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Original Research

Inequalities in hip fracture incidence are greatest in the North of England: regional analysis of the effects of social deprivation on hip fracture incidence across England

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ABSTRACT

Objectives: Hip fracture risk varies by geography and by levels of deprivation. We examined the effect of local area-level deprivation on hip fracture incidence across nine regions in England, using 14 years of hospital data, to determine whether inequalities in hip fracture incidence rates vary across geographic regions in England.
Study design: Sequential annual cross-sectional studies over 14 years.
Methods: We used English Hospital Episodes Statistics (2001/02–2014/15) to identify hip fractures in adults aged 50+ years and mid-year population estimates (2001–2014) from the Office for National Statistics. The Index of Multiple Deprivation was used to measure local area deprivation. We calculated age-standardised hip fracture incidence rates per 100,000 population, stratified by gender, geographic region, deprivation quintiles and time-period, using the 2001 English population as the reference population. Using Poisson regression, we calculated age-adjusted incidence rate ratios (IRRs) for hip fracture, stratified as above.
Results: Over 14 years, we identified 747,369 hospital admissions with an index hip fracture. Age-standardised hip fracture incidence was highest in the North East for both men and women. In North England (North East, North West and Yorkshire and the Humber), hip fracture incidence was relatively higher in more deprived areas, particularly among men: IRR most vs least deprived quintile 2.06 (95% confidence interval [CI] = 2.00–2.12) in men, 1.62 (95% CI 1.60–1.65) in women. A relationship, albeit less marked, between deprivation and hip fracture incidence was observed among men in the Midlands and South, but with no clear pattern among women.

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Conclusions: Regional variation in hip fracture incidence exists across England, with the greatest absolute burden of incident hip fractures observed in the North East for both men and women. Across local areas in North England, absolute and relative inequalities in hip fracture incidence were greater than in other regions. Our findings highlight the need for improved fracture prevention programmes that aim to reduce regional and social inequalities in hip fracture incidence.

Introduction

Hip fractures are an important public health problem, with significant impact on morbidity and mortality. Approximately 60,000 hip fractures occur annually in England,[1] and incidence is predicted to rise as our population ages. Hip fractures are costly with annual hospital costs estimated at £1.1 billion for the United Kingdom (UK).[2]

Worldwide geographic variation in hip fracture incidence is well documented, with the highest rates reported in Northern Europe and the United States (US).[3] Regional variation in hip fracture incidence rates has been demonstrated within New Zealand and the US.[4,5] Considerable regional variation in age-adjusted hip fracture incidence has been observed in the UK based on analysis of primary care data, with the lowest rates in London and the highest rates in the south west of England, Northern Ireland and Scotland.[6]

Greater deprivation has been associated with higher hip fracture rates in many high-income countries, including the UK. Analysing English Hospital Episodes Statistics (HES), we recently found that despite public health efforts to prevent hip fractures, amongst both men and women, greater deprivation predicts higher hip fracture incidence, and that, over the last 14 years, this health inequality gap has not narrowed for men and has marginally widened amongst women.[7] However, it is unknown whether inequalities in hip fracture incidence rates differ between geographic regions in England and whether this has changed over time.

We hypothesised that inequalities in hip fracture incidence are not uniformly distributed across the geographic regions of England and that greater inequalities in hip fracture incidence would be observed in more deprived regions, in part potentially owing to variation in lifestyle risk factors for fracture. Hence, we examined the effect of area-level social deprivation on hip fracture incidence in England, across nine geographic regions, over a 14-year period.

Methods

We used HES data from all National Health Service (NHS) hospitals in England for the period 1st April 2001 to 31st March 2015 to identify patients aged 50 years and older with an index case of hip fracture on or during admission using International Classification of Diseases, Tenth Revision (ICD-10) disease codes for fracture of neck of femur (S72.0), pertrochanteric fracture (S72.1) and subtrochanteric fracture (S72.2). We excluded patients aged below 50 years in whom hip fractures are primarily due to high-impact trauma and those with missing data (n = 4667) for age, gender, Index of Multiple Deprivation (IMD) or region of residence. We used Office for National Statistics annual mid-year population estimates for England from 2001 to 2014 as population denominators, stratified by age, gender, IMD quintiles and nine Government Office Regions (GORs). We categorised the nine GORs into three geographic regions: North of England (North East, North West and Yorkshire and the Humber), the Midlands (East Midlands, West Midlands and East of England) and South of England (South East, South West and London). The IMD is a relative measure of socio-economic deprivation for local areas comprising seven domains of deprivation. We categorised patients into deprivation quintiles based on the national ranking of their local residential area, with quintile 1 being the least deprived and quintile 5 the most deprived group.

We used direct standardisation to calculate age-standardised hip fracture incidence rates per 100,000 population for men and women, stratified by geographic region and IMD quintiles, using the 2001 English population as our reference population structure; age-standardised hip fracture incidence rates, further stratified by time-period, were calculated to assess secular trends. We also calculated age-standardised rates for individual GORs using the same approach. To describe the association between local area deprivation and hip fracture incidence stratified by geographic regions, separately for women and men, we fitted Poisson regression models with the number of hip fractures per group as the dependent variable and IMD quintile and age as independent variables, including the population size as an offset. Associations are presented as incidence rate ratios (IRRs) with 95% confidence intervals. All statistical analyses were conducted using Stata, version 14 IC (StataCorp, College Station, TX, USA).

Results

Over 14 years, we identified 747,369 people admitted to hospital with a hip fracture. Three quarters (74.2%) were women, and the median age was 83 years; 81 in men and 84 in women. A fifth (19.2%) occurred among individuals in the least deprived quintile and just under a fifth (18.8%) among those in the most deprived quintile.