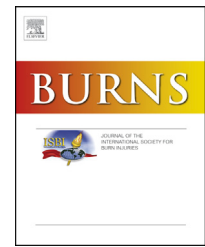


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The impact of socio-economic deprivation on burn injury: A nine-year retrospective study of 6441 patients

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ABSTRACT

Introduction: Low socio-economic status is thought to be associated with increased burn risk, however the significance and generalisability across different populations and cultures has been questioned.

Methods: A nine-year retrospective study of burn presentations to a large teaching hospital (2005–2014) was performed to investigate the association between socio-economic status and burns. Demographic and injury data was collected via the trust 'Information portal'. The Welsh Index of Multiple Deprivation 2011 was used to score for socio-economic status. Chi-squared test and Odds Ratios were calculated and statistical significance defined as $p < 0.05$ throughout.

Results: 6441 burns were identified, with 755 (11.7%) admitted. Overall incidence rates were the highest published in the UK (0.35/1000/year) with sub group analysis showing the highest rates in under fives and males. Significant relationships between both age and burn mechanism and gender and burn mechanism ($p = 0.0005$) were identified. Scald (67.1%) was the most common mechanism with the upper limb (48%) most commonly burned. Chi square analysis demonstrated a significant relationship between socio-economic deprivation, age and burn incidence ($p \leq 0.0005$), with a disproportionately high number of burns in patients under the age of 16 in the most deprived quintile (OR 1.23; 95% CI 1.06–1.44).

Conclusion: This study specifically highlights patients under the age of 16 living in poorer socio-economic areas as the most at risk of suffering burns receiving hospital attention. This study demonstrates burns as a significant public health issue, and the results should aid in designing specific burn prevention strategies to target high-risk groups.

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1. Introduction

1.1. Background

Burns have been described as the most physically and psychologically devastating injuries afflicting humans [1–4]. Each year, burns are responsible for around 300,000 deaths globally [5], with around 5–10% of these occurring in the developed world [6]. The management of burns often entails prolonged hospital stays and a high proportion of patients will be left with burn related disabilities which have long-term psychological, social and economic effects on the survivors and their families. A further implication of burns is the substantial cost involved, with the estimated lifetime direct and indirect costs incurred from burn death being nearly four to six times those of cancer or heart disease [7].

1.2. Importance

Although the management of burns has improved dramatically over the past few decades, prevention remains better than the cure. The incidence of burns in the developed world has reduced by around 30% in the last three decades [8], largely due to widespread burn prevention strategies.

The importance of prevention strategies is identifying and reaching out to those groups that are most at risk. Many different indicators of low socioeconomic status (SES), such as education, unemployment and poverty have been associated with increased risk of burns [9–17], although the significance and generalisability of this across different populations and cultures is not known. Research has also highlighted the incidence and profile of burns directly correlates with the economic development of society [18]. This greater prosperity, in addition to burns prevention programmes, may have a role in the decreased incidence of burns. However it is not well reported as to whether these benefits have influenced the socially deprived within individual societies.

1.3. Goals of the investigation

The goals of this investigation were (1) to review the epidemiology of cutaneous burns presenting to a large teaching hospital in South Wales over a nine-year period, (2) investigate the association between socio-economic deprivation and burns, and (3) to ascertain whether this data could help identify at risk groups to target with prevention strategies in our region.

2. Methods

2.1. Study design and data collection

This retrospective study collected data from all patients who attended the Emergency Department (ED) between June 2005 and April 2014 of a large teaching hospital in South Wales. The

University Teaching hospital has over 90,000 presentations to the ED per year and serves a population of approximately 450,000 people. The Welsh Centre for Burns and Plastic

Surgery based there is the regional adult burn centre for Wales and the South West of England, which serves a population of approximately ten million people. This study only included patients presenting directly to the ED. Patients transferred directly to the regional burns centre were excluded, as these are often from out of area and would have given a misrepresentation of the population in our region.

Patients were identified via the health boards 'Information portal', which is the electronic system used for recording all patient data on presentation to the ED. Data available for analysis included patient demographics (age, gender, post-code), dates and outcomes of attendance and details of the injury (e.g. mechanism and anatomical location of burn). Any patient that presented without a cutaneous burn, including hypothermia (which came under the thermal injury diagnostic code), chemical injury to eye, ingestion injury or pure inhalational injury was excluded from this study.

This study was approved by the South-West Wales research and ethics committee and did not require individual patient consent for use of routinely collected data.

2.2. Deprivation scores

The Welsh Index of Multiple Deprivation (WIMD) 2011 was used as the score for SES [19]. The WIMD is the official measure of relative deprivation for small areas in Wales, produced by the Welsh Assembly Government. The index was developed as a tool to identify deprivation so that funding and improved opportunities could be focused on the most disadvantaged. The index is based upon eight different indicators (income, employment, health, education, access to services, housing, physical environment and community safety), which are weighted to give the overall deprivation scores to each small area. The individual indicators are scored for each post-code area.

The WIMD has been previously reported as a measure of social deprivation in Welsh patient populations [20–24]. The income domain indicator has the highest weighting for the overall WIMD score (23%) and was used as a marker of deprivation in this study as it correlates most closely with the overall deprivation index. In contrast to the WIMD code (relative score), the income domain indicator is an absolute score, providing the percentage of those living in the area receiving income related benefits. Using the WIMD code, each patient was assigned the corresponding income domain indicator score (two being the least deprived, up to fifty being the most deprived) and this was used as an absolute measure of deprivation in the analysis. The income domain indicator scores were then grouped into quintiles defined by the Welsh Assembly Government statistics office for analysis (I = the 20% most deprived and V = the 20% least deprived quintile). For the purpose of this study, we will use the term deprivation score rather than income domain indicator.

2.3. Data analysis

Demographics, burn data and deprivation scores (as reflected by the income domain indicator) were entered into a Microsoft Excel (Microsoft Corp., Redmond, WA) spreadsheet. The data was then exported and statistically analysed in Minitab®

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