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Research Article

Deprivation and Time to Heal for Paediatric Burns Patients

George H Lye[1,2]*, Jack Hiscock[1], Liz Nicholls[1] and David Ralston[1,2]

[1]Sheffield Children's NHS Foundation Trust, Sheffield Children's Hospital, UK

[2]Sheffield Teaching Hospital's NHS Foundation Trust, Northern General Hospital, UK

*Corresponding author

George H Lye, Sheffield Teaching Hospital's NHS Foundation Trust, Northern General Hospital, Herries Road, Sheffield, UK. S5 7AU

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Keywords

- Time-to-heal
- Paediatric burns
- Deprivation
- Children

Abstract

Background: The incidence of sustaining a burn increases with deteriorating deprivation. It is not known whether deprivation is correlated with delayed healing from burn injuries.

Aim: To assess whether deprivation affects time to heal following a burn.

Methods: Only superficial partial thickness burns were included to minimize the effect of heterogeneous depths. Patients attending Sheffield Children's Hospital were identified over a 3-year period (9th April 2013 – 30th March 2016) on the International Burn Injury Database. Time to heal was identified in the nursing documents. The Index of Multiple Deprivation was used for the deprivation measure (1= most deprived; 10= least deprived). Data analysis was performed using Excel 2010 and SPSS 2017 for Spearman's Rank Correlation.

Results: 378 patients met the inclusion criteria with adequately documented information. Median Index of Multiple Deprivation was 2. Median TBSA was 1% (Range 0.1 – 27%). Median time to heal was 9 days (Range 2-42). No significant correlation between the Index of Multiple Deprivation score and length of time to heal exists (r = -0.072 with a p-value of 0.082).

1.5. Discussion/Conclusion: This study found no correlation between deprivation and time to heal following a superficial partial thickness burn. These findings may differ in an adult population.

INTRODUCTION

There is an increased incidence in sustaining a burn injury with deteriorating deprivation [1-3]. The cause of this is unknown, but may be linked to safety education, household overcrowding and household facilities. Several studies have alluded to this [1-3]. Furthermore, socioeconomic status has been linked to a worse outcome for children suffering from several other conditions [4]. If deprivation can be associated with an increased risk of sustaining a burn, could it also be associated with a worse outcome? Socioeconomic status and outcome from a burn injury in terms of length of hospital stay and hospital readmission has been studied, with those from more deprived backgrounds having an increased length of stay and frequency of readmission [5,6]. However, we performed a literature search to find papers where the effect of deprivation on time to heal from burns, as an outcome measure, had been quantified. This would be interesting to know for directing public health prevention campaigns and for designing outpatient services with a strategy to help those from more deprived backgrounds, such as the use of outreach nursing and clinics. No papers were identified. Therefore, to the best of our knowledge, no such study has previously been performed.

AIM

Our study aimed to assess whether there is an association between deprivation and length of time to heal following a burn.

MATERIALS AND METHODS

A retrospective review of data gathered for patient's sustaining burns over a 3-year period (9th April 2013 – 30th March 2016) for the International Burn Injury Database (iBID) from Sheffield Children's Hospital, was performed. This database has been used to collate information for all patients admitted with a burn to hospitals within the UK since 2005 and has been used in previous studies.

In order to minimize the heterogeneous effect of burn depth, we only included superficial partial thickness burn injuries in our inclusion criteria. Assessment of burn depth was made by a Burns Registrar doctor who has completed the Emergency Management of Severe Burns (EMSB) course and is experienced at assessing burn depth. Criteria for assessing superficial partial thickness burns includes blistered skin with a pink/red base, moisture with a moderate exudate, brisk capillary refill, painful, being sensitive

to air and light touch. Patients are reviewed a minimum of twice weekly until healed. A Consultant Burns Surgeon reviews these patients if there is any doubt of depth at the earliest opportunity.

The effects of chronic diseases on healing, such as diabetes, were negated by excluding any such patients.

The length of time to heal was taken from information recorded on the nursing documents, based on the time for the burned area to fully epithelialize. This was assessed by direct observation following cleansing of the burned area. All nurses assessing burns healing have completed the NBCN Burns nursing competencies level 3 and above. Analysis of the data including size of burn, mechanism, age of patient, gender, length of time to heal and postcode data was carried out.

Postcode data was used to extrapolate the social deprivation score for each patient in the study. The Index of Multiple Deprivation Score (IMDS) 2015 was used for the deprivation measure (1= most deprived; 10= least deprived) [7]. Areas known as Lower-layer Super Output Areas (LSOA) are given a rank from 1 being most deprived to 32,488 being least deprived. Each area is roughly the same size in terms of population and household number. These areas are then divided into 10 equal deciles. The deprivation scores for each postcode are based on the most up to date census data and uses indicators from 7 different domains. The weightings of the domains used to calculate the IMDS are listed in Table (1). Only patients who resided in postcodes from within the Sheffield city boundary were included in the study. Data analysis was performed using Excel 2010 and SPSS 2017. Spearman's Rank Correlation was used as a non-parametric correlation tool to identify any relationship between the variables.

RESULTS AND DISCUSSION

Results

378 patients met the inclusion criteria. No patients with superficial partial thickness burns had a past medical history including diabetes mellitus type 1 or 2. Patient and burn characteristics are described in Figures (1-3) and Table (2). There was no significant correlation between the Index of Multiple Deprivation score and length of time to heal (r = -0.072 with a p-value of 0.082) (Figure 4, Table 3).

Discussion

This study has demonstrated that no correlation exists between deprivation and length of time to heal following a superficial partial thickness burn in children. The effect of differing depths of burns on healing time was minimised by only assessing superficial partial thickness burns. Although the size of the burns differed between patients, the presence of adnexal structures, such as hair follicles and sweat glands, within the remaining skin should allow for epithelialisation over the wound. It is standard practice in the UK for superficial partial thickness

Table 1: Domains used to produce overall Index of Multiple Deprivation 2015.

Domain	% weighting towards IMD score
Income deprivation	22.50%
Employment deprivation	22.50%
Education, Skills and Training deprivation	13.50%
Health deprivation and Disability	13.50%
Crime	9.30%
Barriers to Housing and Services	9.30%
Living Environment deprivation	9.30%

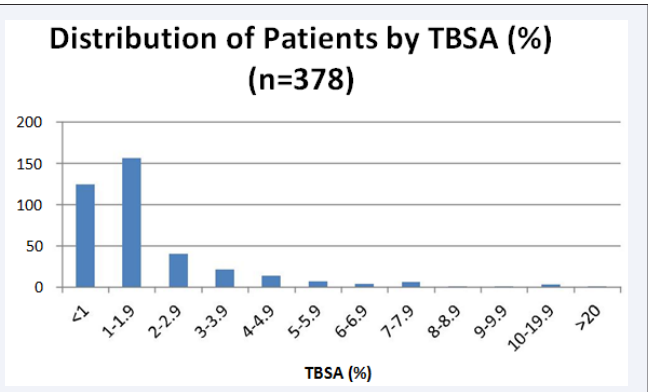

Figure 1 Distribution of TBSA (%) amongst study population. 1-1.9% is the median TBSA (%).

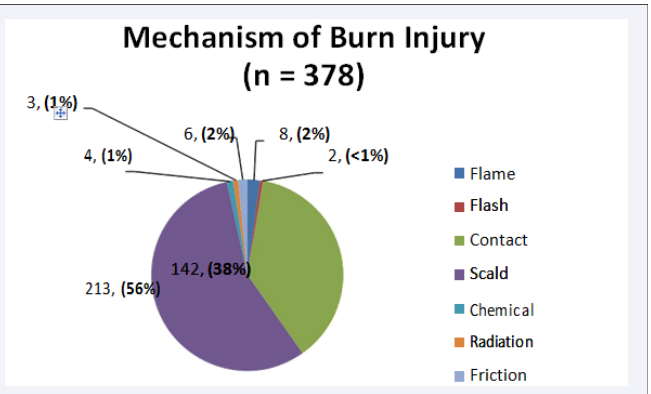

Figure 2 Mechanism of Burn Injury in the study group. Scald and Contact burns were the most common mechanisms.

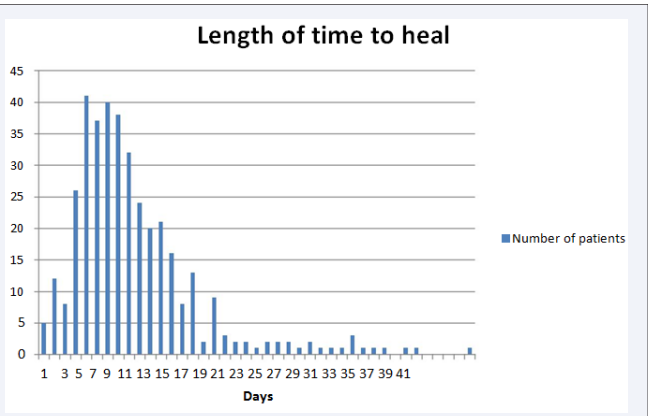

Figure 3 Distribution of length of time to heal from superficial partial thickness burns. The median time to heal was 9 days. Range 1 – 41 days.

Table 2: Patient and Burn characteristics.		
	Median	**Range**
IMD score	2	10-Jan
TBSA (%)	1	0.1 - 27
Age (Years)	1	<1-15
Time to heal (Days)	9	Feb-42
Gender	178 (47%) : 200 (53%)	Female : Male

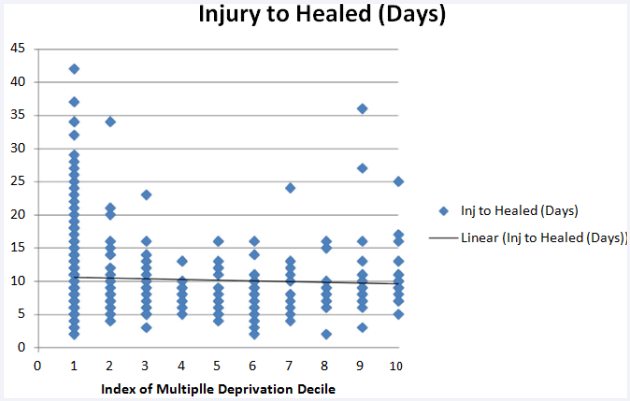

Figure 4 The Association between deprivation and time for burn to heal showing no significant correlation..

Table 3: Summary output from SPSS spreadsheet showing no significant correlation between index of multiple deprivation and time to heal following a burn injury.

				Time to
			IMD	heal
			Rank	(days)
Spearman's	IMD Rank	Correlation	1	-0.072
rho		Coefficient		
		Sig. (1-tailed)		0.082
		N	378	378
	Time to	Correlation	-0.072	1
	heal (days)	Coefficient		
		Sig. (1- tailed)	0.082	
		N	378	378

burns to be managed with dressings only, unless healing is likely to take beyond 21 days. Dressings such as Biobrane®, a biosynthetic dressing, were used for larger, clean and confluent superficial partial thickness burns, as they could be applied once and only start to peel away from the skin once the burn has re-epithelialised.

Length of time to heal was similar to the popularly quoted figures for superficial partial thickness burns [8] with 95% of our study group healing within 21 days.

The Index of Multiple Deprivation is used by the UK Government to assess deprivation in England. The use of such an index does not take into account the individual who may not be deprived, but lives within an area where individuals are generally of a more deprived status. However, this is the index used in other published studies where deprivation has been shown to correlate with an increased incidence of sustaining a burn.

The median age group was similar to other studies in the paediatric burns population, being under the age of 2 years [9]. This coincides with when most children begin to crawl and walk. The inquisitive nature of most young children coupled with their new motor skills explains how the main burn mechanisms were scald and contact burns (94%).

The population studied was paediatric, thus the consequences of an inadequately nutritious diet, or generally less healthy lifestyle on healing that may be more prevalent in a deprived population, may be less pronounced than in adults. None of the patients included in this study had Diabetes Mellitus or vascular insufficiency. The damaging effects of such conditions on the small vessels within, below or around the edge of burned skin, may not lead to a significantly prolonged healing time in this population as the chronic disease has not had sufficient time to negatively impact on the healing potential of the child's skin when compared with an adult. In this instance, our findings may not be the same if the population studied were adults.

The context of the study took place within the National Health Service, which is a health care system available to the whole population and is free at the point of delivery. There is a very high uptake of service use, which may differ from systems that are not free at the point of delivery. This may balance any negative impact on healing resulting from deprivation. Therefore, the results of this study may not be the same if it was conducted in a system where healthcare is not free at the point of delivery.

LIMITATIONS

The main limitation of this study is that it only examines patients with superficial partial thickness burns. The results may not be the same if we included patients with deeper burns.

Similarly, only children from a UK inner city were included in this study. It is possible that adult patients from increasingly deprived environments take longer to heal their burns. Furthermore, around the world, burns occur more frequently in the developing world. In these locations, the impact of an inadequately nutritious diet on children may well affect the time taken to heal, particularly in the severely undernourished.

CONCLUSION

Deprivation does not impede time to heal from superficial partial thickness burns in children up-to 16 years of age in an inner city population in the United Kingdom.

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