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A prospective observational study investigating all children presenting to a specialty paediatric burns centre

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ABSTRACT

Aim and method: The aim of this study was to describe the mechanism of injury and outcome of all children who presented to The Stuart Pegg Paediatric Burns Centre (SPPBC) with a burn injury in the year 2013. A detailed proforma was completed prospectively at time of presentation to hospital.

Results: During the one year period, 758 children with a median age of 2 years 3 months presented with a burn injury. Overall, 12.7% of patients ($n = 96$) were initially treated as inpatients. Similarities existed between in and outpatients. Over half the children admitted had a scald injury (53.1%). Whilst slightly higher than the outpatient scald rate of 43.1% there was no statistical significant difference. However, there was a significant difference between inpatients and outpatients with respect to other mechanisms of injury. Contact burns were under represented in inpatients (27.1%) compared to outpatients (44.5%), $p < 0.05$. In contrast, flame burns were over represented in inpatients, 11.5% compared to outpatients, 2.9% ($p < 0.05$).

Conclusion: Paediatric burns are a common cause of childhood injury. The majority of children present with small to medium sized partial thickness injuries and are managed as outpatients. In order to understand the true impact of paediatric burn injury and to develop appropriate targeted injury prevention campaigns, data repositories must include detailed information regarding outpatient paediatric burns.

1. Introduction

In order to understand the true impact of paediatric burn injury and to develop appropriate targeted injury prevention campaigns comprehensive demographic and information regarding mechanism of injury should be collected on all children presenting to a burns centre. Data repositories such as the Burn Registry of Australia and New Zealand (BRANZ) and the American Burn Association National Burn Repository

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primarily track only inpatient data. As such, little is known regarding the differences in epidemiology, aetiology or outcome of injuries between in and outpatients. While outpatient data has been reported for combined adult and children populations [1,2], mechanisms are known to differ between these groups and there is a paucity of similarly comprehensive paediatric data [3–6]. The aim of this current study was to describe the mechanism of injury, details regarding the injury occurrence, first aid received and surgical requirements of all patients who presented to The Stuart Pegg Paediatric Burns Centre (SPPBC) with a burn injury in the year 2013 and as such represents a complete summary of both inpatients and outpatients seen at a paediatric burns unit.

2. Method

Burn data were prospectively collected on all children aged 16 years and younger who were seen at the Royal Children's Hospital (RCH) in Brisbane, Queensland between January 1 to December 31, 2013 inclusive. Consent was obtained from parents/guardians. Ethics approval was obtained prior to commencing this study from the Children's Health Services Human Research Ethics Committee, based at the RCH (HREC/08/QRCH/085) and University of Queensland Human Research Ethics Committee (2013001001).

A detailed pro forma was completed at the time of presentation for both inpatients and outpatients including the following information:

- Demographic data.
- Events leading up to and surrounding the burn injury.
- First aid given, both at the scene and in hospital.
- Depth, site and body surface area of burns.

The SPPBC use the Shakespeare classification for burn depth [7]. This classifies burns as superficial (erythema only), superficial partial thickness, deep dermal partial thickness and full thickness. Children who attended the SPPBC had burn wounds dressed with silver based fabric dressings with the addition of a silicone interface. Either Acticoat™ and Mepitel™ or Mepilex Ag™. Dressings were changed once to twice weekly until re-epithelialisation. Additional information was recorded including time to re-epithelialisation, need for skin grafting and scar management requirements. Children were recorded as inpatients if admitted initially for management of their injury for greater than 4 h. In addition to severity of burn injury there are other factors that determine if a child is admitted when presenting with burn injury. These include social, such as child safety concerns and feeding issues, for example when the mouth is involved in the burn injury and the child is unable to eat or drink adequately. Children initially treated in the outpatient setting (for at least one outpatient appointment) then subsequently admitted at a later date were recorded as outpatients for purposes of this review, details regarding the admission were recorded. For the patients who were seen in the Department of Emergency Medicine (DEM) and not followed up in the SPPBC outpatient clinics, data was obtained from Emergency Department Information Systems. A limited data set is available for children who only attended DEM thus whilst demographic details and mechanism of injury are included in the results, these children are excluded from the more detailed dataset inclusive of first aid, severity and re-epithelialisation. Contrasts and similarities between inpatients and outpatients are presented.

2.1. Data analysis

Statistical analysis was performed using SPSS software (version 22). Mean and standard deviation for outcomes were calculated unless data were not normally distributed, in which case median and interquartile range (IQR) was utilised. Inpatient data were compared with outpatient data using Chi-squared test or Fishers exact test where appropriate. Mann–Whitney U test was utilised to compare age at presentation between groups. Two tailed p values of <0.05 were considered to be statistically significant.

3. Results

During the one year period, 758 patients with a median age of 2 years 3 months attended. Almost half (47.1%) of the children received treatment at RCH DEM, with 152 of these patients initially receiving treatment at other hospitals. The remaining patients were referred from another hospital and/or General Practitioner direct to the outpatient clinic. Whilst all patients attending RCH DEM were either admitted to hospital or offered an outpatient appointment, thirty-five patients attended DEM only with no subsequent follow up. Overall, 12.7% of patients ($n = 96$) were initially treated as inpatients, 71.9% ($n = 69$) of whom were treated at another hospital prior to transfer to RCH.

3.1. Demographics

Males accounted for approximately 60.0% of cases. There was no difference in gender ratio between inpatients (males 63.5%) and outpatients (males 60.3%). However, 68% of children who were initially treated as outpatients then were admitted at a later date for a planned surgical procedure were boys. In children aged 11 and upwards, males predominated (Fig. 1) with the greatest gender difference occurring at 14 years, where males represented 75.0% of cases. Children aged 0–4 years represented 62.4% of the cases. There was no statistically significant difference between presenting age of inpatients and outpatients (Fig. 2).

3.2. Aetiology

Scald injuries represented 44.4% of paediatric burn injuries seen, with contact injuries comprising 42.2%. Within the 0–24 month age group, scald and contact injuries accounted for 95.4% of all injuries, with flame and friction burns becoming more common in the older age groups (Fig. 3). Flame injuries represented 15.4% of cases and friction 14.1% in the 11–16 year age group. Overall the most common cause of burns was scald injuries from hot beverages (18.2%), scalds from food (11.1%) and water from saucepans/kettles (7.2%). Almost half of the food scalds were due to instant noodles. Hotplate injuries accounted for 6.6% of burns, representing the most common