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Admissions for orthostatic hypotension: an analysis of NHS England Hospital Episode Statistics data

Eoin Duggan , Roman Romero-Ortuno , Rose Anne Kenny

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Mercer's Institute for Successful Ageing, St. James's Hospital, Dublin, Ireland

Correspondence to
Dr Eoin Duggan;
eoin.duggan@ucdconnect.ie

ABSTRACT

Objectives To determine whether admissions for orthostatic hypotension (OH) and its consequences, such as falls, have changed over the past 10 years in the National Health Service (NHS) England.

Setting Data from NHS England Hospital Episode Statistics, a database containing details of all admissions, accident and emergency attendances and outpatient appointments at NHS hospitals in England, were obtained and analysed.

Participants Data on hospital admissions in NHS England, as defined by finished consultant episodes (FCEs), were examined between 2008 and 2017.

Main outcome measures FCEs for the following International Classification of Disease codes were examined: OH (I95.1), tendency to fall (R29.6), epilepsy (G40) and chronic obstructive pulmonary disease (COPD) (J44). The total number of FCEs was also examined.

Results Between 2008 and 2017, FCEs for OH rose from 14 658 to 30 759, a 110% increase. The greatest increase was in the over 75 years age group where FCEs went from 10 639 to 22 756, a 114% rise. The number of falls related FCEs in this age group rose from 61 841 to 89 622 (45%). Admissions for epilepsy and COPD rose by 7% and 35%, respectively.

Conclusions The number of admissions for OH has risen dramatically over the past 10 years, as have admissions for falls and related disorders. This rise is out of proportion with admissions for other conditions such as epilepsy and COPD. We postulate that this relates to tighter blood pressure (BP) targets. This suggests caution in the application of recent BP targets to older, frailer adults.

Strengths and limitations of this study

- We used a large comprehensive data set, Hospital Episode Statistics, which includes details of all admissions to NHS hospitals in England.
- We examined 10 years of data to establish trends in admissions over a prolonged period.
- We examined control variables chronic obstructive pulmonary disease and epilepsy to try ensure that results were not confounded by overall rises in admissions due to population ageing.
- Limitations include the fact that it is observational data, therefore we cannot infer causation and the possibility of misclassification bias and coding errors.

INTRODUCTION

Our population is ageing and by 2040 nearly one in four people in the UK will be aged 65 years or over.[1] Orthostatic hypotension (OH), defined as a sustained drop in systolic blood pressure (SBP) by at least 20 mm Hg or diastolic blood pressure (DBP) by at least 10 mm Hg within 3 min of standing,[2] is common affecting 1 in 10 people aged 50 years or over.[3] OH is most prevalent in older persons with multimorbidity and frailty.[4] Age-related structural and physiological changes such as: increased vascular stiffness, impaired baroreflex sensitivity, impaired autonomic reflexes, sarcopenia, attenuated renin-angiotensin activity, elevated norepinephrine levels, reduced thirst sensation and hypovolaemia contribute to the higher prevalence of OH and susceptibility to OH in persons over 75 years. Age-related OH is a risk factor for injurious and all-cause falls,[5 6] depression,[7] cognitive decline[8] and possibly dementia.[9]

Over the past number of years the target for SBP and DBP control in hypertension has progressively declined from 160 mm Hg to more recent Systolic Blood Pressure Intervention Trial (SPRINT) targets of 120 mm Hg.[10] In 2017 a Cochrane review concluded that 'there is insufficient evidence to know whether a higher BP target (less than 150–160/95–105 mm Hg) or a lower BP target (less than 140/90 mm Hg) is better for older adults with high BP'. The review acknowledged however that an 'even lower BP target of less than 140 mm Hg is commonly applied to all age groups'.[11]

Such lower BP targets in the very old are controversial in context of concerns for OH and subsequent adverse events—in particular falls.[12]

Given the progressive lowering of targets for SBP in hypertension, and the known association between OH with CV medications,[13] we

hypothesise that admissions for OH have increased over the past 10 years in the National Health Service (NHS) England. Given that falls are commonly associated with OH, we also examined whether hospital admission for falls have risen. These were compared with overall rates of admissions for two other age-related disorders unconnected to hypertension treatment—epilepsy and chronic obstructive pulmonary disease (COPD).

METHODS

We obtained data from the NHS England Hospital Episode Statistics (HES) database for years 2008 to 2017. HES is a database containing details of all admissions, accident and emergency attendances and outpatient appointments at NHS hospitals in England. Clinical coders based on hospital trusts record diagnosis information using the International Classification of Disease 10th Revision (ICD-10) classification system. Each HES record captures up to 20 diagnosis values, recording the primary reason the patient is being treated and any relevant secondary diagnoses.

We examined admissions as defined by a finished consultant episode (FCE) for a primary diagnosis coded with a selection of ICD-10 codes. An FCE is a continuous period of admitted patient care under one consultant within one healthcare provider.

The ICD-10 codes examined were: OH (I95.1), tendency to fall (R29.6), epilepsy (G40) and COPD (J44). Admissions for epilepsy and COPD were examined as control variables. Epilepsy was chosen as it is a cause of transient loss of consciousness and falls but is not associated with cardiovascular disease. COPD was chosen as a common disorder whose prevalence increases with age but is not related to cardiovascular disease. The total number of admissions across all diagnoses were also examined. Data for 'Tendency to fall' were available only between 2013 and 2017.

The number of FCEs were split into age groups: under 60 years, 60 to 74 years and 75 years and older. Descriptive statistics were examined in Microsoft Excel.

There was no direct patient or public involvement in this study.

RESULTS

Over the 10 years from 2008 to 2017, FCEs for OH rose from 14 658 to 30 759, a 110% increase. The greatest increase was in the over 75 years age group where FCEs increased from 10 639 to 22 756, a 114% rise (figure 1A).

There was a 45% increase in the number of falls-related FCEs in the over 75 years age group between 2013 and 2017, rising from 61 841 to 89 622 (figure 1B). Admissions for epilepsy in the over 75 years remained relatively stable in the period 2008–2017 rising from 6820 to 7310 (7%) (figure 1C), while admissions for COPD rose 35% (77 967 to 104 942) for the same age group (figure 1D).

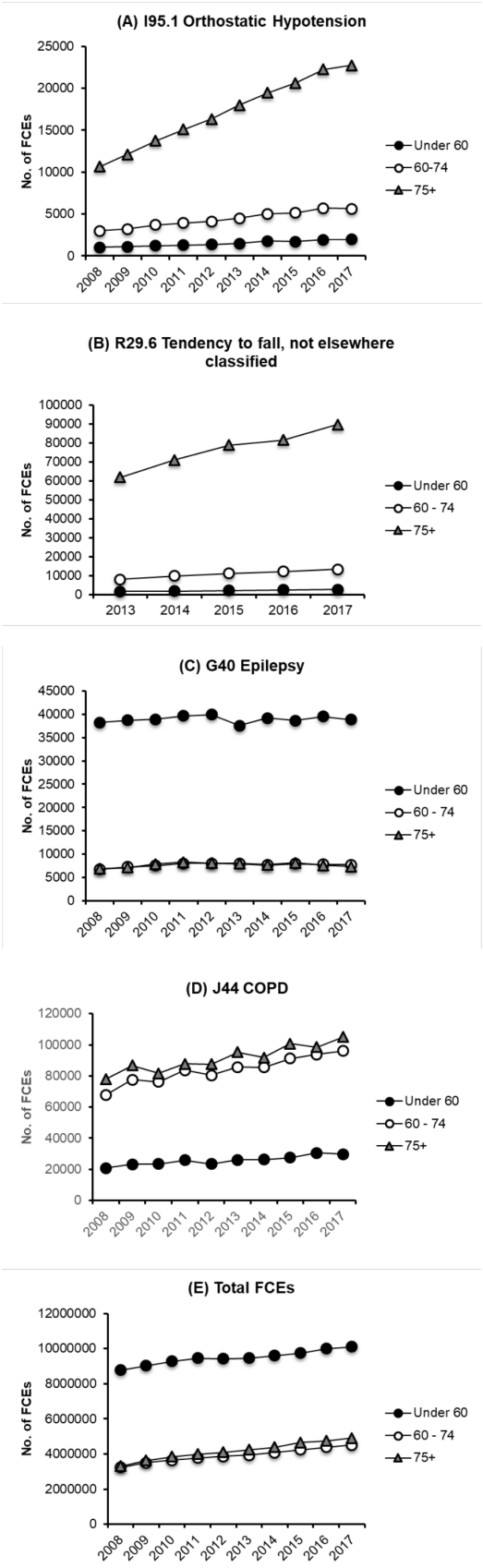

Figure 1 Number of finished consultant episodes (FCEs) per year by International Classification of Disease tenth revision code: (A) Orthostatic hypotension I95.1. (B) Tendency to fall R29.6, (C) Epilepsy G40. (D) Chronic obstructive pulmonary disease (COPD) J44. (E) Total FCEs per year, by age groups.

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During the same period overall admissions in NHS England rose by 28% from 15 359 062 to 19 726 907. Admissions for over 75 years rose 48% from 3 314 849 to 4 912 704 (figure 1E). FCEs for OH as a percentage of total FCEs for over 75 years increased from 0.32% to 0.46%.

The admission rate for OH for the year 2017 was calculated as follows: (total admissions for OH 2017 ÷ population of England 2017) ×1000 = 0.55 per 1000 person-years. This calculation however does not take into account the fact that a particular individual may have had more than one admission for OH in 2017.

DISCUSSION

In this analysis of discharge data from the HES database we have demonstrated that admissions for OH have risen significantly by 110% over a 10-year period from 2008 to 2017, with the greatest increase in the over 75 years age group. This increase is disproportionate to the rise in admissions overall, which rose 48% for those over 75 years in the same time period. This is also disproportionate to the increase in admissions for epilepsy and for COPD—7% and 35%, respectively. Admissions for falls have also increased in excess of expected rates—by 45%.

Given that epilepsy and COPD are both widely prevalent in older persons, one would expect a proportionate increase as admissions for older people in general increase. The increase in admissions for OH however, far exceeds these.

The increase in admissions of persons aged 75 years and older is likely attributed to ageing demographics and multimorbidity in these age cohorts—over 80% of this cohort has multimorbidity.[14] An English study in 2015 found that admissions in NHS England coded with frailty syndromes increased from 64 559 to 150 085 between 2005 and 2013.[15]

Possible reasons for the disproportionate increase in OH are more aggressive treatment of hypertension and cardiovascular disorders. Increased awareness of the OH and more precise coding of the diagnosis could also contribute to the higher numbers of admissions for the diagnosis. It is not possible to differentiate these possibilities from the current data set, however in the National Audit of Inpatient Falls 2015 only 16% of the sample of 4846 patients had a lying and standing BP recorded by their third hospital day.[16] This would suggest a low level of awareness of the issue and that the increase seen in admissions is unlikely to be due simply to changes in diagnosis and coding. In response to the National Audit of Inpatient Falls, the Royal College of Physicians published a lying and standing BP measurement guide in January 2017.[17] However, the increase in admissions identified in our study precede these guidelines and thus cannot be attributed to the change.

Previous research on admissions for OH is limited, however, a population-based cohort study in Malmo of over 32 000 people found a rate of hospital admission of 1.42% or 0.5 per 1000 person-years for OH and that rate increased with age and comorbidities.[18] Admissions for OH were found to predict cardiovascular mortality. Given the differences in study population and methodology with this study it is difficult to compare rates of hospital admission for OH. However we have calculated an admission rate for OH in NHS England of 0.55 per 1000 patient-years, similar to the rate in the Malmo study.

The strengths of our study include its robust, comprehensive source data and population coverage.

It is however observational data and as such we cannot infer causation. There is the possibility of misclassification bias given the reliance on hospital ICD-10 discharge coding. Furthermore, due to the limitations of the source data we were unable to control for confounding variables. Finally, as HES only includes patients admitted to hospital, those patients who present to the emergency department/accident and emergency but are discharged directly from there will not have been included in our study.

In conclusion our results raise the question as to whether lower BP targets and more aggressive blood pressure control are to blame for the significant increase in admissions for OH in older people, however further research is needed to prove this hypothesis.

Contributors ED: obtained and analysed the data, drafted the manuscript. RR-O: assisted in drafting, editing and critically reviewing the manuscript. RAK: developed the concept, assisted in analysis of data, reviewing and editing of the manuscript.

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ORCID iDs

Eoin Duggan http://orcid.org/0000-0001-8490-2076
Roman Romero-Ortuno http://orcid.org/0000-0002-3882-7447

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