Identifying the clinical characteristics of older people living in care homes using a novel approach in a primary care database

SUNIL M. SHAH¹, IAIN M. CAREY¹, TESS HARRIS¹, STEPHEN DEWILDE¹, RICHARD HUBBARD², SARAH LEWIS², DEREK G. COOK¹

¹Division of Community Health Sciences, St George’s University of London, London, UK
²Division of Epidemiology and Public Health, University of Nottingham, Nottingham, UK

Address correspondence to: S. M. Shah. Community Health Sciences, St George’s University of London, Cranmer Terrace, Tooting, London SW17 0RE, UK. Tel: +44 (0)208 725 0066; Fax: +44 (0)208 725 3584. Email: sushah@sgul.ac.uk

Abstract

Objectives: to enhance identification of older nursing and residential home residents in a national sample and describe their chronic disease prevalence.

Design: cross-sectional analysis of an established primary care database (The Health Improvement Network).

Setting: 326 English and Welsh general practices.

Subjects: 435,568 patients aged ≥65. Care home residents were identified by either a Read code for care home residence or multiple care home residence markers (postcode linkage, household size identifier and location of consultation).

Comparisons: nursing and residential home residents were compared with a community control group with no markers of care home residence using age and sex standardised chronic disease prevalence ratios.

Main outcome measures: chronic disease prevalence using definitions from the national primary care contract.

Results: 11,547 (2.7%) older people were identified as care home residents, of whom only 4,403 (38.1%) were directly identified by their primary care record. Mean age for nursing and residential homes was 84.9 and 86.1 years compared to 74.7 for controls. Prevalence ratios for dementia were 14.8 (95% CI 13.4–16.4) for nursing and 13.5 (12.4–14.8) for residential homes compared to controls. Stroke and severe mental illness were commoner in nursing and residential homes but hypertension, respiratory and cancer diagnoses were slightly less common. Recorded disease prevalences in nursing and residential homes were similar.

Conclusions: recording of care home residence is limited in primary care and this is a barrier to routine monitoring of this group. Higher dementia and stroke prevalence in care home residents confirms high clinical need, but the small differences in disease prevalence between nursing and residential homes have implications for delivering medical and nursing care to residential homes. Lower prevalence of some chronic diseases suggests incomplete recording or case finding. Routine flagging of care home residents in health care systems is a potential tool for improving monitoring and outcomes.

Keywords: care homes, nursing homes, primary care, quality and outcomes framework, elderly

Introduction

Older people in nursing and residential homes in England and Wales have high levels of need and health care use [1]. In the 2001 census, 3.5% of the population aged 65 and over was resident in nursing or residential homes [2]. There is international concern over quality in care homes which relates to a range of issues including dignity, abuse, nutrition and medical care [3–5]. Despite the size and vulnerability of the population, there is limited information on their clinical characteristics and medical care. The last nationwide survey in England was undertaken in 2000 and relied on self- or carer-reported clinical details [1]. Other UK studies rely on small or selected care home populations and often do not include a suitable community comparison [6–9]. A large national sample survey is undertaken in US nursing homes, and sample surveys and analyses of administrative databases have been undertaken in other countries [10–15].

Unlike other vulnerable groups, such as people with learning disability, there is no routine monitoring of the health and medical care of care home residents. In particular, the quality
and outcomes framework (QOF) of the general practice contract does not require their separate identification.

In this paper, we report a novel methodology for enhanced identification of care home residents in a primary care database and describe the prevalence of common medical conditions including comparison with community residents. We believe that this is the first national description of disease prevalence in UK care homes using standard definitions from the primary care contract.

**Methods**

**Data source**

The Health Improvement Network (THIN) is an established primary care database which collects anonymised data from a sample of the 23% of UK general practices which use the Vision computer system [16, 17]. It holds a full longitudinal record of registration, diagnosis and prescribing.

The Vision practice system includes an identifier, family number, which allows practices to link patients in the same household or institution. This identifier has been used to link mothers and babies in a single household [18, 19]. The Vision system also includes a flag which allows recording of the location of consultation including whether it occurred in a care home.

**Postcode linkage**

THIN allows anonymised patient postcode linkage during data collection. A UK postcode identifies, on average, 15 residential addresses, and larger communal establishments may be the only address in a postcode. We commissioned postcode linkage to identify patients who lived in postcodes which included a care home. Postcodes were obtained from registration authorities in England and Wales. Care homes were categorised according to type (nursing or residential) and primary client group (generic or specialising in learning disability or alcohol and drug problems) based on registration details. The end result of this linkage was a flag in the record of patients who lived in a postcode with a care home.

**Subjects**

Older people were defined as those aged 65 and over. Our study included 435,568 older people from 326 English and Welsh practices who were registered on the last day of data provided by their practice. All included practices provided data up to at least March 2008 and most provided data to February 2009.

**Identifying care home residents**

Care home residents were identified by the presence of either a Read code for residence in a care home (Appendix 1, available in Age and Ageing online) or at least two other independent markers of care home residence in their record. The independent markers were (i) address in a care home postcode, (ii) a family number with four or more older people in a household or (iii) a record of consultation in a care home. Our identification of care homes included nursing and residential homes but did not aim to include supported housing schemes such as sheltered housing which were included in our community group.

We assessed the performance of our identification of care home residents by comparing the demographic and clinical characteristics of our sample with national sources and against using care home residence Read codes alone.

**Control and undetermined group**

A community resident control group was identified with no markers for care home residence. It excluded patients in family numbers with three older people and those for whom postcode linkage had failed. The remaining patients, with one marker, and those who shared a household with a patient with any marker of care home residence, were classified as undetermined status.

**Type of care home**

We further identified care homes which provided general care for older people including those specialising in dementia. Specifically, we excluded patients in postcodes for care homes which specialised in learning disability and alcohol and drug problems. We also excluded patients where the family number linked to a majority of younger patients (<65 years), as these homes would be unrepresentative of care homes for older people. We stratified care home patients into residential and nursing home patients based on postcode linkage. Nursing homes provide care by qualified nurses in addition to the general personal care provided by residential homes.

**Disease prevalence**

We examined recorded chronic disease prevalence in nursing and residential homes compared to the community using QOF disease definitions from the UK general practice contract [20]. Definitions were applied based on the disease Read codes identified in the QOF (Appendix 1, available in Age and Ageing online), ignoring prescribing requirements (asthma, hypothyroidism and mental health), as these might bias estimates for care home residents who have recently registered. We excluded patients registered for <90 days to ensure completeness of disease recording.

**Analysis**

All disease prevalence rates were directly standardised to the combined nursing and residential care home population in 5-year age and sex bands. Age-, sex-, region- and practice-adjusted prevalence ratios were calculated using a log binomial generalised estimating equation model [21]. Practice
effects were included in the model assuming an exchangeable correlation structure.

Results

Identifying care home residents

A total of 11,547 (2.7%) patients had a Read code for residence in a care home or two or more independent care home markers. Figure 1 shows the frequency of individual markers and approach to identifying and classifying care home residents (see Appendix 2 for details, available in Age and Ageing online).

Fifteen thousand eight hundred and twenty-one (3.6%) patients were identified with only one marker of care home residence or lived in a household with patients with a care home marker and classified as undetermined. The majority (10,619, 67.1%) lived in care home postcodes with no other care home markers.

Community control group

Four hundred five thousand one hundred and seven (93.0%) patients were identified as not care home residents based on the absence of care home markers. This excluded patients who were linked by family number with two other older people (1,962) and patients where postcode linkage had failed (1,131).

Type of care home

Based on postcode linkage and household characteristics, 362 (4.9%) care home residents were identified in specialist or younger adult care homes and 10,985 (95.1%) in care homes for older people including homes specialising in dementia. Of these, 4,563 (41.5%) were in nursing homes, 4,962 (45.2%) in residential homes, 394 (3.6%) in postcodes that contained both nursing and residential homes and 1,066 (9.7%) identified without postcode linkage were not further classifiable (Figure 1).

Performance

The mean age of care home residents was 85.4 with 56.9% aged 85 or over (Table 1). This compares to a mean age of 85.0 for older care home residents in the Health Survey for England and 58.7% of residents over the age of 85 in the census. Similarly, 76.5% of our care home sample was female compared to 75.7% and 77.1% in the Health Survey for England and census.

The demographic characteristics of our care home sample were consistent irrespective of the number of markers, whether identified with or without a specific care home residence Read code or whether identified through postcode linkage and household structure, independent of the consultation record (Table 1). By contrast, patients identified with just one marker of care home residence, our undetermined group, were younger and more likely to be male.

Characteristics of older people in care homes

We assessed completeness of identification of care home residents by examining the ability of our markers to identify patients with a Read code for care home residence. Use of any single marker identified 4,064/4,403 (92%) of patients with care home residence Read codes. Our threshold of two markers identified 2,947/4,403 (67%) patients with Read codes. A more stringent threshold of three markers identified 1,035/4,403 (24%).

Disease prevalence

Prevalence of common chronic conditions in nursing homes, residential homes and our control group is shown in Table 2. Nursing and residential home residents had markedly higher recorded prevalences of stroke, dementia, depression and mental health problems and slightly lower recorded diagnoses of hypertension, respiratory disorders and cancer. For most conditions, the difference between nursing and residential homes was small.

Discussion

We have described a novel methodology for the enhanced identification of care home residents in a primary care database.

Strengths of this study

A limitation of primary care databases and other UK health care information sources is the paucity of information on living circumstances. Current approaches to identifying care home residents rely on recording of care home residence by practices which is incomplete [22]. Our novel use of postcode linkage allows identification of more than twice as many patients than use of Read codes for care home residence alone. Compared to survey methodologies, our approach is not biased by selective non-response and proxy reports, a concern in care homes with high rates of cognitive impairment. We have previously shown the value of primary care databases in examining quality of care for older people [23, 24]. Data quality in primary care databases is good in terms of completeness and diagnostic accuracy for chronic conditions compared to other epidemiological sources [16, 25]. Our methodology offers the potential to extend analyses to care home residents, a vulnerable under-studied group. This is important as many large studies, such as the English Longitudinal Study of Ageing and General Household Survey, exclude care homes [26].

Limitations

Our method trades off identifying all care home residents and ensuring that patients are not misclassified as care home residents. Use of a single marker allows identification of more care home residents but, based on demographics characteristics, identifies a population contaminated with non-care home residents. Patients who are not resident in a care
home may legitimately share a care home postcode or have a consultation in a care home during a convalescence stay. A threshold of two markers reduces misclassification and identifies a population consistent with care home residents but misses, at worst, up to a third of residents. These ‘missed patients’ potentially limit the generalisability of our findings if they systematically differ from our identified population. The consistency of the demographic characteristics of our
identified population, when stratified by number and type of care home markers, and in comparison to existing national data, suggests that our sample is representative. Also, our control group is unlikely to include any misclassified patients as we have excluded all patients living in care home postcodes or with any care home marker.

Our analysis of disease prevalence excludes patients with less than 90 days registration for practical reasons. In our sample, this group accounts for approximately 5% of care home residents, reflecting high resident turnover in care homes. This needs to be considered when applying our findings to unselected care home residents as patients who survive less than 90 days in a care home are likely to be different from the majority of longer term residents.

Our identification of chronic disease assumes similar approaches to recording in care homes and the general population. We cannot distinguish under-recording from incomplete case finding, but the consistency of our results for dementia with surveys in care homes does not support a systematic under-recording of key diagnoses. In addition, under-recording, in itself, is a quality issue especially where disease recording mediates access to interventions such as monitoring.

**Comparison with other literature**

Our estimates of dementia prevalence are similar to other UK estimates. A recent census of homes by one care provider estimated that 38 and 31% of nursing and residential home patients had a primary diagnosis of dementia which is similar to our 36.4 and 33.6% [6]. Similarly, the English care home registration body estimates that 40.2% of care home residents need dementia care based on a sample of care

---

**Table 1. Demography of older people in care homes**

<table>
<thead>
<tr>
<th>Main groups</th>
<th>n</th>
<th>Mean age (SD)</th>
<th>Male (%)</th>
<th>Mean registration length (years)</th>
<th>No. with &lt;1 year registration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Care homes for older people</td>
<td>10,973</td>
<td>85.4 (7.6)</td>
<td>2,576 (23.5%)</td>
<td>10.7</td>
<td>2,163 (19.7%)</td>
</tr>
<tr>
<td>Community control</td>
<td>405,084</td>
<td>74.7 (7.2)</td>
<td>223,634 (44.8%)</td>
<td>23.1</td>
<td>8,368 (2.1%)</td>
</tr>
<tr>
<td>Undetermined (one marker)</td>
<td>15,815</td>
<td>78.6 (8.7)</td>
<td>9,843 (37.8%)</td>
<td>20.0</td>
<td>1,352 (8.0%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Care homes for older people by number of care home markers</th>
<th>n</th>
<th>Mean age (SD)</th>
<th>Male (%)</th>
<th>Mean registration length (years)</th>
<th>No. with &lt;1 year registration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 or more</td>
<td>4,783</td>
<td>85.6 (7.6)</td>
<td>1,086 (22.7%)</td>
<td>10.0</td>
<td>799 (16.7%)</td>
</tr>
<tr>
<td>1 or 2</td>
<td>6,190</td>
<td>85.3 (7.5)</td>
<td>1,490 (24.1%)</td>
<td>11.2</td>
<td>1,364 (22.0%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Care homes for older people by whether identification depends on consultation record</th>
<th>n</th>
<th>Mean age (SD)</th>
<th>Male (%)</th>
<th>Mean registration length (years)</th>
<th>No. with &lt;1 year registration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record independent*</td>
<td>5,858</td>
<td>85.3 (7.5)</td>
<td>1,384 (23.6%)</td>
<td>9.8</td>
<td>1,330 (22.7%)</td>
</tr>
<tr>
<td>Record dependent†</td>
<td>5,115</td>
<td>85.5 (7.7)</td>
<td>1,192 (23.3%)</td>
<td>11.8</td>
<td>833 (16.3%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Care homes for older people by type (n= 9,513)a</th>
<th>n</th>
<th>Mean age (SD)</th>
<th>Male (%)</th>
<th>Mean registration length (years)</th>
<th>No. with &lt;1 year registration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing</td>
<td>4,558</td>
<td>84.8 (7.7)</td>
<td>1,204 (26.4%)</td>
<td>9.2</td>
<td>1,051 (23.1%)</td>
</tr>
<tr>
<td>Residential</td>
<td>4,955</td>
<td>86.1 (7.4)</td>
<td>1,029 (20.8%)</td>
<td>11.7</td>
<td>895 (18.1%)</td>
</tr>
</tbody>
</table>

---

**Table 2. Disease prevalence in nursing home, residential home and community patients (n = 412,243)*

<table>
<thead>
<tr>
<th>Community (n = 403,259)</th>
<th>Adjusted %</th>
<th>95% CI</th>
<th>Adjusted %</th>
<th>95% CI</th>
<th>Ratio†</th>
<th>95% CI</th>
<th>Adjusted %</th>
<th>95% CI</th>
<th>Ratio†</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary heart disease</td>
<td>17.1%</td>
<td>20.2%</td>
<td>19.7–20.7</td>
<td>19.3%</td>
<td>18.0–20.6</td>
<td>0.98</td>
<td>0.93–1.05</td>
<td>18.6%</td>
<td>17.2–19.9</td>
<td>0.92</td>
</tr>
<tr>
<td>Heart failure</td>
<td>4.0%</td>
<td>8.0%</td>
<td>7.6–8.4</td>
<td>9.6%</td>
<td>8.6–10.5</td>
<td>1.22</td>
<td>1.11–1.34</td>
<td>8.3%</td>
<td>7.2–9.5</td>
<td>1.07</td>
</tr>
<tr>
<td>Stroke</td>
<td>4.4%</td>
<td>6.3%</td>
<td>6.1–6.5</td>
<td>15.0%</td>
<td>13.8–16.2</td>
<td>2.45</td>
<td>2.26–2.66</td>
<td>21.3%</td>
<td>19.5–23.0</td>
<td>3.57</td>
</tr>
<tr>
<td>Hypertension</td>
<td>48.9%</td>
<td>56.3%</td>
<td>55.4–57.3</td>
<td>43.9%</td>
<td>42.1–45.8</td>
<td>0.79</td>
<td>0.76–0.83</td>
<td>41.2%</td>
<td>39.1–43.2</td>
<td>0.75</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>7.4%</td>
<td>12.2%</td>
<td>11.9–12.5</td>
<td>12.5%</td>
<td>11.5–13.6</td>
<td>1.06</td>
<td>0.98–1.15</td>
<td>14.0%</td>
<td>12.8–15.3</td>
<td>1.18</td>
</tr>
<tr>
<td>Diabetes</td>
<td>13.0%</td>
<td>11.3%</td>
<td>10.9–11.6</td>
<td>13.7%</td>
<td>12.7–14.7</td>
<td>1.23</td>
<td>1.15–1.32</td>
<td>13.5%</td>
<td>12.2–14.7</td>
<td>1.21</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>8.9%</td>
<td>11.6%</td>
<td>11.3–12.0</td>
<td>13.1%</td>
<td>12.1–14.1</td>
<td>1.10</td>
<td>1.02–1.19</td>
<td>12.3%</td>
<td>11.1–13.4</td>
<td>1.05</td>
</tr>
<tr>
<td>Asthma or COPD</td>
<td>14.7%</td>
<td>13.2%</td>
<td>12.8–13.6</td>
<td>11.7%</td>
<td>10.6–12.9</td>
<td>0.85</td>
<td>0.78–0.93</td>
<td>9.5%</td>
<td>8.5–10.4</td>
<td>0.70</td>
</tr>
<tr>
<td>Dementia</td>
<td>1.4%</td>
<td>3.4%</td>
<td>3.1–3.6</td>
<td>37.4%</td>
<td>34.7–39.8</td>
<td>13.53</td>
<td>12.38–14.7</td>
<td>40.8%</td>
<td>37.5–44.1</td>
<td>14.83</td>
</tr>
<tr>
<td>Depression</td>
<td>15.1%</td>
<td>14.1%</td>
<td>13.3–14.8</td>
<td>27.1%</td>
<td>25.1–29.1</td>
<td>1.85</td>
<td>1.73–1.97</td>
<td>23.5%</td>
<td>21.5–25.4</td>
<td>1.63</td>
</tr>
<tr>
<td>Severe mental illness</td>
<td>0.8%</td>
<td>0.8%</td>
<td>0.7–0.9</td>
<td>7.1%</td>
<td>6.1–8.2</td>
<td>10.26</td>
<td>8.58–12.27</td>
<td>5.3%</td>
<td>4.5–6.2</td>
<td>7.97</td>
</tr>
<tr>
<td>Cancer</td>
<td>9.9%</td>
<td>11.0%</td>
<td>10.6–11.3</td>
<td>9.8%</td>
<td>8.9–10.7</td>
<td>0.85</td>
<td>0.77–0.93</td>
<td>9.6%</td>
<td>8.7–10.5</td>
<td>0.83</td>
</tr>
</tbody>
</table>

*a n = 412,243 is based on patients from the groups (not care home, residential care home, nursing care home) who are aged 65–104 years and have been registered with their general practice for at least 90 days.

bPrevalence rates are directly standardised to the combined elderly care home population in 5-year age and sex bands.

†Ratio of nursing/residential home prevalence to non-care home prevalence, adjusted for age, sex, region and practice.
home returns [27]. Our finding of higher depression rates is consistent with our earlier work that found depression was commoner in patients who move into a care home [28].

There is less information available in the United Kingdom for other diagnoses, but the Health Survey for England also found lower rates of respiratory and circulatory conditions, aside from stroke, in care homes and markedly higher rates of mental illness and dementia [1].

Other care home studies have used a range of methods including surveys, censuses and administrative databases. Most surveys are small and may not include a community comparison. Care home censuses allow larger, representative samples but cannot include a community comparison and rely on clinical information provided by care home staff. In terms of sample size, we were able to identify a larger sample than UK primary care-based studies and similar to the US National survey [7–10, 29].

**Implications**

Our description of disease prevalence confirms the expected higher rates of stroke, dementia and mental health problems in care homes. Higher recorded prevalences may be partly explained by improved diagnosis and recording of index conditions amongst patients with formal pre-admission assessments. This may be a particular issue for dementia which is known to be incompletely identified in community residents [30].

We were surprised to find lower prevalences of coronary heart disease, hypertension, respiratory disease and cancer in care home residents. As our comparisons are adjusted for age, a healthy survivor effect is unlikely. Our findings suggest incomplete recording or case finding in care homes and may indicate inequity of care for residents. We have focused this study on conditions incentivised in the UK primary care contract with nationally agreed coding definitions. Recording of conditions not incentivised, such as osteoporosis, may show greater differences between community and care home residents with possibly greater inequities in care. The similarity in diagnostic characteristics between nursing and residential homes is described in other recent studies and has implications for organisation and resourcing of medical and nursing care for residential homes, which are not staffed by registered nurses [6].

The identification of care home residents in a primary care database offers a unique opportunity to study the medical care of care home residents with the potential to investigate key concerns, such as antipsychotic prescribing [31]. The difficulty in routinely identifying care home residents in the primary care record is a concern. This finding is likely to apply to all practice systems, irrespective of supplier, as the recording of care home residence Read codes is dependent on practitioner behaviour rather than system characteristics. We estimate that only about a third of care home residents are explicitly recorded in UK primary care. This limits the scope for routine national monitoring of medical care in care homes. There is a strong case for the primary care contract to include quality standards for care home residents including a requirement to systematically identify care home residents. Similar mandatory flagging of residents in other UK health care information systems and internationally may be an important step in improving health care for a vulnerable group.

---

**Key points**

- There is limited information on the health of older care home residents from controlled studies and no national monitoring.
- Our novel methodology enhances identification of care home residents in a large national sample.
- There is little difference in chronic disease prevalence, including dementia and stroke, between nursing and residential homes.
- Lower prevalences of hypertension, respiratory disorders and cancers raise concerns over incomplete case finding or recording in care homes.
- Improved recording of care home residence in the primary care record would allow better surveillance of a vulnerable group.

---

**Conflicts of interest**

None declared.

**Funding**

The study was supported by a grant from the BUPA Foundation, an independent medical research charity. The funder had no role in the design, execution, analysis, interpretation or writing of this paper.

**Ethical approval**

The study was approved by the South-East Multicentre Research Ethics Committee (study reference: 08/H1102/33).

**Contributors**

S.S. had the idea for the study and led the project. I.C. undertook the analysis. All authors contributed to the development of the project methodology, interpretation of the results and drafting of the paper. S.S. is the guarantor for the paper.

**Supplementary data**

Supplementary data mentioned in the text is available to subscribers in *Age and Ageing* online.
References


Characteristics of older people in care homes


Received 22 December 2009; accepted in revised form 6 May 2010