Available online at www.sciencedirect.com
ScienceDirect
journal homepage: www.elsevier.com/locate/burns

Agents, mechanisms and clinical features of non-scald burns in children: A prospective UK study

E.L. Johnson [a], S. Maguire [a,*], L.I. Hollén [b,c], D. Nuttall [a], D. Rea [d], A.M. Kemp [a]

[a] Institute of Primary Care & Public Health, Cardiff University School of Medicine, Neuadd Meirionnydd, Heath Park, Cardiff, UK
[b] The Scar Free Foundation Centre for Children's Burn Research, Bristol Royal Hospital for Children, University Hospitals Bristol NHS Foundation Trust, BS2 8BJ, UK
[c] Centre for Child and Adolescent Health, School of Social and Community Medicine, University of Bristol, Oakfield House, Oakfield Grove, Bristol BS8 2BN, UK
[d] University of the West of England, Coldharbour Lane, Frenchay, Bristol BS16 1QY, UK

ARTICLE INFO

Article history:
Received 22 September 2016
Received in revised form
14 December 2016
Accepted 29 January 2017
Available online xxx

Keywords:
Burns
Hairstyling devices
Contact burns
Safety hazards
Children

ABSTRACT

Aims: To inform childhood burn prevention by identifying demographics, clinical features and circumstances of unintentional non-scald burns.
Methods: A prospective cross-sectional study was conducted across Cardiff, Bristol and Manchester, including six emergency departments, three minor injury units and one burns unit between 13/01/2013-01/10/2015. Data collected for children aged <16 years with any burn (scald, contact, flame, radiation, chemical, electrical, friction) included: demographics, circumstances of injury and clinical features. Scalds and burns due to maltreatment were excluded from current analysis.
Results: Of 564 non-scald cases, 60.8% were boys, 51.1% were <3 years old, 90.1% (472/524) of burns affected one anatomical site. Contact burns accounted for 86.7% (489/564), 34.8% (137/394) of which were from objects placed at >0.6 m and 76.5% (349/456) affected the hands. Hairstyling devices were the most common agent of contact burns (20.5%, 100/487); 34.1% (30/88) of hairstyling devices were on the floor. Of children aged 10–15 years, 63.7% (65/102), sustained contact burns of which 23.2% (13/56) were preparing food, and when burnt from hairstyling devices, 73.3% (11/15) were using them at the time of injury.
Conclusions: Parents of toddlers must learn safe storage of hazardous items. Older children should be taught skills in safe cooking and hairstyling device use.

* *Corresponding author.*
E-mail addresses: johnsone3@cardiff.ac.uk (E.L. Johnson), emma@johnsonweb.co.uk, sabinemaguire@gmail.com (S. Maguire), linda.hollen@bristol.ac.uk (L.I. Hollén), NuttallDE@cardiff.ac.uk (D. Nuttall), David.Rea@UHBristol.nhs.uk (D. Rea), KempAM@cardiff.ac.uk (A.M. Kemp).
http://dx.doi.org/10.1016/j.burns.2017.01.036
0305-4179/

1. Introduction

Worldwide, burns account for 5.9% of all unintentional injuries in children aged 15 years or younger [1]. In the United States approximately 55,000 children aged less than 16 were admitted to hospital due to burns in 2006–2015, accounting for 27% of all burns admissions [2]. In the United Kingdom (UK), fewer than 10% of children with burns undergo hospital admission [3] although it is estimated that 50,000 children attend Emergency Departments (ED) with burns each year [4].

Most epidemiological studies have focused on burns admissions, which by their nature capture larger severe burns, predominantly scalds, and often with data from Burn Centers and units [5–10]. This misrepresents the true scale of the challenge in burns prevention. Although 90% of childhood burns are managed in the ED, many of these ED studies have been short, retrospective, single centre studies, which either combine scalds and non-scald burns [11,12] or observe scalds alone [13,14]. While prevention messages for childhood scalds are clear, relating to hot drink hazards, the key prevention messages for non-scald burns are less clear. A previous study of ED attendances for childhood burns in the UK and Ireland identified a number of non-scald burn hazards [15]. At that time, 42% of burns were non-scalds, however there is a constant shift in domestic appliances in use, and thus potential changes in burns risk for children of all ages. Some of these individual agents such as domestic irons, hair straighteners and oven doors have been described in case series [16–18], but current epidemiological studies have not detailed specific agents, and mechanism of injury for individual age groups.

Home safety education can change parental behaviours and reduce hazards, though there is a lack of evidence that such prevention strategies reduce the number of burns in childhood [19]. For prevention to be targeted and effective, we need to have a detailed understanding of the injuries that are being sustained, and how and where these occur. This is particularly relevant in continually changing environments, with the emergence of new burn hazards in the home for children.

This study aims to identify the demographics, clinical features and circumstances of unintentional non-scald burns in children, to inform and underpin prevention efforts.

2. Methods

A prospective cross-sectional study from three UK centres (Cardiff, Bristol and North Manchester) was conducted (Fig. 1). Individual sites included six ED (University Hospital of Wales Paediatric ED, Bristol Royal Hospital for Children ED, Frenchay Hospital Bristol ED, Oldham Hospital ED, North Manchester General ED, Fairfield Hospital ED), three minor injury units (MIU) (Barry MIU, Rochdale Hospital Urgent Care Centre and Southmead Hospital Bristol MIU) and one paediatric burns unit (The South West UK Children's Burn Centre). Data were collected using a proforma, the Burns and Scalds Assessment Template (BASAT, see Supplementary Fig. S1). Clinicians completed the BASAT at presentation for all children, aged

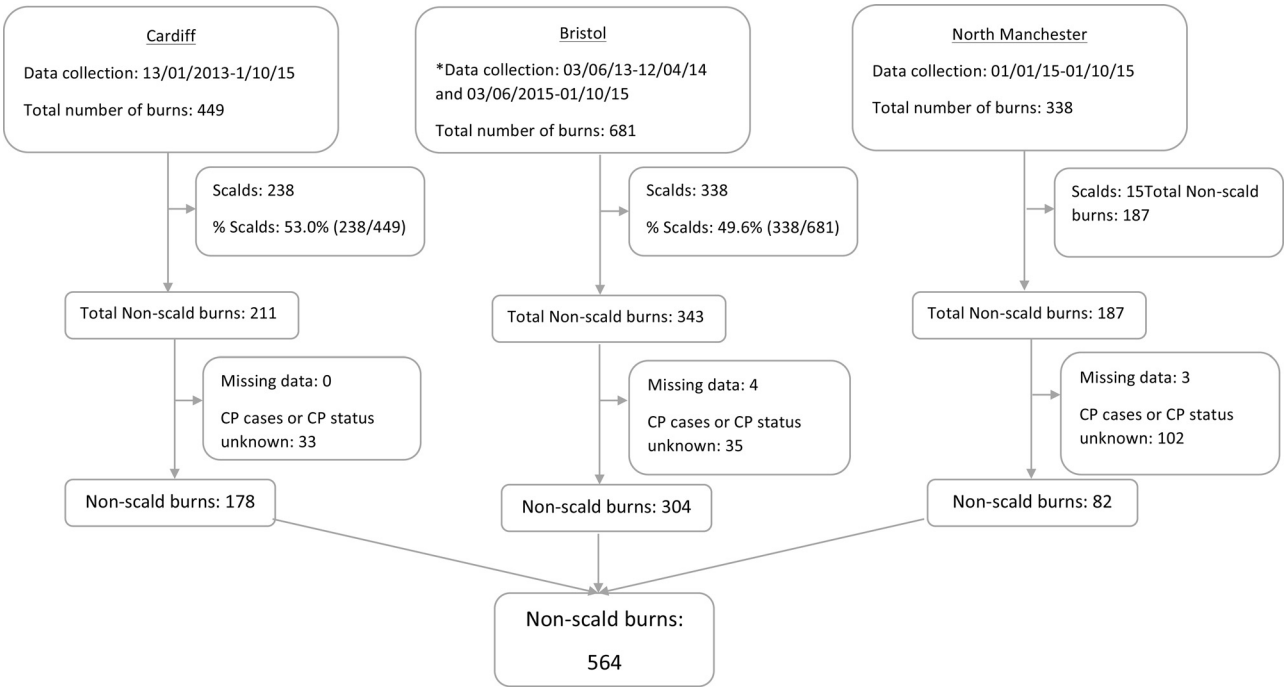

Fig. 1 – A flowchart of centres involved.
***Break from data collection due to hospital location change and introduction of an electronic data collection system. CP=child protection. Cardiff, Bristol and North Manchester are the three study *centres* with each having several *sites*. See Supplementary Tables S3 and S4 for details of each *site*.**

Please cite this article in press as: E.L. Johnson, et al., Agents, mechanisms and clinical features of non-scald burns in children: A prospective UK study, Burns (2017), http://dx.doi.org/10.1016/j.burns.2017.01.036