns

Have a low threshold for referral to plastics if there is any area of full thickness burns because of the risk of contractures etc.

For less serious burns and scalds a Flamazine Bag can be used **but this should be cleared with the on call Plastics team first**. The burn is cleaned and covered with Flamazine, the hand is placed in a polythene bag or glove which is taped at the wrist. The patient should be encouraged to actively mobilise the hand within the bag and the limb should be kept elevated.

The bag needs daily changing.

The patient should be warned of the degree of exudation and maceration that will occur.

Review next available appointment in Central Treatment Suite.

Minor Facial Burns

The eyes should be examined to exclude corneal and deep lid margin burns which will require Ophthalmology referral. Deep facial burns will need plastics referral. For superficial burns exposure is the best form of treatment - the wound being cleaned and left open.

Minor Peripheral Burns

Clean the burnt area and apply a dressing (4 layers of Jelonet)

Blister Treatment

Intact blisters act as a sterile dressing

Large tense blisters if very painful or restricting movement can be deroofed/aspirated and dressed.

Follow-Up

Small superficial partial thickness burns can be simply dressed with Jelonet and the patient can be instructed regarding self-care or advised to attend their GP's practice nurse or DN.

Deeper or more extensive burns should be referred to the Central Treatment Suite. Again dress with Jelonet only. The Plastics team do not advise the use of Flamazine in burns which they are asked to follow-up as it makes estimation of burn depth difficult.

Tetanus Prevention

Although any wound can give rise to tetanus, clean wounds are considered to have a low likelihood of harbouring tetanus spores and of developing the anaerobic and acidic conditions that promote spore germination.

The programme of immunisation in the UK means that anyone born after 1961 should be fully immunised against tetanus unless there was a specific reason not to do so.

All immuno-suppressed patients should be managed as if they were incompletely immunised against tetanus whether they have been fully immunised or not.

Tetanus prone wounds include:

- wounds or burns **that require surgical intervention that is delayed** for more than 6 hours
- wounds or burns that show a significant degree of devitalised tissue or a puncture-type injury, particularly where there has been contact with soil or manure
- wounds containing foreign bodies
- compound fractures
- wounds or burns in patients who have systemic sepsis

Thorough cleaning of wounds is essential. If the wound, burn or injury fulfils the above criteria and is considered to be high risk, human tetanus immunoglobulin should be given for immediate protection, irrespective of the tetanus immunisation history of the patient. This is a precautionary recommendation since there is insufficient evidence to support other alternatives.

High risk is regarded as heavy contamination with material likely to contain tetanus spores and/or extensive devitalised tissue. Very few wounds seen in A&E are high risk.

Injecting drug users may be at risk from tetanus-contaminated illicit drugs, especially when they have sites of focal infection such as skin abscesses that may promote the growth of anaerobic organisms.

Local patients who have GPs can be given booster vaccines at their local surgery. Advise them to state the appointment is for immunisation so that those practices with prescribing nurses can choose to give a nurse appointment.

Immunisation Status	Clean Wound	Tetanus-prone Wound	
	Vaccine	Vaccine	Human Tetanus Immunoglobulin
Fully immunised, i.e. has received a total of 5 doses of vaccine at appropriate intervals	None required	None required	Only if high risk (see above)
Primary immunisation complete, boosters incomplete but up to date	None required (unless next dose due soon and convenient to give now)	None required (unless next dose due soon and convenient to give now)	Only if high risk (see above)
Primary immunisation incomplete or boosters not up to date	A reinforcing dose of vaccine and further doses as required to complete the recommended schedule to ensure future immunity	A reinforcing dose of vaccine and further doses as required to complete the recommended schedule to ensure future immunity	Yes: one dose of human tetanus immunoglobulin in a different site
Not immunised or immunisation status unclear	An immediate dose of vaccine followed, if records confirm the need, by completion of a full 5 dose course to ensure future immunity	An immediate dose of vaccine followed, if records confirm the need, by completion of a full 5 dose course to ensure future immunity	Yes: one dose of human tetanus immunoglobulin in a different site

For the full DoH guidance on tetanus immunisation [click here](#).

Further general information on immunisation can be obtained from the [DoH Green Book](#) (Internet Access required)

[Back to Wound and Burn Management Hot Tips](#)

[Back to Wound Care Guidance](#)