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A five year review of paediatric burns and social deprivation: Is there a link?

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ABSTRACT

Aim: To establish if there is a correlation between burn incidence and social deprivation in order to formulate a more effective burns prevention strategy.

Methods: A quantitative retrospective review of International Burn Injury Database (IBID) was carried out over a period from 2006 to 2011 to obtain data for children referred to our burns centre in West Midlands. Social deprivation scores for geographical areas were obtained from Office of National Statistics (ONS). Statistical analysis was carried out using Graphpad Prism. **Results:** 1688 children were reviewed at our burns centre. Statistical analysis using Pearson correlation coefficient showed a slight association between social deprivation and increasing burn incidence $r^2=0.1268$, 95% confidence interval 0.018-0.219, p value <0.0001. There was a slight male preponderance (58%). The most common mechanism of injury was scalding (61%). The most commonly affected age group were 1-2 year olds (38%). There were statistically significant differences in the ethnicity of children with significantly more children from Asian and African backgrounds being referred compared to Caucasian children.

We found that appropriate first aid was administered in 67% of cases overall. We did not find a statistically significant link between first aid provision and social deprivation score.

Discussion: There was only a slight positive correlation between social deprivation and burn incidence. However, there did not seem to be any change in mechanism of burn in the most deprived groups compared to overall pattern, nor was there a significant difference in appropriate first aid provision.

Conclusion: It would seem that dissemination of burn prevention strategies and first aid advice need to be improved across all geographical areas as this was uniformly lacking and the increased burn incidence in more socially deprived groups, although present, was not statistically significant.

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1. Introduction

Burns in children are potentially devastating and are still the cause of a significant proportion of childhood morbidity and, in some cases, mortality. Almost 5000 children, within the UK,

were admitted to hospital for treatment following a burn in 2012 [1].

A correlation between social deprivation and trauma incidence has previously been described [2,3]. A large cross sectional study of A&E admissions between 1992-1997 across the Trent region in the UK by Hippenley-Cox et al. [4], identified

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burns as one of the six causes of injury which they had shown to be significantly associated with deprivation. We reviewed burns incidence and social deprivation scores for their referring area to validate studies which had previously correlated these two factors.

Mistry et al. [5], previously described an association between increasing social deprivation and a higher rate of admissions and mortality in their burn injured patients.

2. Methods

A retrospective quantitative review of data gathered prospectively from 2006–2011 for the International Burn Injury Database (iBID) was performed. The iBID was set up in 2005 to collate information for all patients admitted with a burn to hospitals within the UK, following recommendations published within the National Burn Care Review (NBCR) in 2001. This would allow recording and analysis of the full extent of the burn problem within the UK and form a basis for audit and ongoing reporting. Information collected includes age and sex of patient, size and mechanism of burn, use of first aid, location of patient when injured, initial and ongoing management, mortality and complications.

As part of the Specialised Commissioning Quality Dashboard programme, a set of quality measures and dashboards have been developed for Specialised Burn Care (both adults and paediatrics). Department of Health have begun to work with the Clinical Reference Group and the iBID team to develop a mechanism of accessing all the relevant data directly from the iBID system to avoid duplication of work. The reporting mechanisms are now in place for Q3 submission data (October–December 2013) to be reported fully via iBID directly to Department of Health.

Analysis of data, including age and sex of patients, mechanism of burn, first aid provision, ethnic origin of patients and postcode data was carried out. The postcode data allowed extrapolation of a social deprivation score for each patient in the study, the social deprivation score used was the Index of Multiple Deprivation (IMD) score 2007. This is a measure of relative deprivation and are based on 37 different indicators across 7 different domains — income, employment, education, skills and training, health deprivation and disability, crime, barriers to housing and services and living environment. The weightings of each domain are as follows — income and employment (22.5% each), education and health deprivation and disease (13.5% each), crime, housing and living environment (9.3% each). These scores allow ranking on the basis of deprivation relative to other areas, so giving a continuous scale of deprivation. It is, however, important to remember that not everybody living in a socially deprived area, share the same level of social deprivation. The IMD scores were obtained using a geographical data conversion website, <http://geoconvert.mimas.ac.uk> [6], and is based on information obtained from the UK census.

In order to calculate burn incidence, the postcode data firstly had to be converted into data relating to the patient's electoral ward. An electoral ward is a spatial unit within the UK and forms the basis of geographical and population based statistical analysis. Whilst population counts within each

ward vary, they are typically in the order of 5500 people. There were 9523 electoral wards in the UK as of December 2011 [7]. Once each patient's electoral ward was known, it was possible to determine the population of that ward and so calculate burn incidence for each ward. This could then be plotted against the IMD score for each ward, allowing us to test for a correlation between the two variables. See Fig. 1 for process. Due to how this data is collected, it was not possible to calculate incidence as a percentage of just the paediatric population but instead we had to do it as a percentage of the overall population.

Statistical analysis was carried out using standard statistical tests, namely Pearson's correlation co-efficient, Fisher's exact test and Chi Squared test and was calculated using Graphpad Prism[®] version 5.03 software package. Statistical significance was defined as $p < 0.05$.

Patients referred from outside of the West Midlands region or on whom a complete dataset was unavailable were excluded from the study.

3. Results

During the period from 1 October 2006 to 30 September 2011, 1688 children were referred to the Burns Centre for review. A gradual increase in patients was seen year on year over this period, with a peak seen in 2010/11. This, however, does not necessarily reflect an ongoing increase in burn incidence but a significant improvement in data capture using the iBID database (Table 1).

3.1. Demographics

Age range was from 3 days up to 15 years 11 months.

There was a slight male preponderance with 985 patients (58%) being males and 703 (42%) being females.

The most frequently affected age group was the 1–2 year old group (38%). This was consistent across all ethnic groups.

3.2. Burn incidence and social deprivation

Within more socially deprived areas, burn incidence increased, in the order of approximately 0.07 per 1000/population in some of the less deprived areas to 4.37 per 1000/population within some of the more deprived areas. (Fig. 2). Pearson correlation gave an r^2 value of 0.1268 with a 95% confidence interval of 0.018–0.219 and a p value of < 0.0001 .

We found that our most deprived ward, Washwood Heath (IMD score = 63.14), had an incidence of 0.97/1000, population — 32,983. This compared to an incidence of 0.35/1000 in our least deprived area, Slideslow (IMD score = 3.29), population — 5636. This represents an almost 3 fold increase. However, statistical analysis using Chi squared test with Yates correction, did not show this to be statistically significant (value = 1.431 with 1° of freedom, $p = 0.232$).

However, the area with the highest incidence of burns in this series, was not our most deprived area. It was an area called Greets Green in Birmingham with a relatively high IMD score (48.47) population — 1830, but there were fifteen other wards with higher IMD scores. Burn incidence was 4.37, compared to the next highest incidence which was 1.67. The

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