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Patterns of Scald Injuries in Children – Has Anything Changed?

Abstract:

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Abstract

The objective was to study presentation patterns of scald injuries in children and suggest potential countermeasures to reduce these injuries. We retrospectively studied scald injuries in children attending an urban paediatric emergency department between January 1st and December 31st 2008. Data was extracted from our emergency department database using search terms – burn, – scald, – other burn. Scalds were analysed for; age at presentation, sex, time of presentation, causal agent, scald outcome and treatment required. Burns accounted for 280(0.66%) of total attendees, 161(57%) were scalds. 127(79%) were under 5 years old (mean age 42months). 104(65%) were caused by hot beverages, 25(16%) hot water and 16(10%) hot food stuffs. 97(60%) presented within 1 hour of injury. 40(25%) received first aid. The most affected areas were upper limbs 79(35%) and upper trunk 74(33%). Overall 45(28%) were discharged home requiring no further treatment, 9(6%) were admitted to hospital and 101(63%) attended dressing clinic or plastic surgery OPD. Our results are consistent with other studies and illustrate that the incidence and pattern of scald injuries have not changed over the past decade. Scalds will continue to be a significant cause of unintentional injury and morbidity among young children unless preventative strategies are devised and employed.

Introduction

Burns and thermal injuries are one of the most common injuries presenting to Emergency departments worldwide and account for 9.1% of the distribution of global child injury deaths. Burns can be caused by skin contact with a hot liquid, hot solid, gas, electricity, radiation or chemicals. The most common burns sustained are caused by hot liquids (scald e.g. hot water), hot solid (contact burn e.g. iron) and radiation (sunburn). Children at highest risk of sustaining a burn in the home are young children especially those under 4 years of age. Older children are more likely to sustain a burn when outside the home. Other factors that increase the risk of a child sustaining a burn are; lower socio-economic status, poverty, gender and vulnerable children such as mentally or physically disabled children. In Western societies males are at a higher risk than females however in some eastern societies where females get involved in food preparation from a young age females are at an increased risk of burns especially if they cook over an open fire.

Protective factors include high literacy levels amongst parents, higher socio-economic status, appropriate first aid and emergency response and adequate knowledge of the risks of burns and of health care services. These factors also minimise any long term consequences such as loss of mobility and/or function, pain or psychological stress. Scalds, like burns are more common amongst males and are most prevalent under 4 years of age, with the peak presentation occurring between 6 and 18 months. Most scalds occur in the home, particularly in the kitchen and bathroom due to the increased likelihood of a child being exposed to hot liquids whilst in these rooms e.g. bathing or during cooking. There are two peaks associated with scald injuries; the first is in the late morning/early afternoon when the morning work is completed and the second is in the evening. It is thought this is as at these times of day children are generally supervised less and thus at increased risk of incurring an injury. Scald injuries commonly affect the upper limbs, face, neck and chest. This is due to the mechanism by which most scalds occur; a hot beverage spilling either accidentally while being drunk or due to the child pulling a unguarded beverage onto themselves from a tabletop or pulling a pan down from the hob. The lower limbs tend to be affected if the injury occurs in the bathroom as the child is getting into or while they are in the bath.

Worldwide, the mortality and level of burns and scalds has been decreasing over the past 10 years^{11,12}. This positive trend may be attributable to the increase in burn prevention campaigns, parental education and the introduction of legislation/guidelines capping the maximum temperature of hot water produced from household taps at fewer than fifty degrees Celsius (120 degrees Fahrenheit). This change in legislation is particularly important as water kept at fifty degrees or under takes five minutes of continuous exposure to cause a scald as opposed to five seconds at sixty degrees. These guidelines can be compiled with by fitting thermostatic mixing valves to all domestic taps. These valves mix heated water with cold water before it reaches the tap.

Methods

A retrospective study of scald injuries in children (0-16 years) attending an urban paediatric emergency department serving a population of approximately 150,000 children between January 1st and December 31st 2008. Data was compiled using information extracted directly from our Emergency department database regarding all patients diagnosed with – burn, – scald or – other burn and compiled into an Excel spreadsheet. Those presenting with a scald injury were then further analysed.

Results

Of 42,830 attendees, 282(0.66%) were diagnosed as – burn, – scald and – other burn, 121(43%) were diagnosed as burns and 161(57%) as scalds. The 161 scalding injuries were then further analysed by gender and mean age, month and day of injury, time elapsed prior to presentation, time of presentation, causal agent of scald, area of scald, first aid received prior to presentation and discharge outcome. Male: female ratio was 1:1. Mean age was 42 months (3 years 6 months) and 127 (79%) of all attendees were less than 5 years old, 18 (11%) were 10 years or older. June was the month with the single highest attendance rate, accounting for 22 (14%) overall. The first 6 months of the year showed consistently higher attendances as compared to the last 6 months.

Over 60% presented to A&E within 1 hour of sustaining their scald and over 75% presented within 4 hours. Thirteen (8%) presented over one week later generally with a complication such as infection. We found the minor peak occurs between 12 and 1pm and the major peak occurs between 8 and 9pm. Our results are consistent with the findings of previous scald studies that have also demonstrated that there are two peak periods during the day when scalds tend to occur.

Figure 1: Graph illustrating what time patients present to A&E with scalds

Hot beverages (tea, coffee, hot milk, cocoa or unspecified hot water drink) were accountable for 104 (65%) of all scalds, with tea alone accounting for 45 (28%). The other major causal agent was hot water which accounted for 25 (16%) of scalds (bath/shower scalds, pulling pots off the stove or pouring water from the kettle directly onto the child). Scalds from hot foods such as soup or sauces caused 16 (10%) of scalds.

Figure 2: Graph illustrating the breakdown of scald causes

The upper limbs (hands, wrists, forearms, shoulders and axilla) and the upper trunk (neck, chest, face) were the areas most commonly affected accounting for 79 (35%) and 74 (33%) of total scalded areas respectively. The most affected areas were the arm 52 (23%) and the chest 36 (16%). This is due to the mechanism of the injury; spilling or pulling hot liquid (possibly down from a higher area) onto oneself. Overall the upper body was twice as likely to sustain a scald injury as compared to the lower body (153:73).

Figure 3: Graph illustrating the breakdown of the body areas affected.

Forty (25%) of attendees had received some first aid prior to presentation. Applying cold water to the area was the commonest measure administered 37 (92%). Other measures used included applying raw egg, Savlon cream, Diclofenac cream and Lasseters paste. Of 161 patients, 45 (28%) were discharged home requiring no further treatment and 101 (63%) attended either the daily dressing clinic or the plastic surgery clinic. Only 9 (6%) required hospital admission.

Discussion

A typical scald patient is a pre-school child sustaining a scald injury from a hot beverage. Our findings are consistent with those found in recent Irish paediatric burn publications^{9,18}. These studies verify that scalds are the most common burn sustained by children (over 50% in each study) and that the median age of a child presenting with a scald is between 15 and 18.6 months old. Importantly our findings demonstrate that the incidence and pattern of scald injuries has not changed dramatically over the past decade as Cronin et al studied burns in 1992-1993 and demonstrated similar results to ours. This shows that little improvement has been made despite increased awareness, parental education and advances in home technologies e.g. cordless kettles.

Our study includes both major and minor burns attending a large paediatric emergency department. Scalds are a significant cause of injury in children worldwide in both developing and developed countries. Male gender is a more common finding than female gender in most studies except where girls are expected to help their mothers in the kitchen from a young age and would be exposed to more potential sources of burns e.g. open fires, stoves, hot cooking liquid. We have shown that hot water and hot beverages were the two biggest causal agents of scalds. The higher prevalence of scalds found during the summer of 2008 may be due to the poor weather experienced in Ireland at that time. Children may have been kept indoors for longer periods and thus at a sustained risk of incurring a scald or other burn injury. Clearly these figures illustrate that young children are at the highest risk of sustaining a burn/scald injury when in the home from a hot beverage, hot water or hot foodstuff. We feel that scalds will continue to be a significant cause of unintentional injury and morbidity among young children unless preventative strategies are devised and employed.

A recent review¹⁹ noted that most scald prevention studies had limitations, in particular the failure to measure outcome measures post-completion of the prevention programme. Prevention programmes can take many forms but those found to be most effective work directly with high risk groups. They educated the parents of 'at risk' children in small group sessions or in a one to one environment. One way to ensure all parents receive this education would be to introduce it through routine health screening checks. Legislation concerning household hot water taps should be implemented ensuring all household taps are fitted with thermostatic mixing valves. Currently there are no fixed regulations regarding maximum hot water temperature such as they have in Australia^{20,21}.

The major weaknesses in our study are twofold; we were unable to quantify the total body surface area (TBSA) involved in each scald and the time taken to heal as this data was not available in the A&E records. The absence of this information is unfortunate as the TBSA is a major determinant of the severity of a scald and studies have shown that burns that take over 21 days to heal are associated with increased scarring and morbidity²⁰. However despite the absence of this information we feel our study illustrates that the pattern and incidence of scald injuries has not changed dramatically in Ireland over the past decade and scalds are still a major and preventable source of childhood injury and thereby designing, implementing and analysing prototype prevention programmes within high risk groups in Ireland, we can begin to address this intractable problem.

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