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Clothing-related burns in New South Wales, Australia: Impact of legislation on a continuing problem



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ABSTRACT

To combat the risk of nightwear burns a mandatory standard regulating the design, flammability and labelling requirements of children's nightwear was introduced in Australia in 1987. This population-based study examined the trends, characteristics and causes of clothing-related burns to inform a review of the current standard, and to facilitate the development of targeted prevention strategies.

Clothing-related burns for 1998–2013 were identified from hospitalisation data for all hospitals in NSW and detailed information regarding circumstance of injury from a burn data registry. To investigate percentage annual change (PAC) in trends negative binomial regression analysis was performed.

There were 541 hospitalisations for clothing-related burns, 18% were nightwear-related and 82% were for other clothing. All clothing burns decreased by an estimated 4% per year (95% CI −6.2 to −2.1). Nightwear-related burns decreased by a significantly higher rate (PAC −7.4%; 95% CI −12.5 to −2.1) than other clothing (PAC −2.5%; 95%CI −4.7 to −0.1). Exposure to open heat source (campfire/bonfire) was the most common cause, followed by cooking. Of factors known to be associated with clothing burns, accelerant use was reported in 27% of cases, cigarettes 17%, loose skirt or dress 8%, and angle grinders in 6% of cases.

Hospitalisations for clothing burns are relatively uncommon in NSW and rates, particularly of nightwear burns, have decreased over the last 15 years. Strategies for continued reduction of these injuries include increasing the scope of the current clothing standard or developing new standards to include all children's clothing and adult nightwear, and increasing community awareness of the risk associated with open heat sources, accelerant use and loose clothing.

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1. Introduction

Despite major advances in the prevention of clothing-related burns seen in many countries over the last 60 years they continue to constitute a significant burn hazard worldwide, particularly in low to middle income countries where loose and/or flammable clothing catching fire remains a major cause of flame burns [1–3]. Although now comparatively uncommon in high income countries, clothing-related burns remain potentially devastating injuries. In the United States (US) in 2009, it was estimated that 4300 clothing-related burns are treated in hospital emergency departments each year and 120 people die [4].

The decrease in morbidity and mortality associated with clothing burns experienced in high income countries has been attributed in part to a change in fashion towards tight fitting clothing and the introduction of synthetic fabrics that do not burn readily, combined with the introduction of regulations restricting the flammability of clothing [5]. The first of these fabric regulations, the Flammable Fabric Act (FFA) was introduced in the US in 1953 in recognition of the high burn danger posed by brushed rayon sweaters and cowboy chaps [6]. Much of the early regulatory efforts thereafter focussed on children's nightwear, as it was recognised at the time that the majority of severe injuries were attributable to loose-fitting easily ignited night attire [5]. Regulations introduced in the United Kingdom (UK) the following year addressed the flammability of fabrics specifically in children's night dresses. In 1967, the UK regulations increased in scope to include adult nightdresses [7] and in the same year the US Flammable Fabric Act was amended to include all articles of wearing apparel and interior furnishings [6]. In 1973 additional standards were introduced in the US to regulate the flammability of young children's sleepwear (sizes 0–6X) and increased to include larger sizes (sizes 7–14) in 1975 [8]. In Australia, the clothing standard AS 1249 'Safe design rules for children's night clothes', was first introduced in 1972, updated to 'Children's night clothes having reduced fire hazard' in 1976 [9] and mandated under national legislation in 1978 [10]. The standard has undergone several subsequent amendments and currently includes some daywear or underwear items that may commonly be used as nightwear such as boxer shorts and infants all-in-ones [11].

Several studies have shown that the incidence of nightwear-related burns in children reduced significantly compared to other clothing burns following the introduction of nightwear standards/regulations in the US, UK and New Zealand [12–14]. In particular a study undertaken at the Shriner's Burns Institute in Boston demonstrated that the percentage of nightwear related burns dropped from 32% to 4% of all burn admissions after the nightwear regulations were enforced [13]. Since these early reports, few studies have explored the long-term impact of the introduction of clothing regulations and standards. One study investigating impact of UK regulations found little to no sustained impact [15], and there has been little published on trends in other non-nightwear clothing burns.

In Australia, the clothing standard AS/NZS 1249:2003 underwent public comment and review in 2013. Our aim

was to examine the trends, characteristics and causes of clothing burns at a population level in NSW, to inform the clothing standards review, and to facilitate the development of targeted prevention strategies.

2. Methods

2.1. Data sources

2.1.1. Admitted patients data collection (APDC)

The APDC is a routinely collected census of all private and public hospitalisations across NSW. The APDC records 'episodes of care' in hospital which end with the discharge, transfer or death of the patient. All Hospitalisations due to burns and scalds were identified by ICD-10-AM external cause codes 'X00-X19' and of these, clothing-related burns were identified using ICD-10-AM external cause code 'X05' *Exposure to ignition or melting of nightwear* and 'X06' *Exposure to ignition and melting of other clothing and apparel* for the 15 years financial period 1998–1999 to 2012–2013. Records where the mode of admission was a transfer from another hospital or change in service category were excluded to minimise multiple counting of cases for the same injury. Cases admitted to a hospital in NSW but usually residing another state were also excluded as hospitalisation rates were calculated against the NSW resident population. All NSW residents admitted to interstate hospitals are included in the APDC and were included in the analysis. Numbers and rates for 2011–2012 and 2012–2013 include an imputed estimate of these interstate hospitalisations ($n = 184$).

2.1.2. Agency for clinical innovation NSW statewide burn injury service (SBIS) burns data registry

The SBIS burns data registry contains admission records and case details for all patients admitted to the three designated Burns Units in NSW (two adult, one paediatric) and captures both hospitalisations and outpatient clinic visits. Detailed demographic, etiological and clinical data items are collected including a free text description of the circumstances resulting in the burn injury. Cases are classified according to mechanism of injury. Clothing-related burns were identified by mechanism of injury 'Flame-clothing and bedding' for the 6 years period for which full data coverage is available, 2007–2008 to 2012–2013. The free text descriptions of the circumstances of injury were reviewed and admissions for house fires and bedding-related burns were excluded.

2.2. Statistical analysis

Analysis was performed using SAS Enterprise Guide 5.1 [16]. Direct age and sex standardised rates per 100,000 population were calculated along with the percentage annual change in the hospitalisation rate. Ninety-five percent confidence intervals were calculated assuming a Poisson distribution [17]. Age-specific population estimates for NSW at 31 December for each of the years studied were used to calculate rates. These estimates correspond to the mid-point of each financial year of hospitalisation data, and were interpolated from the Australian Bureau of Statistics population estimates at 30

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