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Health status of UK care home residents: a cohort study

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Abstract

Background: UK care home residents are often poorly served by existing healthcare arrangements. Published descriptions of residents' health status have been limited by lack of detail and use of data derived from surveys drawn from social, rather than health, care records.

Aim: to describe in detail the health status and healthcare resource use of UK care home residents

Design and setting: a 180-day longitudinal cohort study of 227 residents across 11 UK care homes, 5 nursing and 6 residential, selected to be representative for nursing/residential status and dementia registration.

Method: Barthel index (BI), Mini-mental state examination (MMSE), Neuropsychiatric index (NPI), Mini-nutritional index (MNA), EuroQoL-5D (EQ-5D), 12-item General Health Questionnaire (GHQ-12), diagnoses and medications were recorded at baseline and BI, NPI, GHQ-12 and EQ-5D at follow-up after 180 days. National Health Service (NHS) resource use data were collected from databases of local healthcare providers.

Results: out of a total of 323, 227 residents were recruited. The median BI was 9 (IQR: 2.5–15.5), MMSE 13 (4–22) and number of medications 8 (5.5–10.5). The mean number of diagnoses per resident was 6.2 (SD: 4). Thirty per cent were malnourished, 66% had evidence of behavioural disturbance. Residents had contact with the NHS on average once per month.

Conclusion: residents from both residential and nursing settings are dependent, cognitively impaired, have mild frequent

behavioural symptoms, multimorbidity, polypharmacy and frequently use NHS resources. Effective care for such a cohort requires broad expertise from multiple disciplines delivered in a co-ordinated and managed way.

Keywords: *homes for the aged, nursing homes, cohort studies, health status, health resources, older people*

Background

Care homes in the UK provide 'accommodation, together with nursing or personal care, for persons who are or have been ill, who have or have had a mental disorder, who are disabled or infirm, or are or have been dependent on alcohol or drugs'[1]. They include homes with and without 24 h onsite nursing staff, known as residential and nursing homes, respectively.

Unlike countries such as the Netherlands, the UK does not have a specialty service for care home medicine, nor are specialised geriatric medical services routinely involved in provision. Instead, primary health care is usually provided, free at the point of contact by the National Health Service (NHS), through 'general medical services' (GMS) delivered by general practitioners (GPs) and their teams, and community health services such as district nursing and physiotherapy. In some areas, extra services are provided by GPs through 'local enhanced service agreements' (LES), although it is up to health commissioners whether they wish to offer such arrangements and up to GPs whether they wish to participate [2]. In some parts of the country, specialist teams of varying professional compositions support care homes, and in other parts specialist care home nurse practitioners play a role [3]. The closest to a specialist care home service the NHS has are 'personal medical services' (PMS) sites, where GPs provide primary care services solely for care home residents. However, PMS contracts focusing specifically on care homes are rare [3]. Residents pay fees to care homes for their board, lodgings and personal care, with access to means-tested financial support as for other social services. Additional arrangements are in place to assess the degree to which the NHS contributes to these fees, and 10% of care home residents receive such funding. However, neither the means-tested social services support nor the NHS support, if provided, specify the model of health care to be used.

These arrangements to provide health care to UK care homes are often inadequate. The UK incentive framework for GPs inadequately addresses care home residents' needs [4]. Twenty-five per cent of NHS trusts surveyed in 2008 reported inequality of access to physiotherapy and occupational therapy and 35% to district nursing [5]. Fifty-seven per cent of residents in a 2009 Care Quality Commission (CQC) survey were unable to access all healthcare services required [6]. In 2011, a collaboration of healthcare groups led by the British Geriatrics Society went so far as to describe existing arrangements as 'a betrayal of older people, an infringement of their human rights and unacceptable in a civilised society' [2].

For policy-makers to provide the framework and for providers and commissioners to design appropriate models of healthcare delivery, the precise needs of care home residents must be described in sufficient detail to ensure that provision matches need. Such description has not, so far, been satisfactorily reported. Of the three large UK care home surveys commonly cited as describing residents, all used proxy data collected from social care staff without access to healthcare records [7–9], two took a narrow view of health defined by aims and objectives focused around quantifying social care costs [7, 8] and none measured NHS resource use, an important indicator of ill-health episodes. Local surveys to guide regional service development have been conducted in several areas but rarely published and are hence not widely available.

We set out to describe the health status and NHS resource use of a representative cohort of UK care home residents. Based upon existing data and prevailing assumptions, we hypothesised that residents would be dependent, suffer multiple morbidity and use NHS resources frequently.

Method

The database of the CQC (the care home regulator for England) was searched for care homes within 10 miles of the University of Nottingham, returning 131 homes with 4952 beds. All were approached by mail. Sixteen agreed to participate. We did not attempt to further approach non-participating homes to understand their reason for not volunteering.

To ensure representativeness, a purposive sampling matrix was developed taking account of nursing/residential status and dementia registration—on the grounds that these could be established from the CQC database and might influence residents' health status. Homes were selected to replicate the prevalence of these variables across the UK.

Sample size calculations were based upon the accuracy of estimation of hospital emergency admissions. Local primary care data suggested 2 unscheduled admissions to hospital per care home per month. Based on this, 200 people followed for 6 months would provide an estimate of the rate of unscheduled emergency hospital admissions accurate to 0.02 per person per month.

Care home managers made the initial approach to residents and relatives and determined which residents had mental capacity to consent to participate, defined against the criteria in the English Mental Capacity Act [10]. For residents without capacity, a consultee was identified and, where they were in favour of proceeding, residents enrolled. Residents were excluded if they refused participation, lacked capacity and had no consultee, were receiving respite care or were felt to be in

the last days of life by the care home manager. All residents were followed for 180 days from the date of enrolment.

Baseline and follow-up data sets comprised a battery of validated indices chosen to establish an overview of health status. These were the modified Barthel index (BI) for dependency [11], Mini-mental State Examination (MMSE) for cognition [12], Neuropsychiatric Inventory (NPI) [13] for behavioural disturbance, Mini-Nutritional Assessment (MNA) [14] for nutritional status, EuroQoL 5-domain (EQ-5D) [15] for health-related quality of life and the 12-item General Health Questionnaire (GHQ-12) [16] for psychological morbidity. All variables were collected at baseline and EQ-5D, GHQ-12, NPI and BI at follow-up after 180 days.

A list of current diagnoses and medications was collected from care home records at baseline and reconciled against data from NHS databases. Where conflict existed, NHS records were regarded as definitive for diagnoses and care home records for medications.

NHS resource use data were collected from electronic databases held by GPs, acute hospitals, the ambulance service and mental healthcare trust. Hospital admissions were categorised as either day-case (no overnight stay) or in-patient (overnight stay). Data on diagnoses, drug prescriptions, wound management and diagnostic tests were collated from GP databases.

Descriptive statistics were used to describe the overall population and their outcomes. Differences between residential and nursing homes were explored using ANOVA/t-tests for normally distributed variables; Kruskal–Wallis non-parametric ANOVA/Mann–Whitney tests for non-normally distributed/ordinal variables; and Chi-squared/McNemar's tests for unpaired/paired categorical variables. Type I error was avoided when conducting multiple tests using the Bonferroni correction.

Results

Recruitment was between 19 January 2009 and 16 December 2009. The distribution of the sample is summarised in Table 1. There were 391 beds across participating homes, but subtotal occupancy meant that there were only 323 residents, from which 227 (70%) were recruited. There were three dementia registered and three non-dementia registered residential homes, and three dementia registered and two non-dementia registered nursing homes. The mean (SD) number of residents per home was 35.3 (10.4).

Table 1. Attributes of care homes included in sample

Type of home	Proportion of sample	
	All UK homes (%)	Sample (%)
Dementia registered/without nursing	19	27.8
Non-dementia registered/with nursing	34	24.7
Dementia registered/with nursing	25	25
Non-dementia registered/without nursing	21	22.7

Sixty-one (19%) residents lacked capacity and had no contactable consultee, 23 (7%) declined to participate, 6 (2%) were in hospital during recruitment and 6 (2%) were receiving respite care or felt to be in the last days of life and were not recruited.

Of 27 GP practices identified as holding resource use data for the cohort, 22 agreed to participate (209/227 participants). Therefore, while data on health status collected through the care home were analysed for all 227 participants, service use data were only available and analysed for 209 of these.

The mean GHQ-12 score (SD) at baseline was 11.5 (5.0), 11.8 (5.3) and 11.1 (4.2) for all, residential and nursing home participants, respectively. The mean EQ-5D indices (SD) at baseline were 0.514 (0.252), 0.535 (0.242) and 0.476 (0.266) for all, residential and nursing home participants, respectively. Response rates for the GHQ-12 and EQ-5D were low, with only 44 and 74% of participants, respectively providing complete responses. Non-response was associated with lower MMSE ($P < 0.01$). These indices were not analysed further. The remaining baseline variables are outlined in Table 2.

The prevalence of specific dependencies from the BI at baseline is presented in the Supplementary data available in *Age and Ageing* Appendix Table S1.

Sixty-six per cent of respondents had behavioural disturbance, evidenced by at least one positive NPI domain. The prevalence of severe behavioural symptoms, defined as the proportion of participants with symptoms of moderate to high severity, and frequent behavioural symptoms, defined as the proportion of participants with symptoms once or more per week were calculated and are presented in the Supplementary data available in *Age and Ageing* online, Appendix Table S2. The most commonly cited symptoms—agitation, nervousness and irritability—were present in a third of residents. For all domains, apart from disinhibition, the proportion of residents reported to have frequent symptoms was greater than that reported to have severe symptoms.

Sixty-one (30%) of participants were malnourished and a further 113 (56%) at nutritional risk according to the MNA. A minority of residents (14%) had normal nutritional status.

The 10 most common diagnoses (number; percentage of participants) were dementia (141; 62%), essential hypertension (102;45%), primary generalised osteoarthritis (83;37%), cerebrovascular disease (71;31%), osteoporosis with pathological fracture (45;20%), chronic renal failure (35;15%), non-insulin-dependent diabetes (34;15%), recurrent depressive disorder (33;15%), atrial fibrillation/flutter (31;14%) and chronic ischaemic heart disease (30; 13%).

Thirty-seven (16%) participants died and one left the area without forwarding details before follow-up at 180 days. Sixteen participants who died were from residential and 21 from nursing homes. Death rates varied significantly between individual homes (range 0–32% of respondents; $P < 0.05$; Chi-square).

The median (IQR) BI score fell from 5 (1.5–8.5) at baseline to 3 (0–7) at follow-up for nursing home residents

Table 2. Summary variables collected at baseline, overall and by care home type

Variable	Whole cohort	Residential homes	Nursing homes
Number of participants	227	124	103
Mean age (SD)*	85.2 (7.5)	86.8 (7.3)	83.2 (7.3)
% of residents female	78.9	80.6	76.7
Mean no. of GP practices per home (range)	4.6 (1–9)	5 (1–9)	4.2 (1–8)
Median no. of days since admitted to home (IQR)	79 (5–153)	68 (0–147)	94 (28–160)
Mean body mass index (SD)	23.8 (5.9)	24.5 (5.9)	22.8 (5.7)
Median Barthel index (IQR)*	9 (2.5–15.5)	11 (7–15)	5 (1.5–8.5)
Median MMSE (IQR)*	13 (4–22)	16 (8.5–23.5)	10 (1–19)
Median MNA score (IQR)*	20 (16.8–23.3)	21.5 (19.3–23.8)	17.5 (14–21)
Mean no. of diagnoses (SD)*	6.2 (4)	6.9 (3.1)	5.5 (2.4)
Median no. of medications (IQR)	8 (5.5–10.5)	7 (4.5–9.5)	8 (5.5–10.5)
Median NPI score (IQR)*	3 (0–7.5)	2 (0–4.5)	6 (0–13)

*Significant difference between residential/nursing homes ($P < 0.01$).

($P < 0.01$; Wilcoxon-signed ranks) but did not change significantly for either residential home residents or the cohort as a whole over time. Median (IQR) neuropsychiatric index scores demonstrated greater behavioural disturbance in all groups at follow-up, rising from 3 (0–10.5) to 5 (0–13), 2 (0–6.5) to 4 (0–10) and 6 (0–19.5) to 8 (1.5–14.5) for the whole cohort, residential and nursing home residents, respectively ($P < 0.01$ for all; Wilcoxon-signed ranks).

Secondary care resource use data were collected for all 227 participants over the 180 days. Primary care resource use and medication use data were collected for the 209 participants whose GP had allowed access. Out of a total of 227, 110 (48.5%) participants used secondary care services and 181/209 (86.6%) used either primary or secondary care services. Over the 180-day follow-up period there were 41 hospital admissions which resulted in an overnight stay, comprising 503 inpatient days and a further 11 day case admissions. There were 763 general practice contacts, comprising 264 in-practice consultations and 499 consultations at the home. Resource use by individual service is presented for the cohort as a whole—and the group who used each service—in Table 3. In this table, prescription contacts refer to new or repeat prescriptions for either drugs or wound management materials over the follow-up period.

Discussion

The residents had high levels of dependency, were predominantly cognitively impaired, manifested frequent mild behavioural symptoms and multiple morbidity. Less than half used NHS secondary care resources during the study period but those who did used them intensively. When primary and secondary care services were considered together, participants used NHS services on average once a month.

The study was detailed, prospective and had high recruitment rates. The sample was broadly representative in terms of age, gender distribution and home registration status when compared with a national care home market survey [17]. Based on the local NHS trust's reported admission rate of 2 per home per month—which would have resulted in 132 admissions—the homes sampled were potentially lower than average users of secondary care resources. An important limitation was the low response rate for GHQ-12 and EQ-5D which, although explained by the high prevalence of cognitive impairment, meant that measurements of psychological wellbeing and health-related quality of life were inadequate. The study did not collect data on some important care problems in older patients, such as falls and pressure ulcers which might be useful in designing or commissioning services.

The prevalence of cognitive impairment was considerably higher than previously reported in UK care homes—75% of residents had an MMSE ≤22, compared with a 50% dementia prevalence reported in 2004 [9]. This may represent an increasing tendency for care homes to be used predominantly for the growing number of people with dementia rather than physical disability alone. Behavioural disturbance was less prevalent than expected, affecting two-thirds of residents in this cohort by comparison with 75–79% of US and Norwegian nursing home residents [18, 19]. Antipsychotic prescribing was also less prevalent than in overseas studies: 12% of participants were receiving antipsychotics, compared with 58% in US nursing home cohorts [18]. These differences might suggest differing patterns of psychopathology as well as its management in UK care home residents. Changing patterns of antipsychotic prescribing among GPs might also be an important contributor.

In our study, there were significant differences between dependency, cognitive function, behaviour, nutrition, medication and use of services between nursing and residential care homes. However, residents of both types of homes had profound dependency and frailty and there seems no evidence-based rationale for rationing access to healthcare resources on the basis of residence in one type of home or the other, as has been reported by other researchers to occur commonly in clinical practice [6]. The finding that death rates varied significantly between individual homes is important. It is not clear whether this is due to differences in case mix or quality of care; however, data collected by us in a companion qualitative study suggest that the former is likely to be at least as important as the latter [20]. Although the mortality of care

Table 3. Mean resource use per participant by service and residential setting

| Healthcare service | Participant group | | | | | |
| Mean number per participant (95% CI) | All (n = 227) | | Residential (n = 103) | | Nursing (n = 124) | |
	Whole cohort	Service users	Whole cohort	Service users	Whole cohort	Service users
Inpatient contacts	0.35 (0.25–0.49)	2.05 (1.73–2.45)	0.31 (0.17–0.51)	2.00 (1.56–2.67)	0.39 (0.25–0.58)	2.09 (1.67–2.65)
Duration of stay (days)	2.22 (1.42–3.67)	12.90 (8.91–19.39)	1.23 (0.62–2.37)	7.94 (5.11–13.64)	3.03 (1.70–5.50)	16.35 (10.29–26.69)
Day-case contacts	0.07 (0.04–0.12)	1.07 (1.00–1.33)	0.05 (0.02–0.11)	1.00 (1.00–1.00)	0.09 (0.05–0.16)	1.10 (1.00–1.40)
Outpatient contacts*	0.83 (0.67–1.04)	2.16 (1.86–2.54)	0.48 (0.30–0.74)	1.96 (1.52–2.62)	1.12 (0.87–1.43)	2.24 (1.88–2.72)
Ambulance service contacts	0.04 (0.02–0.08)	1.14 (1–1.75)	0.03 (0.00–0.11)	1.50 (1.00–2.00)	0.04 (0.02–0.09)	1.00 (1.00–1.00)
Mental health service contacts*,**	0.77 (0.48–1.23)	5.80 (4.07–8.12)	0.28 (0.15–0.50)	2.23 (1.58–2.87)	1.17 (0.64–1.98)	8.53 (5.76–11.69)
Total secondary and intermediate care contacts*,**	2.05 (1.63–2.63)	4.24 (3.49–5.22)	1.15 (0.79–1.60)	3.11 (2.50–3.97)	2.81 (2.10–3.76)	4.83 (3.79–6.31)
	All (n = 209[a])		Residential (n = 90)		Nursing (n = 119)	
Primary care contacts	3.65 (3.21–4.17)	4.46 (3.98–5.03)	3.24 (2.53–4.17)	4.87 (4.06–6.08)	3.96 (3.43–4.63)	4.24 (3.71–4.92)
Total primary, secondary and intermediate care contacts*	5.73 (4.95–6.63)	6.61 (5.83–7.64)	4.39 (3.45–5.63)	6.08 (4.97–7.53)	6.74 (5.65–8.05)	6.91 (5.82–8.23)
Drug prescription contacts*	40.90 (37.27–44.67)	43.39 (39.79–47.05)	36.12 (30.69–43.71)	39.65 (34.34–48.03)	44.51 (40.05–49.18)	46.06 (41.85–50.58)
Wound management prescriptions	5.04 (4.04–6.53)	8.78 (7.32–11.25)	5.96 (4.29–9.34)	9.57 (7.23–14.70)	4.35 (3.31–6.11)	8.09 (6.55–10.98)

[a]n = 209 for primary care data because data were only available for those respondents whose GP agreed to participate.

*P < 0.05 for whole cohort resource use between residential and nursing home patients.

**P < 0.05 for service-user resource use between residential and nursing home patients.

home residents has been studied using large, robust epidemiological databases [21], the issue of variable mortality between homes has not been studied and is an important area for future investigation.

These results address the shortcomings of previous surveys through the greater detail with which they describe health status. The health care needs of residents can be inferred from consideration of these details. Residents had impaired mobility and transfers, and a high prevalence of incontinence, implying a need for access to physiotherapy, occupational therapy and specialist nursing. They had frequent, mild behavioural disturbance of the sort that might be expected to benefit from specialist mental health non-pharmacological management. The prevalence of polypharmacy was similar to that in the Care Homes Use of Medications Study [22] and supports a role for pharmacist-facilitated medication review [23]. One in six residents died during the 6 months of follow-up, indicating a need for expertise in end of life care planning [24], palliative and terminal care [25]. The mean number of diagnoses per participant and the prevalence of stroke, dementia, Parkinson's disease and osteoporosis were higher than previously reported for similarly aged UK community-dwelling cohorts [26, 27], confirming the hypothesis that multi-morbidity is a defining feature of the care home population and implying a requirement for expertise in geriatric medicine that may be beyond that of some GPs. Residents of care homes in this study were among the highest users of healthcare resources [28], indicating that healthcare provision to this sector is not a minor issue and that potential efficiencies are possible such as through the avoidance of unnecessary hospital admissions.

Delivery of the wide range of potentially beneficial inputs from health professionals described above is likely to require assessment by a multi-disciplinary team, as well as skilled management to co-ordinate such a team efficiently and effectively.

The extent to which the models for health care in the UK deliver this is not clear [2, 3]. Virtual multi-disciplinary teams capable of delivering such care are possible using care home staff, existing primary care and community health resources, but it is difficult for the process to be managed by GPs as they must provide GMS for a broader population and frequently have responsibility for residents in many care homes and hence many virtual teams [20]. Specialist teams, nurse practitioners or PMS sites provide and co-ordinate primary care to care homes in a more focused way. Further audit and research are required to evaluate the extent to which current services deliver appropriate care and the most cost effective model for doing so.

Key points

- Healthcare services for care home residents have been developed without reference to detailed information about their health and healthcare resource use.
- This study provides detailed data on the health and functional status of care home residents that could be used for future development of healthcare services.
- Care home residents have high levels of physical dependency, cognitive impairment, multiple morbidity and polypharmacy.
- Care home residents are frequent users of both primary and secondary care resources and those using secondary care resources do so intensively.
- The data presented here support a model of healthcare delivery which is both expert and multidisciplinary.

Supplementary data

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

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Association of stressful life events with incident falls and fractures in older men: the Osteoporotic Fractures in Men (MrOS) Study

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Abstract

Background: small, retrospective studies suggest that major life events and/or sudden emotional stress may increase fall and fracture risk. The current study examines these associations prospectively.
Methods: a total of 5,152 men aged ≥65 years in the Osteoporotic Fractures in Men study self-reported data on stressful life events for 1 year prior to study Visit 2. Incident falls and fractures were ascertained for 1 year after Visit 2. Fractures were centrally confirmed.
Results: a total of 2,932 (56.9%) men reported ≥1 type of stressful life event. In men with complete stressful life event, fall and covariate data ($n = 3,949$), any stressful life event was associated with a 33% increased risk of incident fall [relative risk (RR) 1.33, 95% confidence interval (CI) 1.19–1.49] and 68% increased risk of multiple falls (RR = 1.68, 95% CI = 1.40–2.01) in the year following Visit 2 after adjustment for age, education, Parkinson's disease, diabetes, stroke, instrumental activities of daily living (IADL) impairment, chair stand time, walk speed, multiple past falls, depressive symptoms and antidepressant use. Risk increased with the number of types of stressful life events. Though any stressful life event was associated with a 58% increased age-adjusted risk for incident fracture, this association was attenuated and no longer statistically significant after additional adjustment for total hip bone mineral density, fracture after age 50, Parkinson's disease, stroke and IADL impairment.
Conclusions: in this cohort of older men, stressful life events significantly increased risk of incident falls independent of other explanatory variables, but did not independently increase incident fracture risk.

Keywords: *accidental falls, fractures, life change events, psychological stress, prospective studies, aged, male, men, older people*

Introduction

One-third of community-dwelling adults aged ≥65 years fall at least once annually, half of whom have multiple falls [1–3]. Two to six percent of falls result in fractures [1–4].

While demographics, medical conditions, physical function, medications and sensory impairments are established predictors of falls [5–7] and fractures [8, 9], limited data suggest that stressful life events also may predict these outcomes [10, 11].