Background

BURNS are a common trauma, and affect 1% of the Australian population each year [1]. Burns are associated with significant physical, psychological, social and economic burdens for victims and their families. There has been a recent paradigm shift in understanding burns, which are now viewed as a complex disease requiring a multidisciplinary approach [2].

The aim of this study was to examine differences by area and clusters of burns, and to identify areas of reduced risk of burns in the Western Sydney region (Figure 1). This examination was undertaken to improve our understanding of spatial trends in burn incidence, and to improve burn prevention strategies.

Aims

1. To examine the risk of severe burns by geographical region in NSW using geospatial analytic techniques.
2. To identify high and low risk areas for burn injuries that may be targeted in burn prevention strategies.

Methods

Data

Data were obtained from the NSW Severe Burns Injury Service (NSW SBIS) for the 5 year period of 2006–2010. These data were collected from cases admitted to severe burn units at the Concord Repatriation General Hospital, Royal North Shore Hospital and the Children’s Hospital at Westmead. Population data for each postcode were obtained from the 2006 Census (Australian Bureau of Statistics, 2006a).

Analyses

Data were examined for all age groups combined. The analyses of postal areas in the Greater Sydney Area (GSA) were conducted separately to those of the remaining rural areas. Geospatial imaging software was used to map the relative-risk and clustering of burns by postcodes in NSW.

Cluster analysis was conducted using Getis-Ord and Global Moran’s I statistics. The Getis-Ord G* test was performed to investigate the extent to which a postal area was surrounded by areas of high or low burn risk [3]. Getis-ord statistics allow detection of local “pockets” of spatial association that may not be evident in global statistics [4]. A statistically significant G* value (z-score) reflects a significant difference between the scaled sum of a given postal area and that of its neighbours. A statistically significant z-score reflects a difference that is larger than can be attributed to chance [4].

Positive G* values (positive z-scores) are indicative of clustering of high-risk areas (i.e. burn hot spots), whereas negative G* values denote areas of low risk (i.e. burn cold spots). A G* value approaching zero is suggestive of no apparent clustering. For a statistically significant hot-spot to exist, a postal area must possess a relative risk that extends into areas of relative economic disadvantage (IRSD).

Results

The findings of the Getis-Ord G* analyses are summarised in Figure 1. This figure shows defined spatial areas of increased burns risk (high-risk areas or burn hot spots) and areas of reduced risk (low-risk areas or burn cold spots). Figure 1 shows a statistically significant cluster of high risk of burn injury in the Western Sydney region. It also shows a statistically significant cluster of low risk of burn injury in Eastern and Southern Sydney regions.

The SEIFA indices were used as these provide a summary measure representing an ‘average’ of people and households in a postcode area. The strongest burns hot-spots represent the most intense clustering of high relative burn incidents. These areas are located in the Western Sydney region and correspond with the lowest 30% of socioeconomic deprivation as measured by the SEIFA index of Relative Socio-economic Disadvantage (IRSD). This hot-spot further extends into areas of relative socio-economic advantage to the east of Concord Repatriation General Hospital. The results imply that, as determined by the Getis-Ord analyses, the high-risk postcode areas represent areas that are of most socio-economic disadvantage (i.e. the 30% percentile of most socio-economically disadvantaged communities in Australia). There is also spatial correspondence with the SEIFA indices of economic resources, which measures the general level of access to economic resources of people and households within an area (i.e. household income, housing expenditure and wealth, and education and occupation, which measures the general level of education and occupation-related skills (i.e. level of qualification) of people within an area. A similar pattern was evident with intense clustering in the previously defined high-risk burns postal areas, revealing that these areas correspond to the 30th percentile in each of these indices compared to the average in Australia.

Conclusion

The results of this study showed that burns risk clustered in specific regions. There was an increased risk of burns identified in the Western Sydney area, and a comparatively decreased risk of burns in the Eastern and Southern areas of Sydney. Furthermore, high-risk areas were characterised by socio-economic disadvantage.

This study shows that mapping the risk of burns is a valuable tool for policy makers to plan and deliver targeted intervention strategies for burns prevention.

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References