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Differing patterns in thermal injury incidence and hospitalisations among 0–4 year old children from England

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ABSTRACT

Objective: To describe patterns in thermal injury incidence and hospitalisations by age, gender, calendar year and socioeconomic status among 0–4 year olds in England for the period 1998–2013.

Participants: 708,050 children with linked primary care and hospitalisation data from the Clinical Practice Research Datalink (CPRD) and Hospital Episode Statistics (HES), respectively.

Analysis: Incidence rates of all thermal injuries (identified in CPRD and/or HES), hospitalised thermal injuries, and serious thermal injuries (hospitalised for ≥72 h). Adjusted incidence rate ratios (IRR) and 95% confidence intervals (95%CI), estimated using Poisson regression.

Results: Incidence rates of all thermal injuries, hospitalised thermal injuries, and serious thermal injuries were 59.5 per 10,000 person-years (95%CI 58.4–60.6), 11.3 (10.8–11.8) and 2.15 (1.95–2.37), respectively. Socioeconomic gradients, between the most and least deprived quintiles, were steepest for serious thermal injuries (IRR 3.17, 95%CI 2.53–3.96). Incidence of all thermal injuries (IRR 0.64, 95%CI 0.58–0.70) and serious thermal injuries (IRR 0.44, 95%CI 0.33–0.59) reduced between 1998/9 and 2012/13. Incidence rates of hospitalised thermal injuries did not significantly change over time.

Conclusion: Incidence of all thermal injuries and those hospitalised for ≥72 h reduced over time. Steep socioeconomic gradients support continued targeting of preventative interventions to those living in the most deprived areas.

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1. Background

Thermal injuries (e.g. hot water scalds, flame burns) cause morbidity, prolonged hospitalisation and disability in children aged 0–4 years old both globally and within the United Kingdom (UK). They are the fourth leading cause of injury-related hospitalisation among 0–4 year olds in England [1], and were highlighted in 2014 by Public Health England as one of the five priority injuries for prevention in this age group [1]. Serious burns and scalds have a significant impact on the child, family and health services and can lead to high treatment costs (e.g. £173,000 to treat a serious bathwater scald [2]). Among young children thermal injuries most commonly occur within the home and are largely preventable.

Quantifying the burden of thermal injuries in England is a challenge, with existing national data focusing on those undergoing hospitalisation [3] or specialist burns care [4]; representing a small proportion of the overall burden of thermal injury. Within England over 98% of the population is registered with a general practitioner (GP) [5], with GPs maintaining longitudinal electronic records of patients' medical conditions, including recording diagnoses made in secondary and tertiary care. Through using the Clinical Practice Research Datalink (CPRD), a nationally representative primary care database that is linked to hospitalisation data, we aimed to describe patterns in thermal injury incidence and hospitalisations by age, gender, calendar time and socioeconomic status amongst a cohort of children aged 0–4 years from England.

2. Methods

2.1. Study population

The CPRD is a primary care research database containing the longitudinal primary care records of over 11 million patients from the UK [6]. It has been validated for a number of diseases [7] and is broadly representative of the demographics of the UK population [6]. We used the CPRD to yield a study population of 708,050 children from England, who were aged 0–4 years old between 1st January 1998 and 31st December 2013 and for whom linked hospitalisation data were available. Hospitalisation data are held in the Hospital Episode Statistics (HES) inpatient dataset, which captures all elective and emergency hospitalisations paid for by the National Health Service (NHS). Linked hospitalisation records are available for 75% of English CPRD practices [6], and have been shown to broadly represent the age and gender structure of the English population [6,8], but underrepresent some regions (North East, East Midlands and Yorkshire and the Humber) [8].

Using the CPRD, we carried out an open cohort study, with children entering the cohort at the latest date of: their date of birth, their general practice registration date, 1st January 1998, and the date the practice met the CPRD data quality standards. Each child contributed data to the study until their end of follow-up date, which was the earliest of: 31st December 2013, the child's fifth birthday, the date medical data were last collected from the general practice, or the date the child left the practice (e.g. child moved practice or died). The study population was therefore a subset of children from England, representing approximately 6% of 0–4 year olds from England in 2013.

2.2. Identification of thermal injury records

For each child in the study cohort we identified any recorded thermal injury events occurring during their follow-up time from their primary care (CPRD) and/or hospitalisation records (HES). The CPRD contains information about thermal injuries managed in primary care, but also contains information communicated to the GP about emergency department (ED) attendances and hospitalisations. Previous studies have shown high levels of transcription of information from discharge letters and outpatient summaries into the primary care record [9,10]. Diagnoses are recorded in the CPRD using Read Codes, a clinical coding system used in UK primary care. We identified thermal injuries recorded in the CPRD using a list of Read codes (Supplementary file 1), corresponding to International Classification of Diseases version 10 (ICD-10) categories for burns (ICD-10 T20-T32), injuries due to heat and hot substances (ICD-10 X10-X19), and injuries due to smoke, fire and flames (ICD-10 X00-X09). Chemical burns, corrosions and abrasion burns were excluded. We identified hospitalisations for thermal injuries by extracting any records from HES with an ICD-10 code (T20-T32, X10-X19, X00-X09) or procedure code (e.g. codes for dressing, debridement or exploration of burnt skin, skin grafts) for a thermal injury.

2.3. Identifying incident thermal injuries

To identify incident events using both CPRD and HES data, it was necessary to exclude duplicate records for the same injury recorded in both data sources, and to exclude repeat records for the same injury event (e.g. repeated dressing changes). We did this by using a time-based algorithm (Supplementary file 2), as previously described [11]. In brief, we assessed the time between the first code for a thermal injury event and all subsequent thermal injury codes. Primary care records that occurred within 3 weeks of the event date, if the event was first recorded in primary care, or 8 weeks of the event date if the first record was a hospitalisation, were considered the same event. A longer time-window was used for thermal injuries undergoing hospitalisation as these are likely to be more severe injuries and benefit from longer follow-up. A third time-window of six weeks determined whether hospitalisations occurring after the event start date referred to the same (e.g. readmission) or a new event. Thermal injury codes occurring outside of these time-windows were considered a new injury event. To account for a small number of children receiving repeated skin grafts, any codes for grafts occurring within two years of the first thermal injury event code were considered the same event. We identified these time-windows by plotting the rates of thermal injury codes entered in CPRD and HES after the first injury code [11], and have previously demonstrated that even when these time-windows are doubled, incidence rates by child age are similar to the primary analysis [11].

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