Research Letters


SIR—Morbidity and the use of hospital resources are known to increase with age, and hospital admissions are rising more rapidly for those aged over 65 years, going up by 3% per year compared with 2% for all age groups [1–6]. Aside from the impact on health services, hospitalisation leads to adverse consequences for older people, including breakdown of formal and informal care, loss of social networks, premature admission to residential care and hospital-acquired infections [1, 7]. Despite this, in excess of 20% bed days in the United Kingdom are thought to be avoidable if a suitable alternative to acute admission were available [8–10]. In the United Kingdom and elsewhere there is, therefore, increasing emphasis on reducing preventable admissions for older people. However, access to intermediate or primary care services may be limited, resulting in a hospital admission. Recent UK health policy has made a commitment to services that promote health and independence and prevent unnecessary hospitalisation, emphasising case management of chronic disease in primary care [1, 6]. It is thought that these services will be more effective where interventions focus on specific conditions or patient groups at high risk of avoidable admission [1, 11–15].

One group identified in health policy as potentially avoidable admissions are those patients discharged from hospital with signs, symptoms and ill-defined conditions [1, 12, 14], i.e. patients whose primary disease codes are categorised under Chapter XVIII of the International Classification of Diseases (ICD)-10 [16], ‘Signs, symptoms and abnormal laboratory findings’ (usually abbreviated to ‘ill-defined conditions’, a part of the chapter title in previous versions of the ICD [17]). Ill-defined conditions include not only symptoms such as chest pain and breathlessness but also common geriatric syndromes such as delirium, falls, incontinence and collapse [18–21]. These symptom-related diagnostic codes are a common feature of older people’s emergency admissions in the United Kingdom and elsewhere and, whilst numbers are increasing for all age groups, they are rising more rapidly for older people [4, 5, 22]. This type of admission is likely to be seen as problematic in the context of tariff-based payment systems based on diagnoses, where reimbursement may not cover the costs incurred by these patients; costs per admission for ill-defined conditions are known to exceed those for other emergency admissions [23]. Recent increases in admissions for ill-defined conditions have been attributed to a decline in community services and to an associated rise in psychological and social problems amongst the oldest old [12, 24], but there is little evidence to support this view. In order to be able to respond appropriately to this trend, its underlying causes must be understood. This study explored recent growth in emergency hospital admissions for ill-defined conditions in people aged 65 years and over in England, and examined the impact of population growth, demographic change and changes to hospital activity on the rate of increase in incidence of this type of admission.

Methods

A retrospective analysis of all emergency hospital admissions in England was carried out using the national Hospital Episodes Statistics (HES) database [22]. Data on total emergency finished consultant episodes (FCEs) and FCEs for ill-defined conditions were obtained for people aged 65 years and above. This analysis included data from all hospital departments but, pilot work in medicine and care of the elderly showed very high rates in these settings, supporting the relevance of this analysis for geriatric medicine [19]. Data were obtained for the financial years 1995 to 2003, the complete years available using ICD version 10, resulting in a total sample of 2,793,653 FCEs for ill-defined conditions. Data were broken down into 5-year age bands and numbers of episodes were tabulated. Population estimates were obtained from the Office of National Statistics [25]. Data were analysed using Microsoft Excel 2003 and STATA release 8. Codes for uncategorised data and unknown cause of death were excluded. Standardised episode rates were calculated to explore the growth over time adjusted for age group composition, total population and total FCEs.

Results

During the study period there was a steady increase in the numbers of ill-defined condition episodes, from 210,908 to 402,325 (an increase of 91%), a trend apparent within each age band (Figure 1). Numbers of these episodes tended to increase with age, with the youngest age group experiencing fewer such episodes than the oldest age groups (Figure 1) and rates per 1,000 people increasing by age group in all study years (Table 1). The fall in overall numbers of these admissions in some age groups in years 1999–2000 (Figure 1) is associated with variations in population estimates within those age bands (see Appendix 1 in the supplementary data on the Journal website http://www.ageing.oupjournals.org/) although the incidence rate continued to rise within these age groups during this period (Table 1). Crude episode rates per 1,000 people aged 65 years and over rose from 27.4 to 50.6 in the study period, an increase of 84.7%. However, during the study period FCEs also rose from 1,602,845 to 2,433,039
Table 1. Rates of hospital episodes for ill-defined conditions (per 1,000 people) adjusted for population, age group and total FCEs in people aged ≥65 years in England from 1995 to 2003

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<tr>
<td>65–69</td>
<td>16.0</td>
<td>18.1</td>
<td>20.0</td>
<td>28.6</td>
<td>22.0</td>
<td>24.7</td>
<td>25.7</td>
<td>26.3</td>
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<td>70–74</td>
<td>20.5</td>
<td>23.5</td>
<td>25.9</td>
<td>27.3</td>
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<td>75–79</td>
<td>28.2</td>
<td>31.5</td>
<td>34.8</td>
<td>36.7</td>
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<td>43.1</td>
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<td>48.5</td>
<td>51.6</td>
<td>54.2</td>
<td>60.5</td>
<td>61.5</td>
<td>64.4</td>
<td>69.9</td>
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<td>≥85</td>
<td>56.4</td>
<td>71.2</td>
<td>78.4</td>
<td>75.5</td>
<td>77.9</td>
<td>87.7</td>
<td>92.5</td>
<td>97.0</td>
<td>105.9</td>
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<td>Total crude rate</td>
<td>27.4</td>
<td>32.0</td>
<td>35.2</td>
<td>36.3</td>
<td>38.2</td>
<td>43.0</td>
<td>45.0</td>
<td>47.0</td>
<td>50.6</td>
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<tr>
<td>Standardised rate (95% CI)</td>
<td>(3.00,3.02)</td>
<td>(3.51,3.53)</td>
<td>(3.87,3.89)</td>
<td>(4.00,4.03)</td>
<td>(4.21,4.24)</td>
<td>(4.76,4.79)</td>
<td>(5.01,5.04)</td>
<td>(5.28,5.31)</td>
<td>(5.72,5.76)</td>
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Figure 1. Number of ill-defined conditions related FCEs for people aged 65 years and over in England, 1995–2003.

(an increase of 52%), whilst the number of people aged over 65 years rose from 7,696,700 to 7,947,000 (an increase of 3%) (see Appendix 1 in the supplementary data on the Journal website http://www.ageing.oupjournals.org/). Two concurrent trends may therefore have influenced numbers of admission episodes; the general increase in FCEs within the National Health Service (NHS); and demographic trends to an older population. The analysis was therefore adjusted to account for changes to both population and FCEs. Direct standardisation of episode rates to account for changes in age distribution, population and total FCEs produces lower rates. However, adjusted rates have risen year on year during the study period (Table 1), from 3.0 in 1995 to 5.7 in 2003, a change of 91%. The proportion of the older population experiencing these episodes rose from 2.8 to 5.1% of people aged over 65 years.

Discussion

During the study period, total admission episodes for ill-defined conditions increased. The literature suggests that hospital episodes for ill-defined conditions are associated with increased age, and therefore such episodes can be expected to increase as the population ages [18]. It is known that the population of England has grown during the study period, particularly the proportion of the population aged over 65 years. However, another possible driver of rising ill-defined condition episodes is the general increase in FCEs reported during the study period. Episode rates for ill-defined conditions were therefore adjusted for the number of older people in the population, the age distribution of the older population and the overall number of FCEs. The analysis demonstrated that the growth in ill-defined condition episodes amongst older people exceeded what was expected on the basis of these factors alone. However, whilst the adjusted standardised rates almost doubled during this time, the adjusted incidence rate is much lower than what would be expected from the crude episode data. This suggests that much of the recent increases in this type of admission is likely to be due to a more general rise in hospital episodes, which have increased dramatically during the study period, and to some extent may reflect changes to reporting patterns or increased hospital activity. Nevertheless, a significant increase in incidence rate for these episodes is demonstrated by the adjusted analysis, although the underlying reasons for this trend are not known. It is likely that changes in incidence of ill-defined condition episodes are due to organisational changes that have occurred during this time period. One explanation, favoured by current UK health policy, might
be that these admissions reflect a lack of access to primary care and community care services that would otherwise support chronically ill older people and avoid the need for hospital admission. However, other organisational factors, such as new systems of out-of-hours care, reduced waiting times in Accident and Emergency departments generally increased admission rates for older people, and changes to organisation and funding in primary care might all contribute to the observed trend. During the study period, the mean length of stay for hospital episodes has decreased more for ill-defined conditions than other types of episodes, possibly reflecting more internal transfers or shorter admissions and more rapid discharge from hospital. The impact on diagnosis, coding accuracy and readmissions is not known. The oldest and most frail individuals may be more susceptible to the fragmentation of care that occurs with increasingly rapid transit through the acute care system, making them more likely to have overlooked or incorrect diagnoses. Older people are known to be more likely to present with atypical symptoms or multi-faceted syndromes which make diagnosis a challenge [20, 21]. However, accuracy of diagnostic coding has been shown to be high when considered at this broad chapter level, and there are indications that coding accuracy is improving [26, 27].

Growing numbers of hospital episodes for ill-defined conditions represent a challenge for health services. An ageing population and rising hospital episodes will both contribute to increased hospital episodes for ill-defined conditions. However, these factors do not fully explain the recent rises in incidence rate of admissions for ill-defined conditions, and it is likely therefore, that organisational factors are also implicated. We also need to explore the possibility of changes in accuracy of diagnosis or coding. Further research is required into the relation between age, health needs and different approaches to the organisation of care in order to determine the most appropriate approach to management of admissions for ill-defined conditions.

**Key points**

- Inpatient emergency episodes for ill-defined conditions in older people are rising in the United Kingdom.
- These admissions rise with age and are likely to increase as the population ages.
- Increases in these admissions are not fully explained by either population growth or episode growth.
- Further research on the interaction between ageing and organisational factors is required.

**Conflicts of interest**

None.

**Ethics approval**

Approval for this study was obtained from Southampton and South West Hampshire Research Ethics Committee.

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**Supplementary data**

Supplementary data for this article are available online at http://ageing.oxfordjournals.org.

**References**

Research letters


Glucose control levels, ischaemic brain lesions, and hyperinsulinaemia were associated with cognitive dysfunction in diabetic elderly

SIR—Type 2 diabetes mellitus (DM) in the elderly is associated with impaired cognitive functioning and an increased risk of dementia [1–4]. The pathogenesis of the impairment, however, remains unclear.

Our previous study indicated that the performance of a cognitive functional test was positively correlated with glycohaemoglobin, HbA_1c, which is an index of glucose control [2]. Recently, several studies suggested that use of anti-diabetic medication was associated with improved cognitive function [5], or prevented a decline in cognitive functioning [6].

Several reports have indicated that hyperinsulinaemia is associated with cognitive dysfunction and dementia in the general population [7, 8]. A small preliminary study reported that insulin sensitivity measured by the euglycemic insulin clamp method was inversely correlated with the cognitive functional test score [9].

Many studies have reported that the diabetic elderly have ischaemic brain lesions such as lacunae infarctions, white matter lesions and paraventricular lesions even without neurological symptoms [10]. Several reports have also suggested that these ischaemic lesions were associated with cognitive dysfunction in the diabetic elderly [11, 12].

In this study, we analysed the association of HbA_1c, hyperinsulinaemia and ischaemic brain changes to DM-related cognitive dysfunction by performing an assessment of subjects’ profiles including a brain imaging assessment by MRI.

Subjects and methods

Subjects

For the present study, we recruited consecutively 77 patients with type 2 DM from the Chubu Rosai Hospital’s Diabetic Center. They ranged in age from 65 to 85 years. The exclusion criteria were as follows: malignancy, inflammatory disease (such as collagen disease, thyroid disease and viral hepatitis), severe microvascular complications (such as renal failure) and severe cardiovascular disease (such as myocardial infarction and unstable angina). None of the subjects had audio-visual deficiencies that would prevent them from participating in the cognitive functional assessment.

An ethical committee approved the study and all patients gave their written informed consent prior to the investigation. After giving informed consent, the cognitive functional tests were administered individually to each subject. On the day of the assessment, the subjects had breakfast as usual and the assessment was performed in the morning. Doctors performed a general physical check-up of the subjects before the assessment.

Regarding complications of DM, neuropathy, retinopathy and nephropathy were diagnosed as below: neuropathy, elevated vibratory perception thresholds or symptomatic neuropathy; retinopathy, simple retinopathy and more advanced; nephropathy, microalbuminuria and more advanced.

Cognitive tests

Cognitive function was assessed by structured performance tests that were selected to represent a broad range of cognitive domains.

(i) Mental status: the Mini-Mental State Examination (MMSE) [13]. (ii) Verbal memory (Word Recall): the Word List (a subtest of the Alzheimer’s Disease Assessment Scale (ADAS) [14]; with a score range of 0–10. (iii) Complex psychomotor skill: the Digit Symbol Substitution (DSS)