Care of Burns in Scotland
National Managed Clinical Network

Care of Burns in Scotland

Paediatric Guideline - Non-accidental burns and scalds in children

Reviewed August 2023 by Mr D McGill, Consultant Plastic Surgeon, NHS Greater Glasgow and Clyde with members of the COBIS Steering Group.

NOTE
This guideline is not intended to be construed or to serve as a standard of care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at following discussion of the options with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient's case notes at the time the relevant decision is taken.

Contents

Introduction

The history and examination of all children presenting with burns must include careful consideration of the circumstances and mechanism of the injury to ensure it is compatible with an accidental injury.

Most burn injuries are accidental, but it is estimated that of the children admitted to a burns unit 5.3%-14% of injuries will be the result of abuse.
Abuse may occur from either deliberately inflicted injury or from neglect.

Features of presentation and history which may suggest non-accidental burn or scald

The history is very important in raising concern about non-accidental injury.

- Unexplained delay in presentation
- Unexplained burns
- Changing or evasive history
- History incompatible with injury
- History inconsistent with developmental age of child
- Sibling or child blamed for injury
- Supervising adult not attending with child at A&E or unrelated adult presenting with child
- Lack of concern about treatment or prognosis
- Location of contact burn, inconsistent with child touching hot item unintentionally
- Depth of burn greater than expected from described burning agent
- Multiple burns
- Other injuries or fractures noted
- If the child has sustained a previous burn
- Previous history of accidental or non-accidental injury
- Trigger event such as misbehaviour, soiling or enuresis prior to burn
- Child disclosing abuse

Clinical features of abusive burns and scalds

Intentional Scalds

Scald burns are the most common burn type in children who have been abused.

- Forced immersion scalds are most common- results in circumferential stocking and/or glove distribution and clearly demarcated upper edges/tide mark
- Frequently involve buttocks, legs, perineum and feet
- Are frequently bilateral and symmetrical
- Uniform scald depth
- May be deeper than expected from history
- There may be central sparing of buttocks where a child is held in contact with a bath surface that is cooler than the bathwater ("Doughnut sign")
- There may be skin fold sparing e.g. in the popliteal area from injury sustained with knees flexed

Intentional non-scald burns

Contact burns

- The commonest reported cause of intentional non-scald burns are contact burns (i.e. from cigarettes, irons, hairdryers or domestic heaters).
- Clearly delineated burns or scars which carry the shape of the causative agent (i.e. triangular outline of base of iron, or grill of hairdryer, or circular from cigarette) with sharply demarcated edges. "Geometric shapes".
- Uniform depth
- Commonly deep
- Often multiple (unintentional burns are generally single)
- Can be found anywhere on body but concerning if found on dorsum of hands, shoulders, limbs, buttocks or back as this involves an area that child is unlikely to reach themselves.

Cigarette burns

- Intentional cigarette burns are circular, punched out, circular burns approximately 1cm diameter. Their appearance may vary from raised erythematous or bullous lesions to clearly demarcated circular burns with deep central crater. Intentional cigarette burns are frequently multiple, can be anywhere on body although are often located on the hand, fingers or trunk. These heal to leave small, rounded scars.

Other intentional non-scald burns

- Non-accidental friction/carpet burns can be sustained on the trunk if a child is dragged across a floor.
- Other agents such as stun guns, cigarette lighters etc have been reported –these injuries have an unusual appearance that may reflect the shape or nature of implement used.
- Intentional flame burns and microwave burns have also been reported.
- Deliberate chemical burns have also been reported. These can involve atypical presentations such as: acid dripped in the ear; acid dripped on head; mouth and pharynx injuries from forced drinking of caustic cleaner; and acid thrown at the face.

Typical features of accidental burns and scalds

Injuries should also be assessed for features which support an accidental mechanism.

Unintentional scalds

- One of the most common accidental burns are scalds.
- Toddlers are particularly at risk.
- Accidental scalds tend to have an irregular pattern/margins, irregular burn depth and are asymmetrical. There are commonly smaller “splash mark” burns in appropriate sites.
- The most common scald agent is a cup of hot drink.
- The most common mechanism is a pull-down injury where the child grabs a cup (or pot of hot water used in cooking) and pulls down hot liquid onto themselves (or for older children removing hot food or liquids from a microwave which then spill onto themselves).
- This typically results in a scald over the face, head, neck, trunk, or upper body.
- The burn is deepest at areas where “pooling” may have occurred, for instance at the top of the scald where hottest liquid comes into contact with skin. This then becomes more superficial as the liquid cools as it runs down the body. Deepest burns can also occur in the nappy area or other clothing if hot liquid soaks into the garment and is held in contact with skin for longer time.
- Older children have a higher incidence of accidental scalds to the lower trunk, legs and hands.

Unintentional non-scald burns

Contact burns

- Children can suffer accidental **contact burns,** and these are most commonly seen on the palmar aspect of the hand.
- Most are from touching hot items such as irons, hair straighteners, oven doors or hobs
- When children touch hot objects, they instinctively withdraw their hand thus limiting the extent of the burn. Deep burns therefore suggest that that enforced contact has taken place.
- Often in accidental contact burns there is sparing over joints on palm and sole.
- For anything more than a minor contact burn, the mechanism by which contact was maintained must be clarified.
- Accidental burns from hairdryers can be found on shoulder, back of neck and edge of ear.
- Accidental cigarette burns are rare but can occur if a child brushes up against a cigarette or knocks hot ash onto their skin.

Other unintentional non-scald burns

- Accidental flame burns are mostly seen in older children and young people involved in outdoor activities or high-risk behaviours (such as bonfires, BBQs, fireworks etc)
- Children can also sustain accidental friction burns and these can result from skids on carpet, slides, treadmill injuries and vacuum cleaners (from rotational section).
- Accidental chemical or caustic burns can occur from a splash from household cleaning products. These can be deep burns and are not painful initially. Diagnosis can be from the history, skin pH testing and testing clothes for chemicals (normal skin pH can vary between 7 and 8- suggest testing normal skin and burned area for a comparison).

Conditions mimicking burn injury

A variety of medical conditions may mimic burn injury and cause diagnostic difficulty. These include:

- Toxic epidermal necrolysis
- Staphylococcal scalded skin syndrome
- Cetrimide reaction
- Toxic shock syndrome
- Bullous impetigo
- Tinea
- Phototoxic reactions- sun exposure following chemical contact can cause skin lesions (such as Giant Hogweed, rue [a herb], perfume, lime juice, wild parsnip)
- Intentional burns without malicious intent (for instance traditional remedies, moxibustion, cupping)
- Laxative induced dermatitis (for instance Senna perineal burns)
- Infection (NB- both accidental and intentional burns can also become infected)
- Pressure/friction injuries
- Insect lesions
- Eczema
- Congenital curvilinear palpable hyperpigmentation- causes loop like raised area on back of calves
- Haemangiomas

Guidance for clinicians if non-accidental burn suspected

Accurate and comprehensive documentation is very important

What to document from the history

- Document names of individuals attending ED with child
- Accurately document history of events (including time of incident, agent, mechanism) exactly as described
- Where did it happen, how did it happen, when did it happen?
- Who was present at time of injury?
- Immediate actions following injury (such as first aid, seeking medical attention)
- Document past medical history including other emergency attendances or injuries
- Social history including any previous social work involvement
- Note any siblings in the house (including any social work involvement for them)

Examination of injury

- **Distribution** of burns/ body parts affected
- **Pattern** of injury
- Detailed drawing- size, site, outline/burn edges, ideally use Lund & Browder chart/ body map.
- Obtain early clinical photography of injuries with measurement scale
- Think about the position of child at time of injury eg look for patterns of burn injury with limbs flexed/ hips flexed as this may reveal a more obvious mechanism of injury.
- Are the edges well demarcated? (for instance tide marks in immersion injury)
- Is there skin sparing? Where? Effect of clothes considered?
- Does shape or pattern suggest an alternative mechanism?
- Estimate %TBSA
    - See COBIS fluid resuscitation guidelines for Lund & Browder chart: https://www.cobis.scot.nhs.uk/wp-content/uploads/2018/10/2018-Paediatric-Burns-Poster-FINAL-v1.0.pdf
- **Depth** of injury

General examination

- Look for other burns, injuries or signs of abuse or neglect
- Document height & weight (on centile chart)
- Assess child's development (for instance could they turn tap on or climb into bath themselves?)

Other clinical signs of inflicted injury

Burns can present as part of a pattern of ongoing abuse. It's therefore important to examine children for other non-burn injuries which may have been inflicted. These can include-

- Fractures
    - Accidental fractures are most common in children over the age of 5
    - They are rare under 18 months
    - If there are concerns about an inflicted burn injury, consider a skeletal survey
- Bite injuries
    - Bites are frequently blamed on siblings or friends
    - It can be hard to prove an adult has caused the bite, although forensic dentistry can be used to try to establish the intercanine distance. This can indicate an adult bite however this is not always definitive.

Other considerations

- Consider gathering information from GP/health visitor/social services.
- Consider a forensic assessment of the site including assessment of:
    - heights
    - depths
    - alleged materials
    - examination of clothing
    - assessment of likely temperatures at time of injury

Escalation of concerns to local child protection team and social services

It is important that the assessment of any child with a burn or scald must ensure there is a plausible explanation and that the pattern of the burn fits the history given and the developmental age of the child.

If physical abuse is suspected by the treating team, then the case must be discussed with the local child protection team/paediatrician and a full child protection clinical and risk assessment should be undertaken. Social work should be informed immediately by telephone **and** a notification of concern form submitted to social work by the treating team.

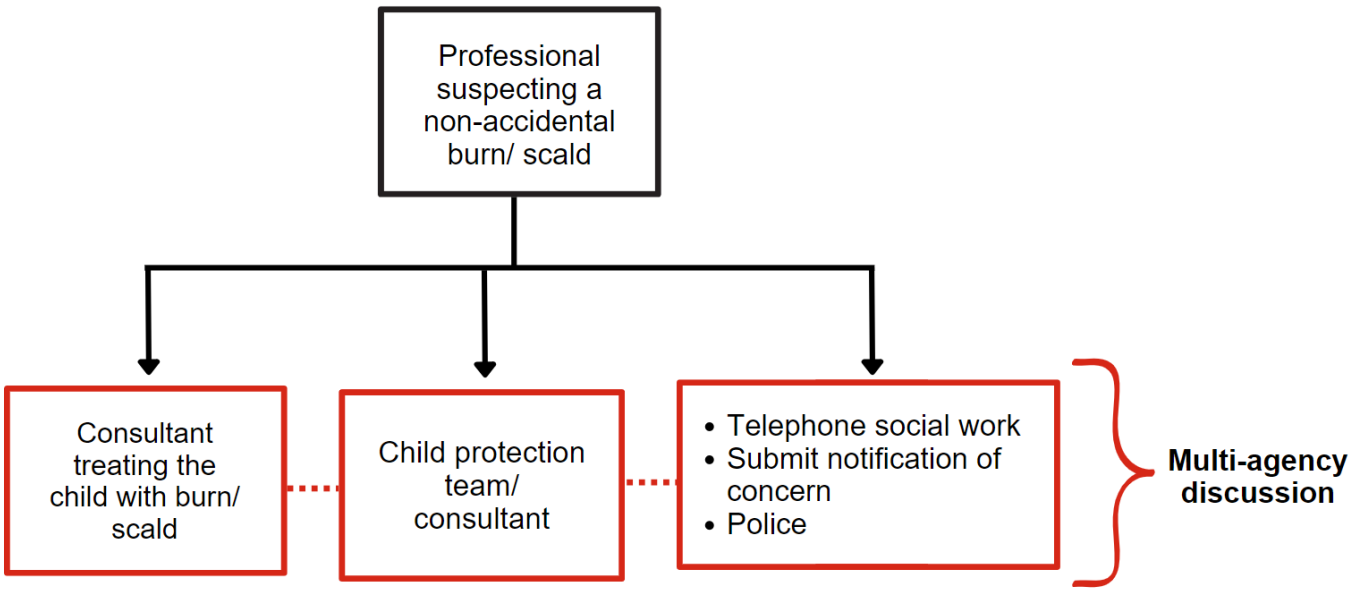
The referring clinician should also discuss their concerns with the receiving consultant burns surgeon.

If physical abuse is suspected, the Royal College of Paediatrics and Child Health (RCPCH) recommend that a skeletal survey and eye examination should be performed in any child under 2 years, and a CT head scan performed in children less than 1 year (and CT head considered for children between 12 months and 24 months of age). The treating team should discuss with consultant radiologist.

A multiagency discussion between health, social work and police should occur prior to discharge.

In difficult cases, discussions between Child Protection consultants and experienced Burn Clinicians may be invaluable in clarifying the likely diagnosis.

Key referral and discussion steps



References

RCPCH Child Protection Companion 2013.2nd Edition. Royal College of Paediatrics and Child Health.

RCPCH Child Protection Evidence. Systematic review on Burns. 2016.

Kemp A, Jones S, Lawson Z, Maguire SA. 2014. Patterns of burns and scalds in children. *Archives of Disease in Childhood.* **99**:316-321.

Kemp A, Maguire S, Lumb R, Harris S, Mann, M. 2014.Contact, Cigarette and Flame burns in Physical Abuse: A Systematic Review. *Child Abuse Review* **23**: 35-47.

Warrington SA, Wright CM, ALSPAC Study Team. 2001. Accidents and Resulting Injuries in Premobile infants: data from ALSPAC study. *Archives of Disease in Childhood.* **85**:104-107.

Hettiaratchy S, Dziewulski P. 2004. Pathophysiology and types of burns. *British Medical Journal.***328**:1427-1429.

Chester DL, Jose RM, Aldlyami E, King H, Moiemen NS. 2006. Non-accidental burns in children-are we neglecting neglect? *Burns.***32**: 222-228.

Hobbs CJ. 1986. When are burns not accidental? *Archives of Disease in Childhood.* **61**: 357-361.

Alexander RC, Surrell JA, Cohle SD. 1987. Microwave oven burns to children: an unusual, manifestation of child abuse. *Pediatrics.***79**: 255-260.