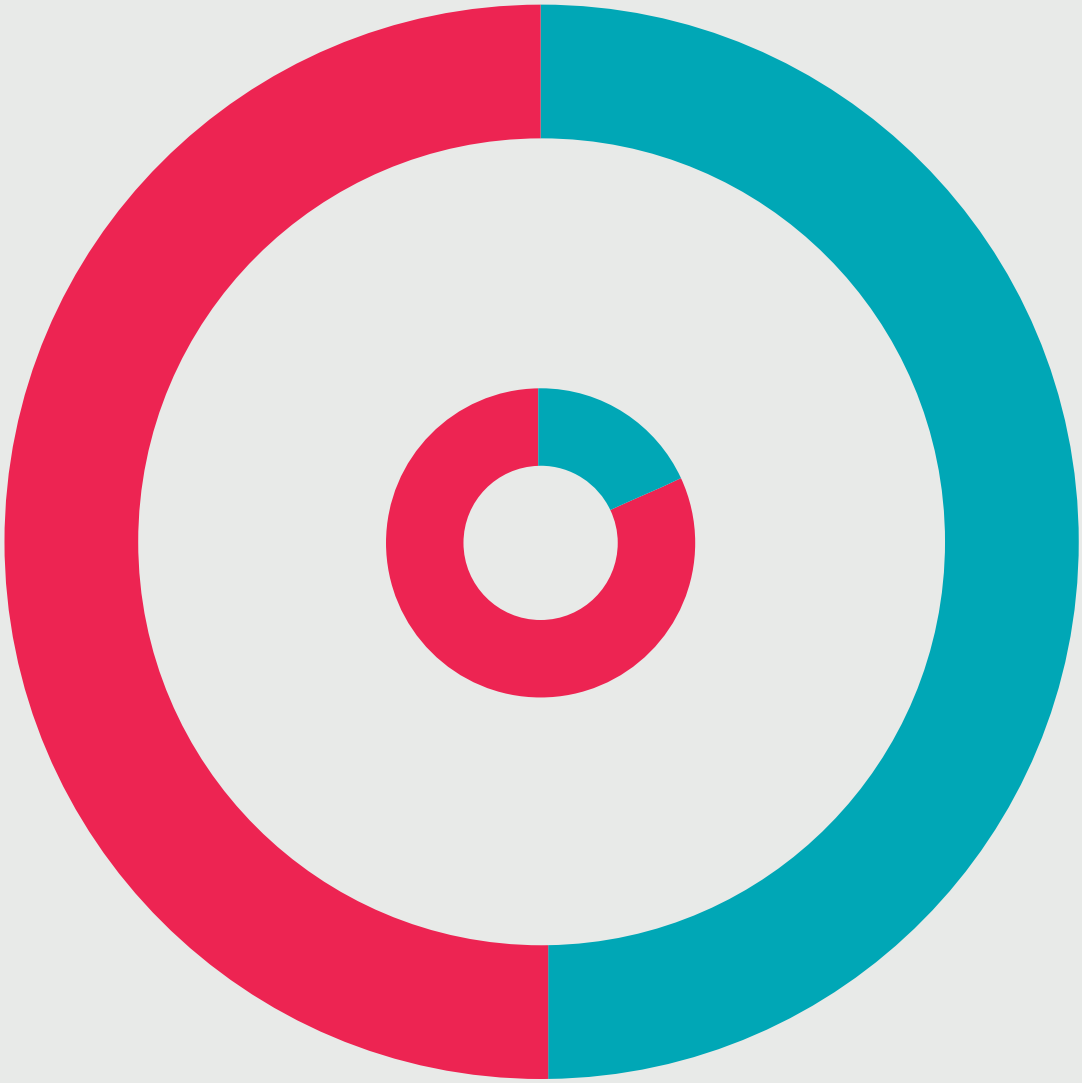
QualityWatch

Focus on: Hospital admissions from care homes

Paul Smith, Chris Sherlaw-Johnson, Cono Ariti and Martin Bardsley



January 2015

The Health Foundation | nuffieldtrust

About QualityWatch

QualityWatch is a major research programme providing independent scrutiny into how the quality of health and social care is changing. Developed in partnership by the Nuffield Trust and the Health Foundation, the programme provides in-depth analysis of key topics and tracks an extensive range of quality indicators. It aims to provide an independent picture of the quality of care, and is designed to help those working in health and social care to identify priority areas for improvement. The programme is primarily focused on the NHS and social care in England, but will draw on evidence from other UK and international health systems.

The QualityWatch website **www.qualitywatch.org.uk** presents key indicators by area of quality and sector of care, together with analysis of the data. This free online resource also provides research reports, interactive charts and expert commentary.

About this report

QualityWatch Focus On reports are regular, in-depth analyses of key topics; these studies exploit new and innovative methodologies to provide a fresh view of quality in specific aspects of health and social care. This QualityWatch Focus On report explores how care home residents use hospital services, and how this can prompt improvement in the way care is provided.

ISBN: 978-905030-94-1

Contents

List of figures, tables and boxes

Figures

Tables

Boxes

Summary

It is estimated that around 325,000 older people live in care homes[1] in England, representing around four per cent of people aged 65 and over (Comas-Herrera and others, 2010). Aside from social care needs, these residents will also require healthcare. Data collected by the Care Quality Commission (CQC) and reported by the British Geriatrics Society (2011) estimate that over half of older people in care homes do not have access to all the services and support they require from the National Health Service (NHS). Despite this, there have been very few population-level studies around hospital use by care home residents.

In this report, we explore whether routinely collected information on hospitalisations from care homes could be used to enhance the understanding of hospital use by care home residents, and thus target areas for shared learning, improvements or regulatory activity.

Key findings from the analysis

- By analysing hospital admission rates for small geographical areas from April 2011 to March 2012, we noted that emergency admission rates for those aged 75 and over were higher in areas that had more care home residents.
- Our results imply that care home residents had 40 to 50 per cent more emergency admissions and Accident & Emergency (A&E) attendances than the general population aged 75 and over, but significantly fewer (about half the number) elective admissions and outpatient appointments.
- Many of the people admitted to hospital from areas containing care homes are close to the end of life – when hospital use typically increases. In our analysis we estimated that 42 per cent of emergency admissions from areas containing care homes were for patients who were in the last six months of their life – which was almost double the percentage of emergency admissions of a similar age who did not live in an area containing a care home. We also found some evidence that care homes help prevent emergency admissions in the last two months of life.
- The health problems recorded on admission to hospital were different for patients who were likely to be living in a care home. A number of conditions were over three times more common in the care home group, including pneumonia, pneumonitis, Alzheimer's disease, dementia and epilepsy. These patients were also less likely to be admitted for heart disease and circulatory system problems.
- In areas containing care homes where hospital admissions were high, there was a greater proportion of instances where patients had three or more admissions in a year (as opposed to the higher rates being because more patients had single admissions).

1. In this report we use the term 'care home' to refer to organisations providing residential care, together with nursing or personal care. Homes that only provide nursing care will be referred to as 'nursing homes'.

- There was significant variation in admission rates between areas containing care homes, implying different uses of hospital services by care homes. We hope that the approach developed in this report will help us understand more about why these differences exist.

Implications of findings

Social care plays an important part in maintaining people's health, and in the wellbeing of older people. We have shown that among the older age groups, people who were likely to be living in care homes were large users of secondary care services. Moreover, our analysis indicates that the patterns of hospital admissions from areas containing care homes were often linked with people who were in the last few months of their life, which emphasises the importance of developing appropriate end-of-life care plans.

We also found that areas containing a care home had a greater proportion of instances where patients had multiple admissions in a relatively short time period. Strategies aimed at preventing the need for hospital admissions may therefore benefit from a specific focus on those people at risk of multiple admissions.

Information about the quality of care provided in residential and nursing homes is not always easy to access. In the health sector, the use of hospital admissions as an indicator that care outside hospitals could be improved has a long track record. This report shows how these ideas can be translated to the care home sector. Potential users of this type of information include:

- providers running care homes, in order to assess their own capabilities and the quality of local primary care, community care and general practitioner (GP) services provided to residents
- commissioners at local authority level, and organisations seeking to promote better integrated care
- external regulatory agencies and the CQC
- care users and their relatives
- healthcare professionals working in care homes.

However, we have to recognise that indicators relating to hospital admissions will require careful handling; they are not simple and there are some important steps to address, including technical issues in identifying care home residents, dealing with statistical uncertainty, and ways to validate and interpret metrics.

It is widely accepted that good quality preventive care in the general population can reduce the frequency of health crises that require hospital admission, and there is no reason why that idea does not apply to people in care homes. Although we are acutely aware that a high rate of hospital admission is not a definitive statement about quality, as there are too many unknowns, it probably does form the basis for further exploration. Here we suggest some simple questions that care homes could ask if they identify high levels of emergency hospital admissions:

- Are the high rates due to a small number of individuals having multiple admissions during the year and could they benefit from improved care planning?
- Are any of the admissions related to end-of-life care?

- Is the local clinical commissioning group performing risk stratification and case management, and including care homes in their at-risk populations?
- Are any of the admissions related to issues such as poor medicines management, falls, or nutritional or hydration issues?
- Could the home benefit from community-based chronic disease management?
- Do all residents get a full comprehensive assessment on admission, with care planning and a medications review, and regular reviews throughout the year?
- Is there regular access to community geriatricians or old age psychiatry?
- Are there shared local care protocols with out-of-hours providers and ambulance trusts?

We realise that many of the datasets that would be required for external monitoring may take some time to establish. However, monitoring by individual care home providers could be made much easier to implement with the appropriate statistical tools and supporting software. Such tools could allow staff working at the homes to easily enter details of any hospital activity, which would trigger an alert where the activity is deemed to be significantly different from what would be expected, and therefore prompt further investigation. These techniques are well established and would provide homes with a relatively quick and easy way of monitoring their own hospital admissions and A&E attendances. Ultimately these measures will need to be tested in terms of how much they can prompt beneficial change in the system, but this report is a useful step on that journey.

1 Introduction

It is estimated that around 325,000 older people live in care homes in England, representing around four per cent of the total over-65 population (Comas-Herrera and others, 2010). Those in care homes mainly comprise the 'oldest old', with more than half aged 85 and over. The health and social care needs of care home residents are complex (Moore and Hanratty, 2013): the majority are frail older people with high levels of disability, comorbidities and limited mobility. In addition, it has been reported that 80 per cent of all people living in care homes have dementia or significant memory problems (Alzheimer's Society, 2013).

Reviews of the literature suggest that arrangements for providing healthcare to care home residents are often unsatisfactory (Gordon and others, 2014). It is estimated from data collected by the CQC that over half of older people in care homes do not have access to all the NHS services and support they require, and as a result many are admitted inappropriately to hospital (British Geriatrics Society, 2011). In addition, it seems that the traditional general practice model is ill-equipped, with GPs now being responsible for people who would once have been under the care of specialist geriatricians. There also appears to be little consensus among commissioners about what services people in care homes need, or how these should be delivered (British Geriatrics Society, 2012). Despite this evidence about the need to meet the health needs of home residents, there have been very few population-level studies around hospital use by care home residents. The only work we are aware of in the UK is that of the CQC in the form of general analysis and an in-depth review on this topic (Care Quality Commission, 2012; 2013a).

The dearth of comprehensive information surrounding residential and nursing home healthcare and hospital use may be due to a number of factors, including a lack of routinely collected administrative data from homes, historical separation between health and social care data systems and budgets, and a relative lack of prioritising services for care home residents by NHS policy-makers and commissioners. There are also significant data quality issues with the source of admission and discharge destination recorded in Hospital Episode Statistics (HES), which precludes any simple analysis of secondary care data. In addition, there are a multiplicity of care home providers: it is a predominantly private market ranging from families running individual houses, through to large international companies, each with their own internal governance and data collections, and no central, standardised approach to data.

Avoidable hospitalisations are costly and potentially detrimental to the health of the older population and, as such, could be targeted as an indicator of the quality of care in homes, and hence of interest to regulators. The number of people aged 85 and over in the UK is projected to double in the next 20 years (Age UK, 2014) and, with the impacts of efforts to increase support to patients in their own home uncertain, could potentially lead to a large increase in the use of residential care. Understanding the patterns of hospital admissions by care home residents will become of increasing importance to policy-makers, as well as providers in the

acute and residential care sectors. In addition, there is a growing body of literature in the United States about indicators that are sensitive to the quality of care in nursing and residential homes.

The aims of this work were to look at whether the rates of hospital use by people living in care homes could provide some information about the quality of residential social care. More specifically, we set out to examine the following:

- Do hospital utilisation rates for people living at a postcode containing a care home differ from those for the general population aged 75 and over?
- Do people admitted to hospital from care homes have different health problems from the general population aged 75 and over?
- Are there significant differences in admission rates between areas containing care homes?

2
Methods

This study used HES covering the period from April 2011 to March 2012 (Health and Social Care Information Centre, 2014). This data period was selected as it provided the closest overlap with the results of the 2011 Office for National Statistics (ONS) census. Although the HES records include some information on the patient's source of admission and destination on discharge, we were concerned about the accuracy and reliability of these to identify care home residents. Without more details on the patient's place of residence, estimating the rates of hospital admission linked with a particular care home becomes problematic; our initial approach, therefore, was to look at small geographic areas and relate activity in these areas to the likelihood that the patient lived in a care home.

Therefore, to identify potential admissions from care homes, the HES database was linked, via the postcode of the HES record, to the CQC database of registered providers (Care Quality Commission, 2014). All healthcare, adult social care and dental care providers must be registered with the CQC before they can operate and, as part of the registration process, providers are required to give a description of the range of services they provide, along with the number of service users they are capable of accommodating. This means that while it was not possible to definitively identify a patient admitted from a care home, it was possible to identify a patient admitted from a postcode containing a care home, along with the associated characteristics of the home. As the patient's postcode could potentially make the information identifiable, all data linkage was performed by the Health and Social Care Information Centre to ensure it was kept anonymous.

For the purposes of this study we restricted the analysis, using the CQC database of registered providers, to homes that were specifically registered as providing services for older people or people with dementia, and that were registered as providing services at any point between April 2011 and March 2012. Unless otherwise indicated, we also restricted the analysis to admissions for patients aged 75 and over as this encompasses the majority of older residents and reduces the probability of an admission coming from a nearby residential address. All population-level data were obtained from the 2011 census (Office for National Statistics, 2011a) and linked to the admissions data via the lower super output area (LSOA) of the patient. LSOAs are units of geographical analysis used by the ONS to publish statistical data and consist of clusters of adjacent postcodes. They are relatively small, containing roughly 1,500 people on average, and offer the best compromise between size and likelihood of disclosing personal information. LSOAs for hospital admissions, outpatient appointments and A&E attendances were obtained from HES data.

All analysis relating to hospital utilisation at the end of life used HES and ONS linked-mortality data for people aged 75 and over who died between January and December 2011. This data period was selected as it allowed us to validate the number of deaths in our analysis with the official number released by the ONS, which publishes deaths by calendar, rather than financial, year.

The majority of the clinical conditions used in the analysis were assigned using the primary diagnosis of the first admission episode (although certain conditions required subsequent diagnosis coding).

3

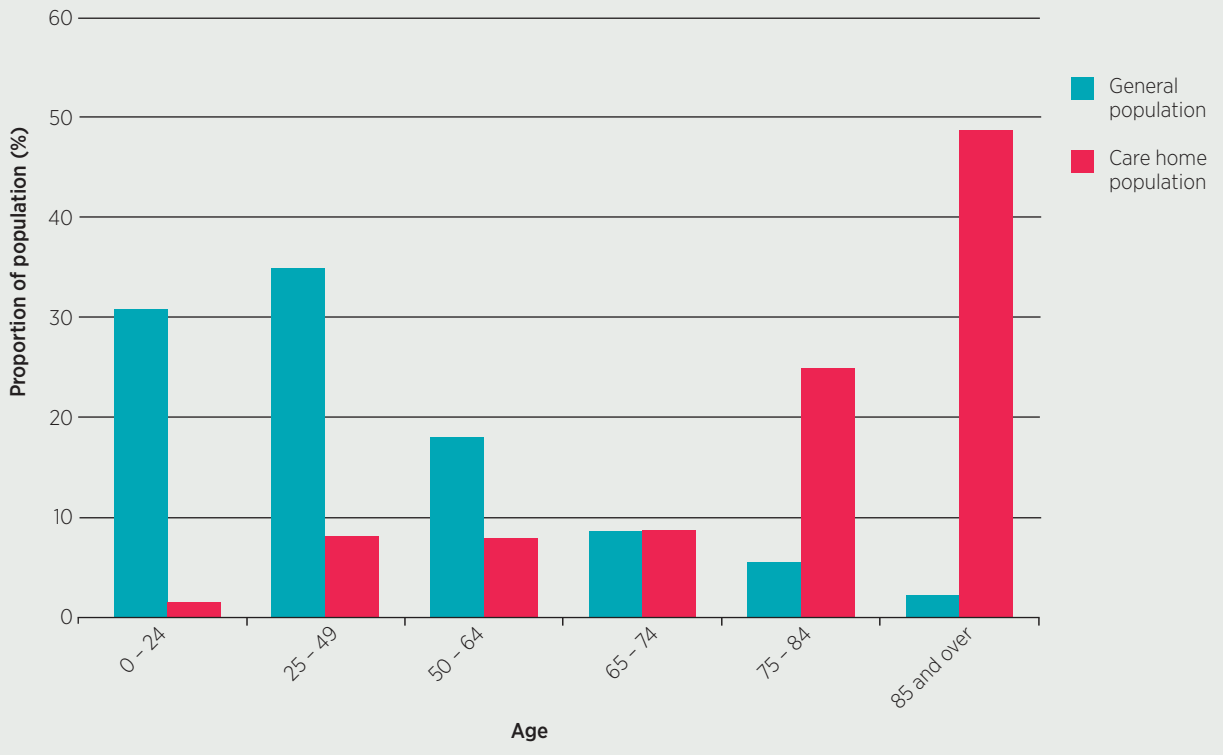
Characteristics of patients admitted from an area with a care home

In total we identified 17,459 care homes considered active based on a registration date of between 1 April 2011 and 31 March 2012, and which had one or more potential service users (beds). A total of 10,443 homes were registered as providing care for older people. Of the homes providing care for older people, there were 374,191 maximum potential service users (from the CQC database of registered providers) and 3,856 homes were listed as providing nursing staff. Figure 3.1, created using data from the 2011 census, shows the age distributions of care home residents and the general population in England. We restricted all analyses to patients aged 75 and over, due to differences in the respective age structures.

Hospital admissions

We identified 2,982,568 admission episodes in HES for patients aged 75 and over, of which 246,031 (8.2 per cent) were from a postcode containing a care home. There were large differences in both the age and sex distributions. Admissions from areas with care homes were:

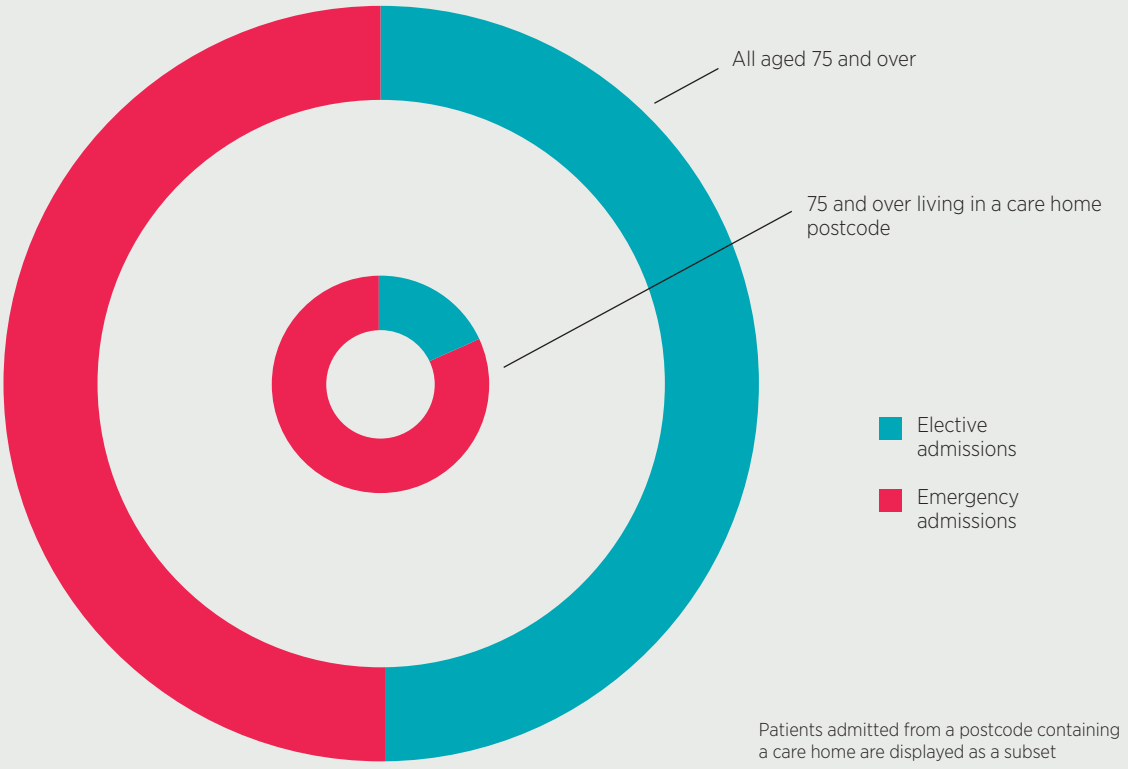
Figure 3.1: Distributions of broad age groups for care home residents and the general population



- more likely to be women – 65.3 per cent of all admissions aged 75 and over were female, compared with 53.0 per cent of the remaining older people admissions
- older – twice the proportion of admissions were aged aged 85 and over (61.0 versus 30.7 per cent), while the average age for the older cohort from care home postcodes was 86.3 years, compared with 82.1 years for the remaining older population
- more likely to be emergency admissions – 79.7 per cent of admissions from care home postcodes were an emergency, compared with 46.3 per cent of admissions for the remaining 75 and over population.

Figure 3.2 shows a breakdown of the entire admissions population in 2011/12 for all people aged 75 and over, with people aged 75 and over living in a postcode containing a care home displayed as a subset. The size of each circle is proportional to the number of admissions for each cohort. In total we identified 1,462,610 emergency admissions, of which 195,974 (13.4 per cent) were from a postcode containing a care home, and 1,447,636 elective admissions, of which 43,739 (3.0 per cent) were from a postcode containing a care home.

Figure 3.2: Breakdown of elective and emergency hospital admissions for patients aged 75 and over in 2011/12



Rates of hospital activity

A number of studies suggest that hospital admissions from residential and nursing homes are common events in other countries (Australian Institute of Health and Welfare, 2013; Graverholt and others, 2011; Gruneir and others, 2010; Intrator and others, 2004), and there are some studies in the UK exploring admissions from individual care homes

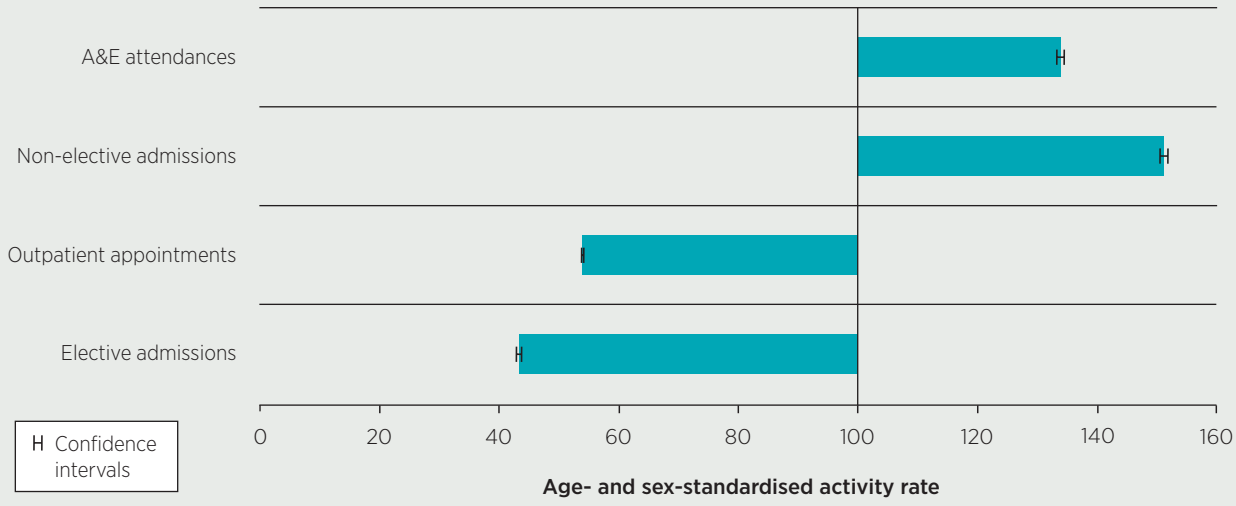
(Godden and Pollock, 2001; Gordon and others, 2014). We are unaware, however, of any work in England examining admission rates from care homes at a population level.

In this report we explore whether there are any differences in hospital admission rates between people living in a postcode containing a care home and the general older population, and also extend this to analyse differences in outpatient appointments and A&E attendance rates.

We used three different approaches to estimate the relative rate of hospital use by care home residents. The simplest approach used indirectly age- and sex-standardised activity rates calculated using inpatient, outpatient and A&E HES data for the 2011/12 financial year. Indirectly standardised rates compare the actual amount of hospital activity from people aged 75 and over living in a postcode containing a care home with the amount we would expect based on the activity rates of the general 75 and over population, adjusting for differences in the age and sex breakdown of the two populations. Appendix 1 in the appendices to this report, published separately (Smith and others, 2015), contains details of the full methodology for this.

A standardised rate equal to 100 means the amount of hospital activity for patients aged 75 and over living in a postcode containing a care home is the same as that of the general 75 and over population, adjusting for age and sex differences in the populations. A value greater than 100 indicates that the amount of activity from the care home postcode population is greater than expected, and a value less than 100 indicates that the activity is less than expected. The standardised activity rates are shown in Figure 3.3.

Figure 3.3: Ratio of observed-to-expected hospital admissions, outpatient appointments and A&E attendances for patients estimated as living in a care home compared with the general population aged 75 and over, with 95 per cent confidence intervals

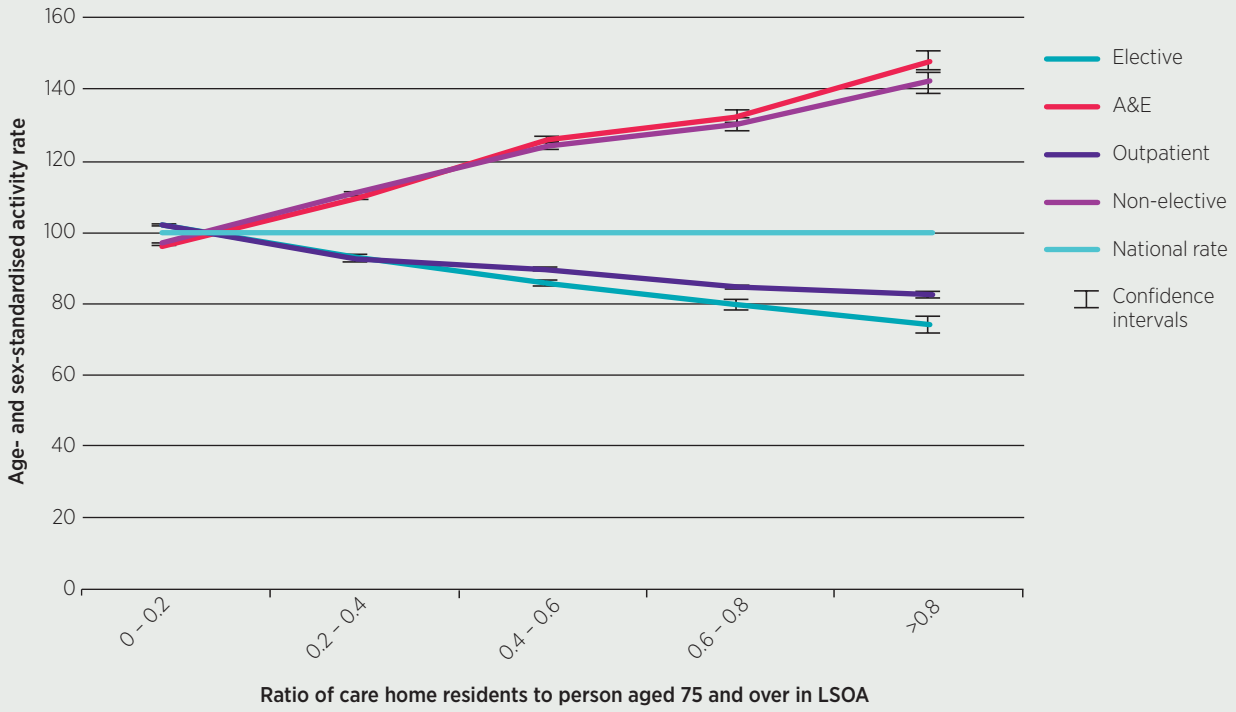


The estimated standardised rates for patients admitted from a postcode containing a care home varied markedly from the national over-75 rates for all types of activity. The rates seem to suggest that patients from care homes were more intensive users of non-elective secondary care services (with a standardised rate of 151.0 for non-elective admissions and 133.8 for A&E attendances), but

appeared to use less elective acute care than the general over-75 population (with standardised rates of 54.2 for outpatient attendances and 43.5 for elective admissions). The higher rate of emergency admissions compared with the general 75 and over population was consistent with another study that found that care home residents had 1.39 times the risk of emergency hospital admission than those in the community (Godden and Pollock, 2001).

We checked these estimates by looking at age- and sex-standardised rates calculated at the small-area (LSOA) level, plotted against the ratio of people recorded as living in care homes to the number of people aged 75 and over. As Figure 3.4 shows, the pattern was very similar, with areas containing larger numbers of care home residents (relative to other people aged 75 and over) showing higher emergency admission and A&E rates, and lower rates of outpatient and elective care (full details of this methodology can be found in Appendix 2: see Smith and others, 2015).

Figure 3.4: Inpatient, outpatient and A&E activity standardised rates, grouped according to the number of care home residents per person aged 75 years and over in LSOA, with 95 per cent confidence intervals



As a final validation we also examined the differences in crude activity rates between areas where we were confident of definitively identifying hospital activity belonging to care homes, and the remaining non-care home dwelling older population. The results were very similar (see Appendix 3: Smith and others, 2015) and matched the same patterns observed using the two preceding methods.

Impact of end-of-life care

There is a body of evidence indicating that towards the end of life the use of hospital care, particularly emergency care, increases significantly (Bardsley and others, 2010; Maddams and others, 2011; Pot and others, 2009), which could partly

explain the observed high emergency admission rates. In order to investigate whether differences existed in hospital use in the last 12 months of life between older patients residing in a postcode containing a care home and the remaining older population, hospital activity data were linked to mortality data containing the patient's date of death.

In total we were able to identify 279,880 deaths between 1 January 2011 and 31 December 2011 for patients aged 75 and over. According to official ONS figures, 303,196 adults aged 75 and over died in 2011 in England (Office for National Statistics, 2011b), meaning we were unable to identify approximately 23,316 deaths, or 7.7 per cent of the total. This is probably due to the fact that our linked mortality data only identified individuals who had a recent interaction with NHS acute services. Of the deaths we could identify, approximately 98,704 (32.6 per cent) were patients either having had a recent admission from a postcode containing a care home, or whose place of death was listed as a care home in the ONS data. Table 3.1 summarises the number and proportion of deaths for people aged 75 and over in 2011 by estimated place of residence in the year prior to death.

Table 3.1: Number of deaths for people aged 75 and over in 2011, split by estimated place of residence in the year prior to death

Place of residence	Number of deaths	Percentage of deaths
Care home – identified either by recent hospital admission from a postcode containing a care home, or by place of death	98,704	32.6%
Non-care home	181,176	59.8%
Unable to determine	23,316	7.7%

Further analysis was carried out to calculate mortality rates following an emergency hospital admission for up to 180 days following the date of admission. The analysis encompassed anyone admitted as an emergency aged 75 and over between 1 January 2011 and 31 December 2011. The results can be seen in Figure 3.5, split by whether the admission was from a postcode area containing a care home. These figures were not adjusted for age and sex. The figures indicate that survival for people admitted from a postcode containing a care home was less than for the general 75 and over population. Moreover, for the areas with a care home, around 40 per cent of people admitted as an emergency died within six months of admission.

Figure 3.6 compares the proportion of people admitted to hospital in the last 12 months of life, for care home and non-care home areas. For most of this final year of life, admissions from the care home group were slightly higher and increasing slightly throughout the year. Both groups showed a sharp increase in the final three months, with admissions from the non-care home group then becoming higher. This offers some evidence that care homes may help to reduce hospital utilisation in the last few months of life.

Figure 3.5: Crude mortality rates for patients aged 75 and over admitted as an emergency in 2011, split by whether the admission was from a care home postcode

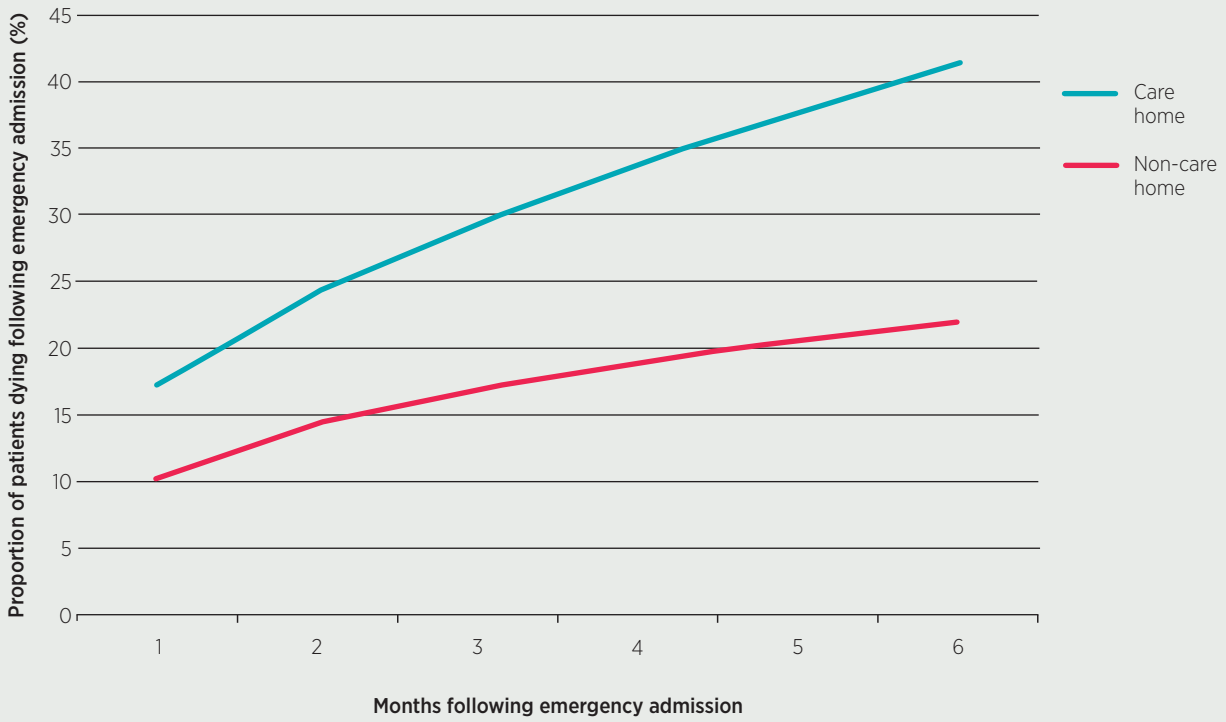
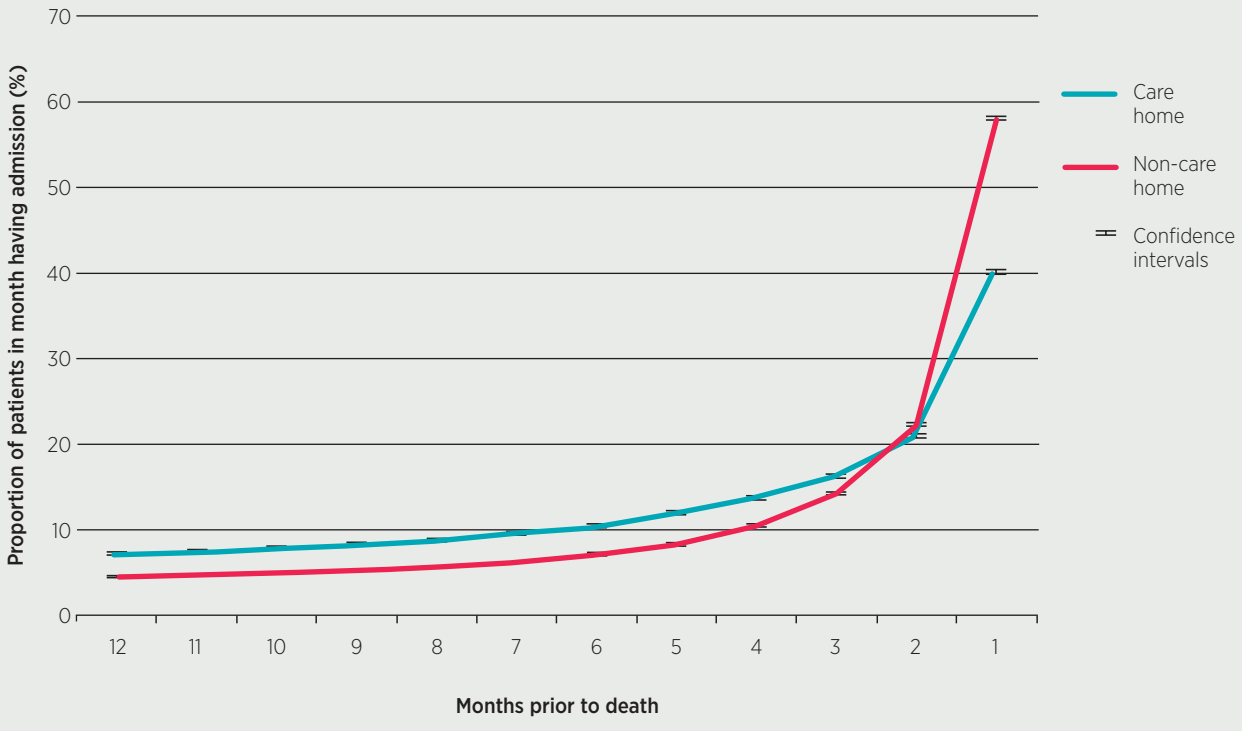


Figure 3.6: Proportion of patients having emergency admissions in 12 months prior to death, for people who died in 2011 aged 75 and over, with 95 per cent confidence intervals



4

Do people admitted from postcodes containing a care home have different health problems from the general population aged 75 and over?

Emergency admissions

To examine if there were any differences in the reason patients were admitted to hospital between people living in a postcode containing a care home and the general older population, we looked at the condition principally responsible for the patient being admitted.

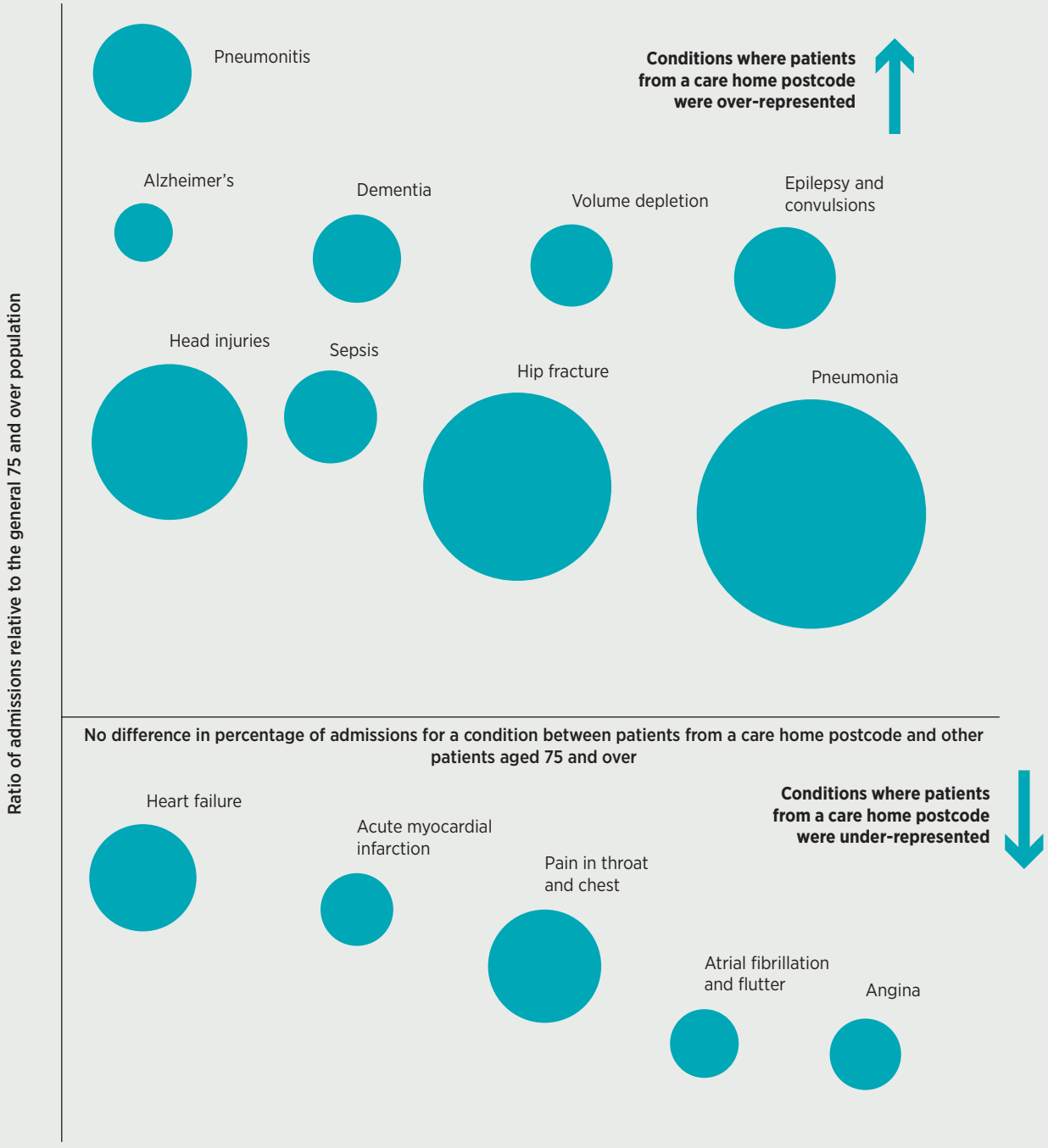
As noted previously, emergency admissions from postcodes containing care homes accounted for 13.4 per cent of all emergency admissions. However, this proportion varied considerably depending on primary diagnosis. In particular, admissions from care home postcodes accounted for:

- 44.0 per cent of all emergency admissions for pneumonitis due to solids and liquids
- 33.3 per cent of emergency admissions for Alzheimer's disease
- 32.2 per cent of emergency admissions for epilepsy
- 31.6 per cent of emergency admissions for other convulsions.

There were also large proportions of emergency admissions for vascular and unspecified dementia, volume depletion and sepsis. In a similar fashion, there were a number of primary diagnoses for which emergency admissions from care home postcodes were under-represented. These diagnoses included atrial fibrillation and flutter, angina and heart failure, and were all more common among emergency admissions from non-care home postcodes.

Figure 4.1 shows the main causes of emergency admission for patients from a care home postcode where there are significant differences with the general 75 and over population. The size of each of the circles is proportional to the number of emergency admissions from a care home postcode (for example, pneumonia, the most common primary diagnosis from a care home postcode, has the largest circle), while the higher the circle is on the chart, the more frequently the diagnosis occurred relative to the general 75 and over population (for example, emergency admissions from a care home postcode were five times more likely to have pneumonitis than other 75 and overs, and three times more likely to have dementia). Conditions occurring below the line were found less frequently in admissions from care home postcodes. It should be noted that the chart is for illustrative purposes only and Appendix 4 (see Smith and others, 2015) contains a full breakdown of the diagnosis comparisons, along with details of the methodology employed to ensure that the findings were not simply due to people from care home postcodes generally being older.

Figure 4.1: Primary diagnoses over- and under-represented in patients admitted as an emergency from a care home postcode



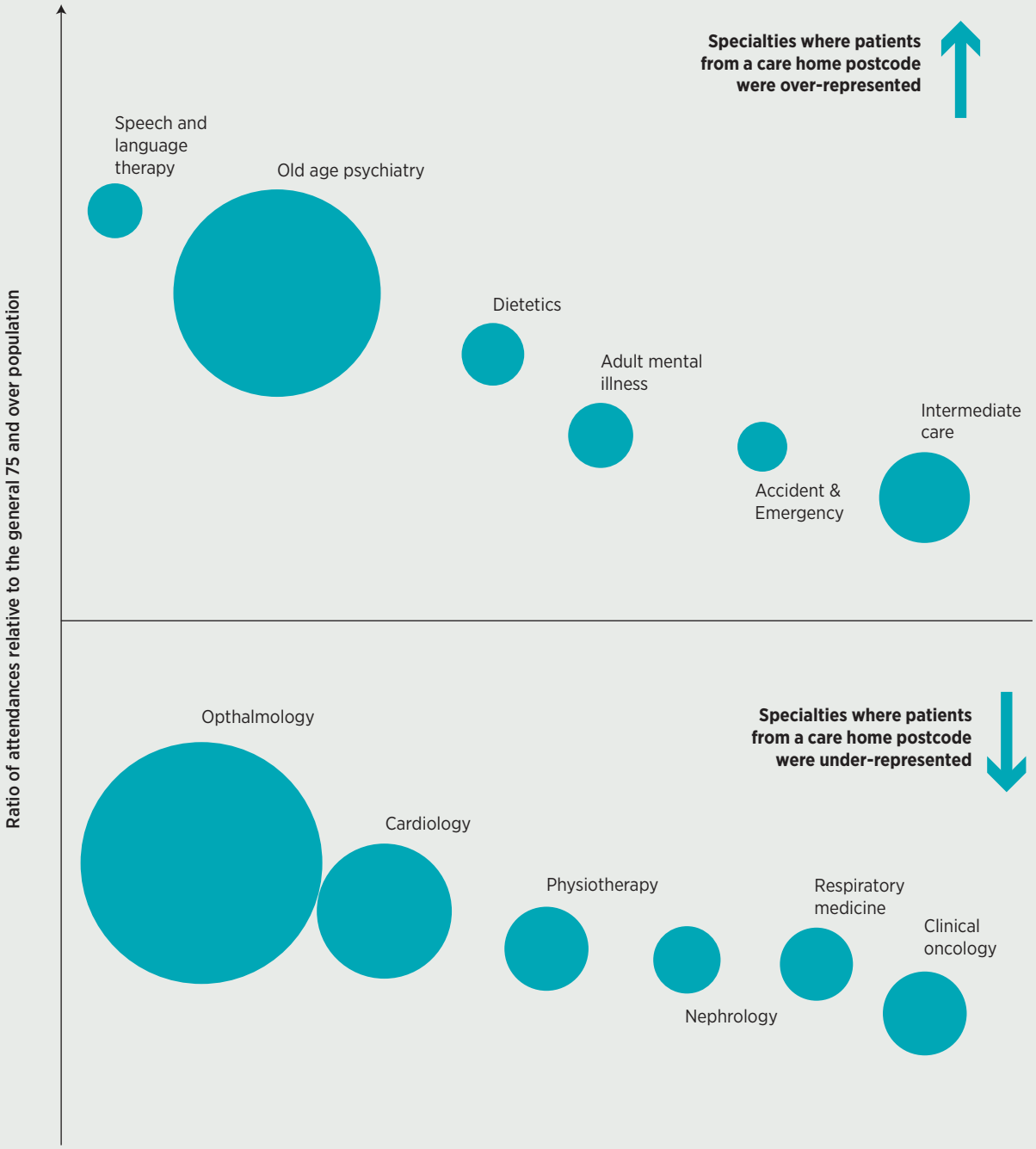
The size of each circle is proportional to the number of emergency admissions from a care home postcode, and the higher the circle is, the more frequently the diagnosis occurred relative to the general 75 and over population.

Outpatient attendances

A similar piece of analysis was performed using outpatient attendances. Attendances from postcodes containing a care home accounted for 4.1 per cent of all attendances, with this proportion varying depending on outpatient specialty.

The main results can be seen in Figure 4.2, with a full breakdown provided in Appendix 4 (see Smith and others, 2015). Specialties that were over-represented by patients attending from a care home postcode included speech and language therapy, old age psychiatry, dietetics, adult mental illness and A&E. Specialties that were found less frequently among attendances from care home postcodes included clinical oncology, nephrology and ophthalmology.

Figure 4.2: Outpatient specialties over- and under-represented in patients attending from a care home postcode



The size of each circle is proportional to the number of emergency admissions from a care home postcode, and the higher the circle is, the more frequently the diagnosis occurred relative to the general 75 and over population. The horizontal line indicates the point of no difference in the percentage of admissions for a condition between patients from a care home postcode and other patients aged 75 and over.

Chronic conditions

We also looked at the frequency of chronic conditions. Flags were assigned to each patient to indicate the presence of one of the following chronic conditions: diabetes, hypertension, chronic obstructive pulmonary disease (COPD), angina, ischaemic heart disease, asthma, cardiovascular disease, renal failure, epilepsy and congestive heart failure. Flags were also assigned indicating whether a patient had a recent diagnosis of cancer, a mental health condition or dementia.

In order to assign these conditions we looked at the patient's hospital admissions for the whole year and assigned the flag based on whether the condition was recorded for the patient at any point during the year. We also calculated the total number of conditions associated with each patient. Note that this analysis was conducted at the patient level, rather than being based on the total number of admissions, to avoid bias towards patients admitted multiple times during the year.

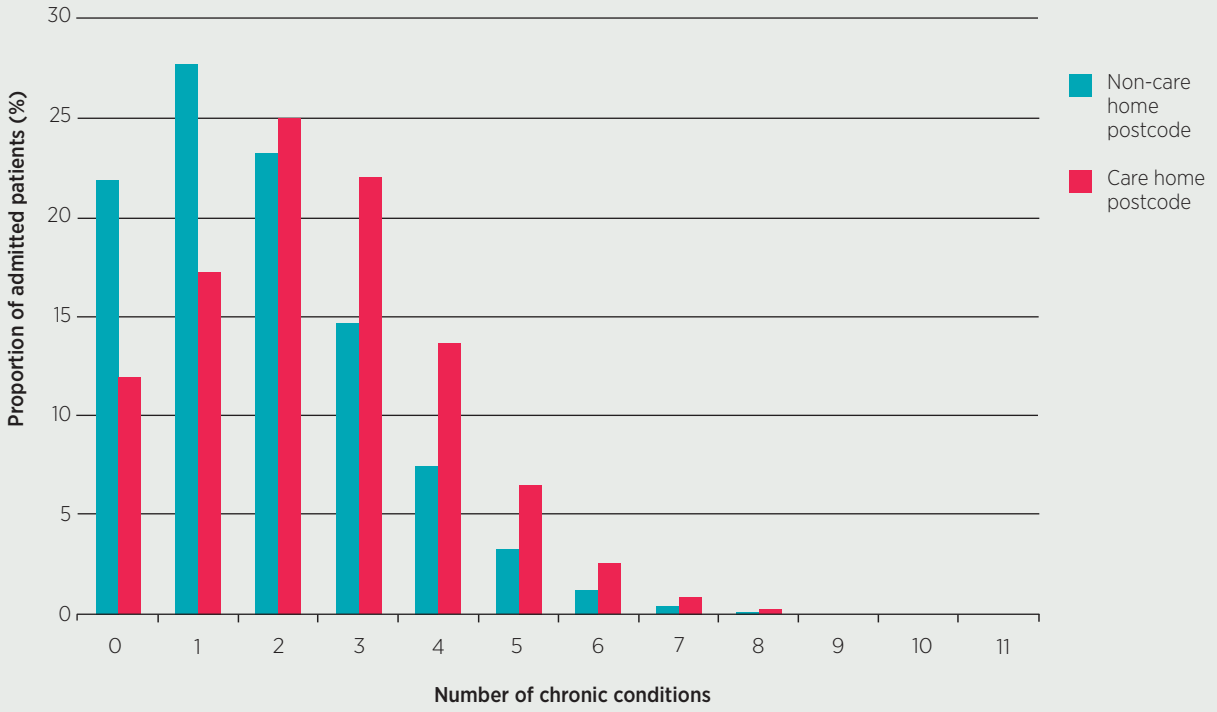
Table 4.1 provides a breakdown of the proportion of patients aged 75 and over admitted to hospital and coded with a chronic condition during the year, split by whether they were admitted from a postcode containing a care home, while Figure 4.3 (page 20) shows the distribution of the number of chronic conditions associated with patients.

The distribution of the number of chronic conditions per patient differed between patients admitted from a care home postcode and other older patients. Of patients admitted from a care home postcode, 88.1 per cent had one or more chronic conditions coded within the year, compared with 78.1 per cent of other

Table 4.1: Summary of chronic conditions associated with patients admitted from a care home postcode, and the remainder of the population aged 75 and over

Condition	Proportion of patients admitted from a care home postcode	Proportion of patients admitted from a non-care home postcode	Ratio
Dementia	39.3%	5.5%	7.2
Mental health	52.0%	14.5%	3.6
Epilepsy	5.3%	1.8%	3.0
Cardiovascular disease	15.3%	8.1%	1.9
Renal failure	6.2%	4.2%	1.5
Congestive heart failure	12.9%	9.1%	1.4
Diabetes	16.8%	16.7%	1.0
COPD	10.2%	10.4%	1.0
Ischaemic heart disease	18.6%	20.1%	0.9
Hypertension	42.9%	51.1%	0.8
Angina	9.0%	10.9%	0.8
Asthma	5.3%	7.2%	0.7
Cancer	10.2%	15.6%	0.7

Figure 4.3: Distribution of the number of chronic conditions associated with patients admitted from care home postcodes, and the remainder of the population aged 75 and over



older patients; and 70.9 per cent of patients from a care home postcode had two or more chronic conditions, compared with 50.3 per cent of other older patients. The mean number of chronic conditions per patient for admissions from a care home postcode was 2.4, compared with 1.8 conditions per patient for non-care home postcodes.

Large differences were also observed in the breakdown of chronic conditions themselves. Patients admitted from a postcode containing a care home were more likely to be coded with cardiovascular disease, renal failure, epilepsy and congestive heart failure, and were much more likely to be coded with dementia or a mental health condition. Older patients not admitted from a care home postcode were more likely to be coded with hypertension, angina, ischaemic heart disease and asthma, and were also much more likely to be diagnosed with cancer. Smaller differences were observed between the two sets of admissions for diabetes and COPD.

These findings are consistent with a previous study (Georghiou and others, 2012), which found higher levels of social care use in patients with dementia and cerebrovascular disease, and lower levels for people with cancer. It is important to note that these samples may not be representative of the true underlying prevalence of these conditions in the older populations as they are solely based on patients admitted to hospital. However, they do provide an illustration of the chronic conditions associated with patients being admitted to hospital from a care home postcode and may provide a reflection of the sorts of conditions most commonly responsible for residential and nursing care needs.

5

Are there significant differences in hospital admission rates between areas containing care homes?

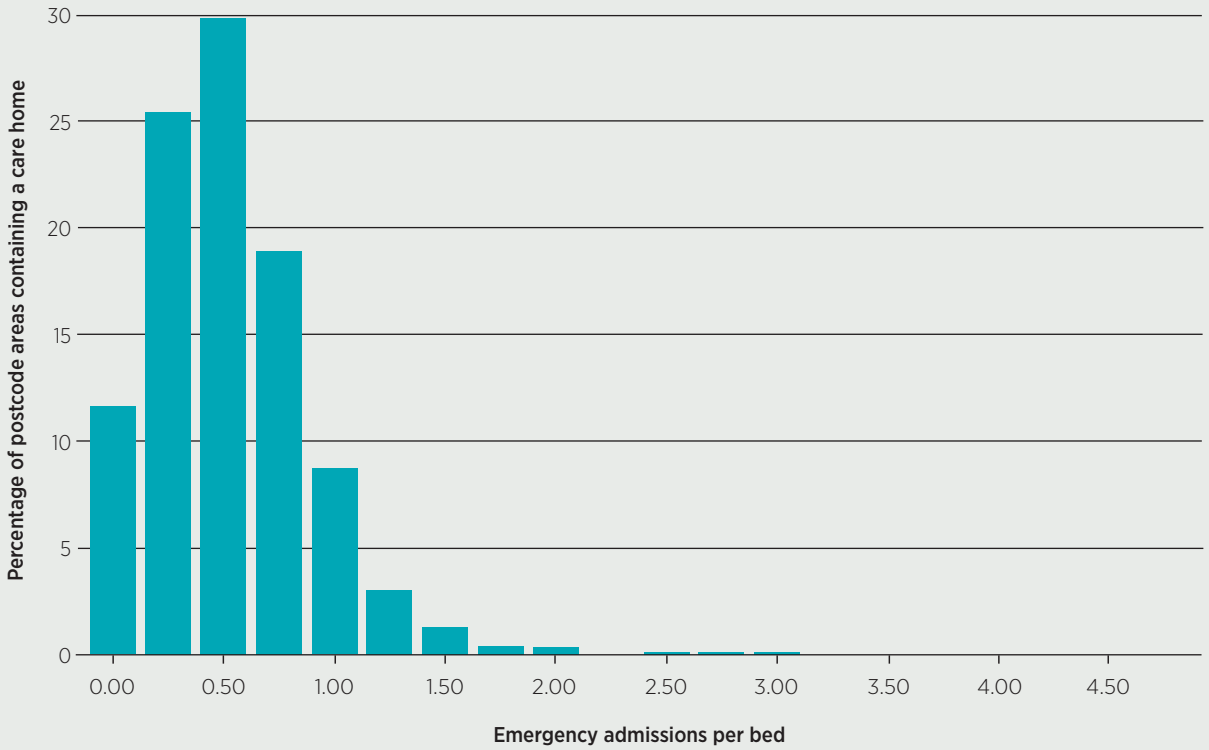
If some aspects of hospital admissions are potentially preventable by better health and social care, it is important that we are able to identify variation between individual homes in terms of hospital admission rates. This approach is currently being used to some degree to help inform the work of CQC social care inspection teams; the assumption being that good quality social care should prevent those crises that lead to emergency admissions and good care homes will have proportionally fewer admissions. With over 17,500 registered care homes in England (Care Quality Commission, 2013b), regulatory activity could be focused on homes with significantly high admission rates (potentially indicating quality issues relating to aspects such as monitoring chronic diseases) or significantly low admission rates (potentially indicating insufficient healthcare provision or problems with access).

As noted, due to data quality problems in HES, it is not possible to definitively identify admissions from care homes; however, it is possible to identify admissions from a postcode containing a care home, which should be a sufficiently small geographical area in the majority of cases to identify outliers.

To examine whether significant differences in admission rates existed, we took all postcodes containing a care home registered in 2011/12 providing services for older people. In total, 10,443 homes were identified as providing services for older people (59.8 per cent of all homes registered in 2011/12). This number of homes equated to 9,822 separate postcode areas, with 90.6 per cent having only one care home within that postcode area. The maximum number of homes located in a single postcode area was 13. For each of the postcode areas we identified, we used the total number of emergency admissions in 2011/12 as the numerator and the sum of total beds for care homes found at the postcode as the denominator, and constructed a crude admission rate.

In total we observed 195,974 emergency admissions for people aged 75 and over across postcode areas containing a care home providing services for older people. These areas contained a total of 379,695 beds, giving a crude overall national rate of 0.52 emergency admissions per bed. Figure 5.1 (page 22) shows the distribution of crude emergency admission rates per bed for postcode areas containing a care home.

Figure 5.1: Distribution of emergency admission rates for postcode areas containing a care home providing services for older people



Those postcode areas containing registered care homes offering nursing services had lower crude emergency admission rates (0.45 admissions per bed) than those offering only residential services (0.59 admissions per bed).

Identifying outliers

In order to identify care homes with significantly different admission rates than their peers, we compared the observed number of admissions from a postcode area with what we might expect given the number of care home beds. Expected values were based on the national emergency admissions rate multiplied by the number of beds in the postcode area. This analysis was performed separately for postcode areas containing homes offering nursing services and those without nursing services. To assist interpretation we constructed 'funnel plots', which provide a graphical means of comparing performance between organisations and displaying atypical values, or outliers (Figures 5.2 and 5.3). Points outside the dashed lines indicate individual areas with care homes that were outliers; having extremely high or low admissions given their size. The vast majority were within the range of values that would be expected (as shown by the dashed lines on the charts).

For postcode areas with homes not providing nursing services, we identified 29 areas out of a total of 6,053 with values higher than the 99.8 per cent control limit, and for areas containing homes offering nursing services, we identified 28 areas out of a total of 3,769 above the upper control limit.

Figure 5.2: Funnel plot showing the distribution of emergency admission rates for postcodes containing care homes not offering nursing services, with 99.8 per cent control limits

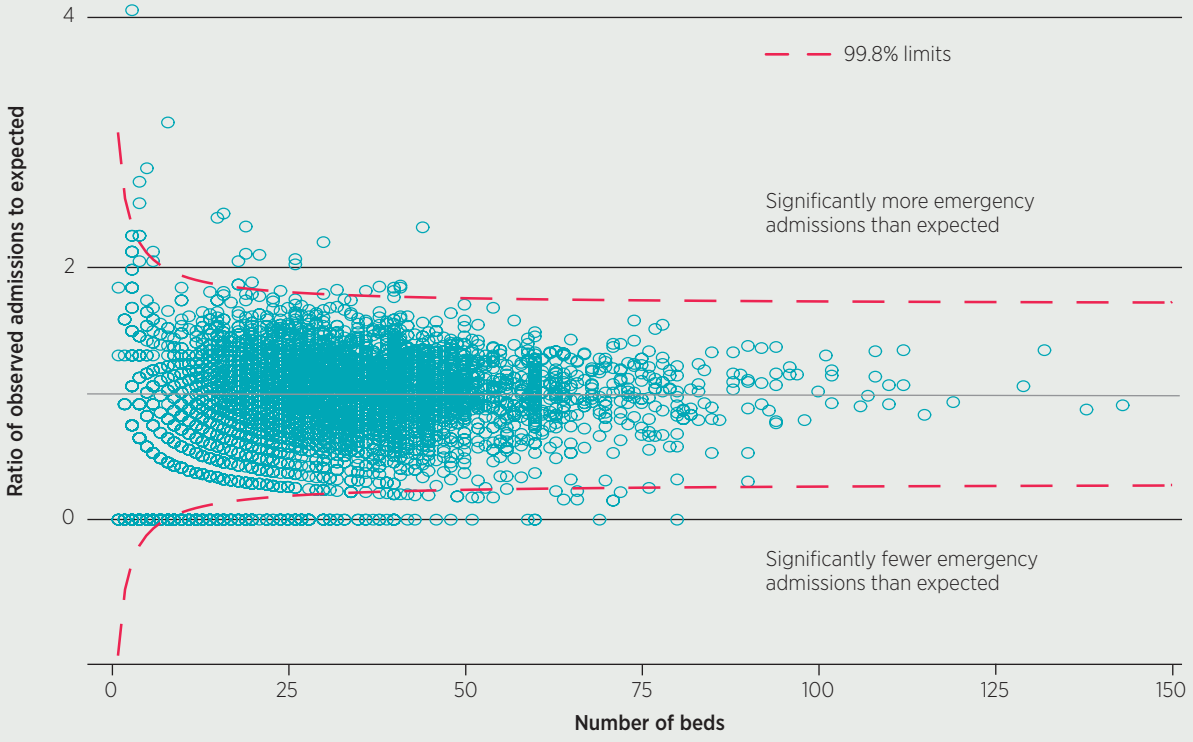
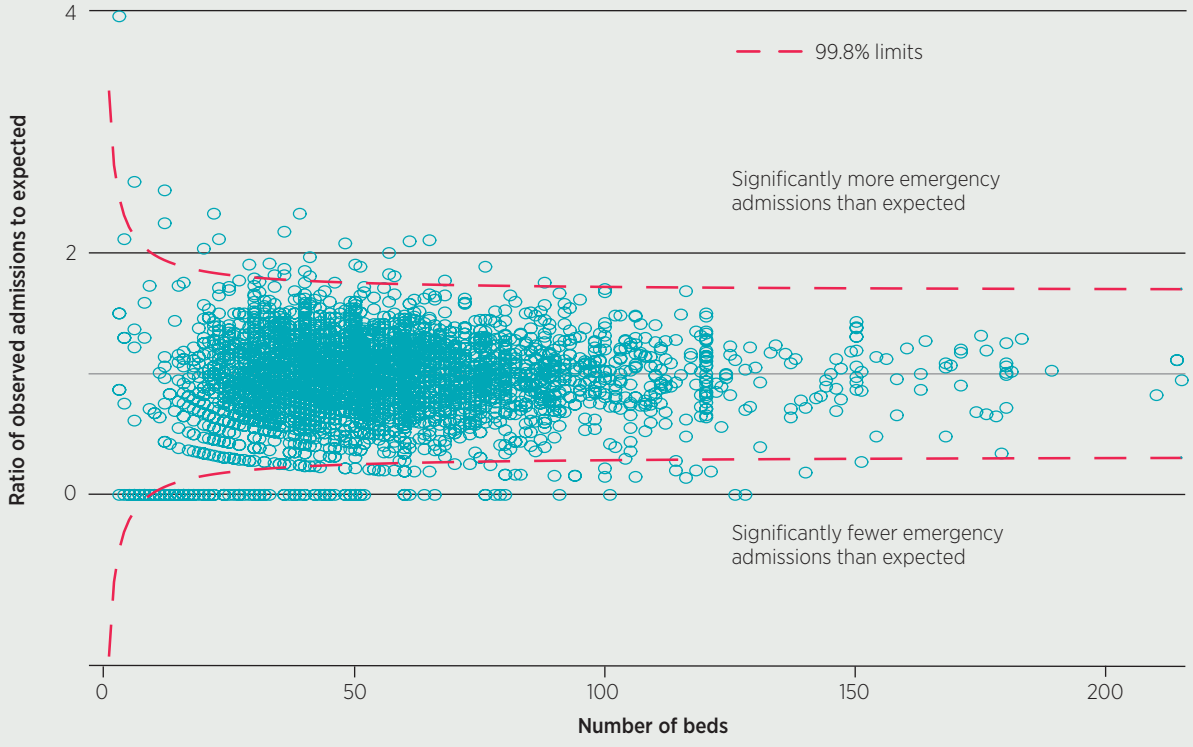


Figure 5.3: Funnel plot showing the distribution of emergency admission rates for postcodes containing care homes offering nursing services, with 99.8 per cent control limits



The plots clearly show a subset of areas containing homes which had no admissions during the study period for people aged 75 and over. In looking in further detail at these low-value outliers, it appears that the distribution of admission rates for areas with homes providing additional services (specifically services for children, learning disabilities, substance misuse, eating disorders, physical disabilities, sensory impairment, young adults and mental health users) may be very different from those providing services exclusively for older people: see Appendix 5 for more details (Smith and others, 2015). This is an area for potential future exploration – it suggests that patients from these homes may have different admission profiles than those from homes providing services exclusively for older people and people with dementia, as they are more likely to be younger and being admitted for different conditions.

Further examination of the high-value outliers did not reveal any specific patterns or common factors in terms of geographical location (there was a mixture of cities of different sizes, in both urban and rural locations) or the age profile of the patients (there was an average age of 86.8 for admissions in the outlying areas, compared with 86.3 for all patients admitted from postcodes containing care homes).

One important observation from these outliers is that they contained a large proportion of patients having multiple emergency admissions within the year, with an overall average of 2.0 emergency admissions per patient per year, compared with 1.5 emergency admissions per patient per year for other emergency admissions from a postcode containing a care home. Figure 5.4 shows the proportion of all emergency admissions accounted for by patients being admitted three times or more as an emergency during the year, stratified by z-score (see Box 5.1 below).

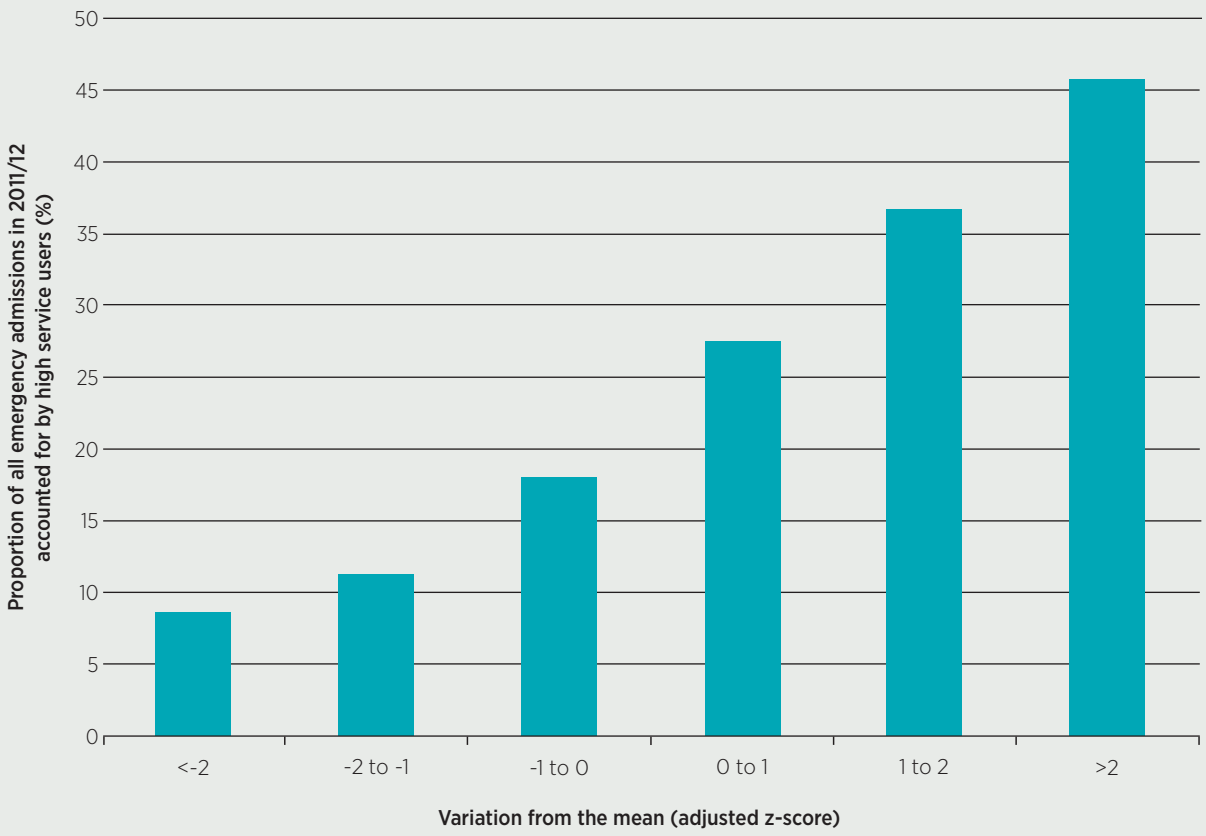
Box 5.1: What is a z-score?

Z-scores provide a measure of how far a particular value is from the mean of the distribution, with a z-score of 0 indicating the value is equal to the mean, and the larger the z-score the further the value is from the mean (and in this case, indicating more emergency admissions per bed compared with the national average).

It can be seen from Figure 5.4 that the larger the z-score for an area, the greater the proportion of emergency admissions in that area was accounted for by high users. This implies that the high admission rates in these areas are explained by small numbers of people accessing services intensively, rather than many people having single admissions. One patient was admitted 31 times during the year as an emergency, of which 27 admissions were for a primary diagnosis of intestinal obstruction. Another patient was admitted 34 times as an emergency during the year, of which 13 were due to falls on separate occasions.

It is important to reiterate here the limitations in the data we had: as we only used bed numbers as a denominator, it was impossible to adjust for age, sex and case-mix, all of which will have a significant impact on hospital admissions; there are no data available on occupancy rates, which could potentially lead to artificially high rates if there is a sizeable gap between the actual number of people in a home and the theoretical maximum; and some admissions could be from patients in the surrounding area.

Figure 5.4: Proportion of all emergency admissions accounted for by patients living at a postcode containing a care home having three or more emergency admissions during the year, by variation from the mean (z-score)



Continuous monitoring of admissions

One of the potential practical applications of these types of data is to help care home providers or commissioners monitor levels of emergency admissions from specific homes on a continuous basis. Continuous monitoring methods provide useful alternatives to analysing snapshots of data over fixed time periods. They are becoming increasingly prevalent in the evaluation of healthcare as they enable healthcare professionals, managers and commissioners to become more responsive, using the latest data as they become available.

One monitoring method that can be used with relatively rare events, such as emergency admissions from an individual care home, involves calculating the frequency between successive events and updating the analysis whenever a new admission occurs. If the accumulation of evidence suggests that admissions are occurring more frequently than expected, then an alert is signalled, which should then trigger some kind of action, such as a case review. As a starting point, we used this methodology with data relating to postcodes rather than homes themselves, and without risk adjustment. We also assumed that all beds within the home were filled, but it would be a simple matter to alter the analysis if the correct bed occupancy was known.

Box 5.2 and Figure 5.5 illustrate the use of one such continuous monitoring method, the Cumulative Sum (or CUSUM), using data from one of the postcodes containing a care home as an example.

Box 5.2: Using CUSUM for continuous monitoring of emergency admissions

Using the example shown in Figure 5.5, the expected frequency of admissions from the postcode, given its size, is approximately two per month. The timings of each admission are represented by the blue diamonds towards the bottom of the chart, with one diamond on top of another indicating there were two admissions in the same day. If successive admissions are within 10 days of each other, the CUSUM plot will move upwards; otherwise it will head downwards. CUSUM charts are constrained not to fall below zero to avoid building up 'credit' for a series of previous good outcomes, and thus be more responsive to potential problems. The control limit is defined such that if it is reached by the CUSUM, there is sufficient evidence to suggest that the frequency of admissions is significantly greater than expected and prompt a review by the home and potentially the GP practices serving the home. When there are clusters of admissions within a short space of time, such as April 2011, the CUSUM rises steeply. The April cluster, however, is followed by a period of relatively infrequent admissions, hence the subsequent fall. Later on, admissions become persistently more frequent, leading to the alert signal in the middle of August 2011.

Figure 5.5: CUSUM chart for monitoring the interval between successive emergency admissions from a single care home postcode

Continuous monitoring methods such as this hold some advantages over snapshot comparisons over fixed periods of time as they use information as soon as it becomes available, enabling quicker responses. These methods also have the advantage of being able to account for the times at which specific events occur, which have a large influence on the overall results. For example, consider two homes having the same average number of emergency admissions over the year, but in the first home the admissions are evenly spaced throughout the year, while in the second they occur mostly in the most recent three months, which could be indicative of a potential issue. An annual snapshot would produce similar results, whereas with a CUSUM the second home would show a significant increase in the frequency of admissions and trigger an alert.

Using these approaches in practice

Emergency admission rates cannot provide definitive evidence of lapses in care and the limitations in the data and low frequency of events mean they have to be interpreted with caution. There are simple checks, however, that could be performed by an external assessor, or in collaboration with the homes themselves, to eliminate false positives generated by artefacts of the data. These could include checking whether the number of emergency admissions identified matches the homes' own records and that they are not from the surrounding area; looking at any low occupancy rates; or looking at any obvious differences in the care pathway. This in turn could prompt improvements in systems and processes at homes if further investigation of these signals identifies problems.

Care homes could also keep track of their own internal data. Potential areas to explore when examining the level of hospital admissions include:

- Size of the care home: Figures 5.6 and 5.7 (page 28) show the number of emergency admissions that would be expected given the size of the home. Any count of admissions larger than expected, especially over the upper limit, should be a cause for further investigation. In a similar fashion to Hospital Standardised Mortality Ratios, high counts should be interpreted as an indication to take a closer look, rather than necessarily an indicator of poor practice; many of the admissions could be entirely appropriate or unavoidable. Caution must be applied when using these charts, due to the previously discussed uncertainties surrounding the numerators and denominators (see page 9) and the lack of adjustment for age, sex and patient complexity. Care must also be taken about false assurance being given to homes on the basis of expected values, as emergency admissions are only one of a large number of potential markers of quality in residential care.
- End-of-life care: Having identified potential excess emergency admissions, were any of these attributable to residents on a formal end-of-life pathway, or who were near the end of their life, which could explain a larger number of admissions?
- High service users: Does the home contain a number of users who are having multiple emergency admissions during the year? Are these driving the high admission rate and could these patients benefit from improved care planning? Also, is the local clinical commissioning group performing risk stratification and case management, and including care home residents in their at-risk populations?

Figure 5.6: Plot of the expected number of emergency admissions by bed number for care homes without nursing services, with 95 per cent confidence intervals

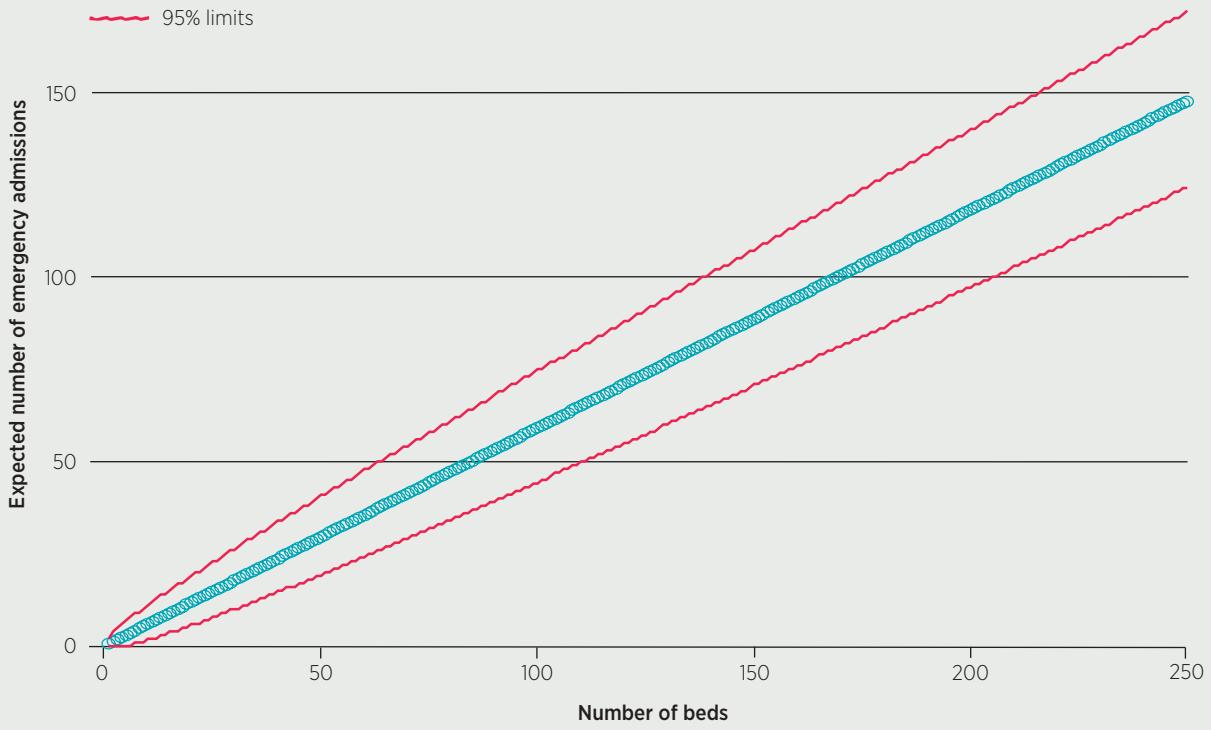
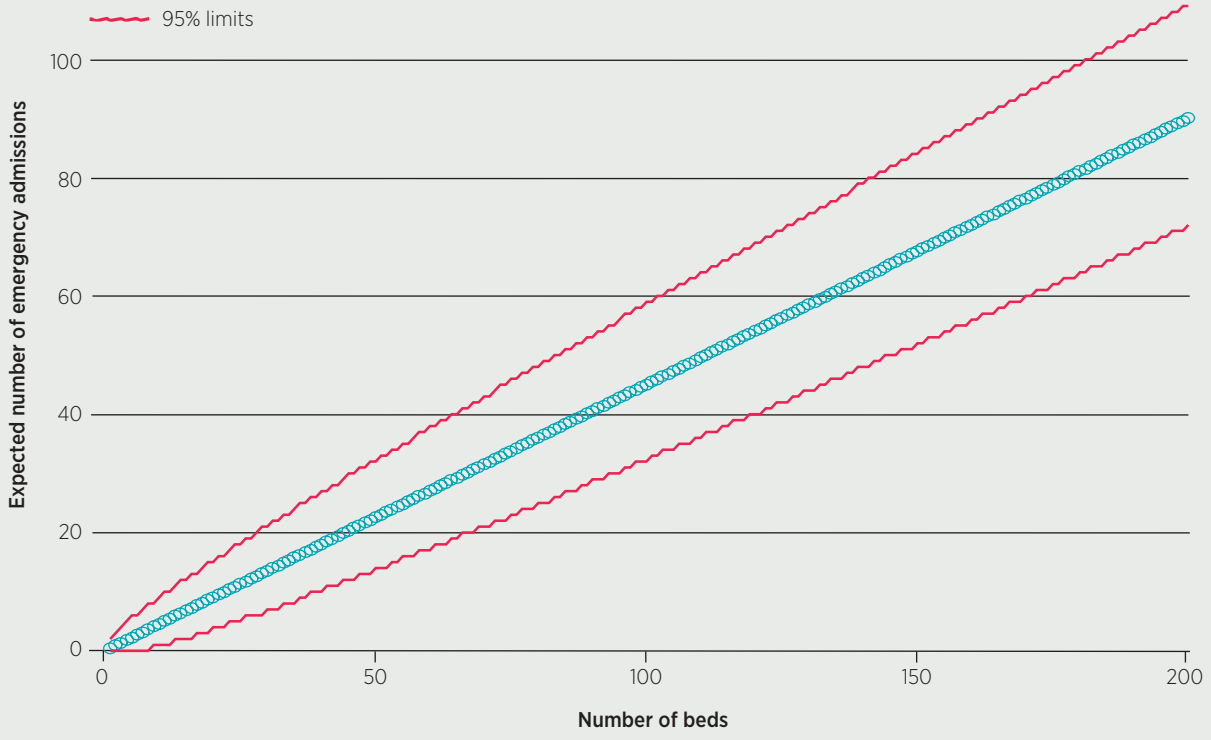


Figure 5.7: Plot of the expected number of emergency admissions by bed number for care homes with nursing services, with 95 per cent confidence intervals



- Reasons for admissions: Are there any patterns to these admissions such as chronic disease or predictable complications of chronic disease? Are they related to, for example, poor medicines management, falls, or nutritional and hydration issues? Could the home benefit from community-based chronic disease management?
- Does the home have any specific local arrangements in place or agreed pathways with providers that could explain the activity?

The British Geriatrics Society also provides commissioning guidance on areas that could be explored (British Geriatrics Society, 2013):

- Does the home have one GP or general practice covering all the residents, or do residents stay with their existing GP on admission?
- Do all residents get a full comprehensive assessment on admission, with care planning and a medications review, and regular reviews throughout the year?
- Is there regular access to community geriatricians or old age psychiatry?
- Do community rapid response teams go into care homes just as they would to people's own homes?
- Are there shared local care protocols with out-of-hours providers and ambulance trusts about non-conveyance (for example on-scene assessment and referral by ambulance crews)?
- Given that many emergency hospital admissions are related to acute confusion, dehydration, sepsis, pneumonia and falls, have care homes got robust plans in place to prevent these problems, or early detection and rapid response services to treat them?

6 Discussion

The quality of care provided to older people is one of the key concerns for the NHS. Assessing quality in social care settings is not easy and this report has explored whether hospital admissions could be used as a probe to look at the quality of care and support people receive in care homes. Care home residents tend to have high levels of functional and cognitive impairment, multiple comorbidities, and are among the frailest in society. These factors, coupled with this part of the population's dependence on good integration between health and social care services, mean they are particularly at risk of emergency hospital admissions and the associated detrimental impact on their lives. In addition, the majority of care home residents are over 75 years of age and, with this segment of the population projected to double in the next 30 years (Age UK, 2014), understanding patterns of hospital use and identifying potentially avoidable hospital admissions will assist commissioners in designing appropriate services to reduce costs and improve quality of care.

In this report, using census population data, hospital admissions data and registered provider data from the CQC, we estimated standardised hospital activity rates for people living in a postcode containing a care home. We then validated these results using a small geography-based analysis based on the density of care home residents within a given LSOA. Overall, emergency hospital admission rates and A&E department attendance rates were statistically much higher than expected compared with the general 75 and over population, while outpatient rates and elective admission rates were much lower.

We noted the high levels of multiple chronic conditions among these patients, making them clinically and medically complex to manage, and the presence of long-term health problems leading to the need for institutional care. Medications management is also a serious issue for these patients; on any day, around seven in every 10 care home patients are the subject of a medication error (Barber and others, 2009). Given these factors, the higher rate of emergency care relative to the general population is perhaps unsurprising. In addition, the proximity of many of these patients to the end of their life compared with general older people admissions, and the associated higher utilisation of secondary care when close to death, could explain a large proportion of the excess emergency activity.

Some of these admissions, particularly from residential homes with few trained nurses, may also be entirely appropriate, with homes that didn't admit but had no alternative provision putting residents at risk. Indeed, the finding that postcode areas containing registered care homes offering nursing services had lower crude emergency admission rates than those offering only residential services may, on one level, be counterintuitive, as nursing home residents have well-defined nursing needs and may represent more complex patients. But it could be postulated that a lack of trained nursing staff leads to lower confidence in dealing with chronic health problems and a greater propensity to use secondary care. It has also been reported that medication administration errors are lower in nursing homes than residential homes (Barber and others, 2009). Higher

admission rates from residential homes than from nursing homes have also been observed in another study (Godden and Pollock, 2001).

What was more surprising was the apparent under-utilisation of outpatient and elective inpatient care, with standardised rates significantly below the national average. Activity rates and secondary care utilisation are affected by a number of factors, including differential need and levels of morbidity, local supply and proximity to end of life. While it is not possible to account for the majority of these using routine data, it is important for policy-makers to understand what is driving these differences and so to plan services more effectively. For example, it is not clear whether the apparent under-use of elective care is due to patient or family preferences, that the home offers particular services, or a combination of staff in the home and GP visits obviates the need for much outpatient care. It is also possible this finding reflects the limited life expectancy of many residents, with less frequent interventions often considered good care towards the end of life. Less positively, this may also occur due to problems accessing services or poorly integrated care, and hence reviews of existing models are required.

The patients' close proximity to end of life that we observed for many of the admissions from care home postcodes is unsurprising given that the median survival time from entering a home is only around 15 months (Forder and Fernández, 2011). Of more interest, perhaps, is that we found some evidence that care homes may help prevent emergency hospital admissions in the last few months of life. This finding is consistent with the results of other studies which found associations, in groups of patients such as centenarians and people with dementia (Evans and others, 2014; Sleeman and others, 2014), between greater care home bed provision and decreased likelihood of death in hospital.

Also of interest was the higher prevalence of patients experiencing multiple admissions in areas with high admission rates. Strategies that aim to prevent the need for hospital admissions may therefore benefit from a specific focus on those at risk of multiple admissions. Indeed, this approach is already being taken by Ashford and St Peter's Hospitals NHS Foundation Trust, with some success (Oliver and others, 2014).

Methodologically, further work is required. While not being definitively capable of identifying whether a unit of hospital activity was from a care home, this analysis should hopefully provide a useful starting point for debate, provide insight around the conditions for which care home residents typically access secondary care, and highlight some of the data issues surrounding monitoring care for this part of the population. A methodology is also provided for care home providers and regulators to work together in a non-resource-intensive manner to address potential quality issues, and to spot and resolve potential problems before they escalate (see pages 27 to 29).

Finally, it is important to note that residents in care homes are also part of a wider system that directly affects their care. High rates of emergency admissions may reflect quality issues in, among other things, local primary care, community care, GP support and dispensing practices in pharmacy chains, as much as the quality of care in the homes themselves. The responsibility of care still predominantly rests with the GP and the care in the home will at least partly be influenced by the quality of the GP services its residents receive and often a single home will be dealing with a number of GP practices. So while care homes do need to look to their own systems, they may have little influence over other surrounding systems.

Developing information

One of the problems with conducting this analysis was that information systems do not easily identify care home residents, or, if they do, the data were too sensitive to share with us. Challenges with the numerator included ambiguous coding of admission source in HES, which could potentially identify care homes, the potential presence of additional admissions from older people from the surrounding postcode area, and the methodology being reliant upon the accuracy of the patient's postcode (there are some questions around how quickly the patient records are updated to reflect the new postcode when a patient is admitted into residential or nursing care).

The issue of admissions from the surrounding area is more likely to affect residential care homes as these tend to be smaller establishments, while only a very small proportion (under four per cent) of nursing homes contain fewer than 20 beds.

Larger challenges were found in defining the denominators. Very little information is available on the number of people in individual homes, let alone age and sex profiles. Appendix 1 (Smith and others, 2015) provides the methodology we used when looking at the national analysis, while the overall number of beds for each home was used when examining admission rates from individual homes.

Ultimately, datasets linking health and social care data could provide case-mix-adjusted admission rates for homes, but in the short term simple things such as age-stratified postcode populations could add significant improvement to any surveillance methodology. Other options could include the use of the Personal Demographics Service to obtain potential data on care home populations. Understanding the nature of these populations is particularly important given the differences we observed in admission profiles depending on the range of services offered at the home (see Appendix 5: Smith and others, 2015).

Further research

There are a number of areas of potential further exploration, particularly around the screening methodology. Time series methods, such as CUSUM (see pages 26 to 27), could be implemented to detect large changes in admission patterns and would also permit homes to be compared against themselves over time and circumvent problems associated with smaller establishments. Another potential area includes the development of marker conditions or diagnostic groups associated with care home residents that could augment the current use of data on emergency admissions. In addition, more work needs to be done exploring the different patterns of secondary care use by care home residents depending on the type of services offered by the home, which could refine the current nursing versus non-nursing benchmark groups.

References

Age UK (2014) *Later Life in the United Kingdom*.

Alzheimer's Society (2013) *Low Expectations: Attitudes on choice, care and community for people with dementia in care homes.*

Australian Institute of Health and Welfare (2013) *Movement Between Hospital and Aged Care 2008–09*.

Barber N, Alldred D, Raynor DK, Dickinson R, Garfield S, Jesson B, Lim R, Savage I, Standage C, Buckle P, Carpenter J, Franklin B, Woloshynowych M and Zermansky AG (2009) 'Care homes' use of medicines study: prevalence, causes and potential harm of medication errors in care homes for older people', *Quality & Safety in Health Care* 18, 341–6.

Bardsley M, Georghiou T and Dixon J (2010) *Social Care and Hospital Use at the End of Life*. Nuffield Trust.

British Geriatrics Society (2011) *Quest for Quality*.

British Geriatrics Society (2012) *Failing the Frail: A chaotic approach to commissioning healthcare services for care homes*.

British Geriatrics Society (2013) *BGS Commissioning Guidance: High quality health care for older care home residents.*

Care Quality Commission (2012) *The State of Health Care and Adult Social Care in England in 2011/12*.

Care Quality Commission (2013a) *The State of Health Care and Adult Social Care in England in 2012/13. Technical Annex 1: Avoidable admissions*.

Care Quality Commission (2013b) *The State of Health Care and Adult Social Care in England in 2012/13*.

Care Quality Commission (2014) 'How to get and re-use CQC information and data'. Available at: www.cqc.org.uk/content/how-get-and-re-use-cqc-information-and-data#directory .

Comas-Herrera A, Wittenberg R and Pickard L (2010) 'The long road to universalism? Recent developments in the financing of long-term care in England', *Social Policy & Administration* 44(4), 375–91.

Evans C, Ho Y, Daveson B, Hall S, Higginson I and Gao W (2014) 'Place and cause of death in centenarians: a population-based observational study in England, 2001 to 2010', *PLOS Medicine* 11(6), 1–13.

Forder J and Fernández J-L (2011) *Length of Stay in Care Homes*. PSSRU discussion paper 2769.

Georghiou T, Davies S, Davies A and Bardsley M (2012) *Understanding Patterns of Health and Social Care at the End of Life*. Nuffield Trust.

Godden S and Pollock A (2001) 'The use of acute hospital services by elderly residents of nursing and residential care homes', *Health & Social Care in the Community* 9(6), 367–74.

Gordon A, Franklin M, Bradshaw L, Logan P, Elliott R and Gladman J (2014) 'Health status of UK care home residents: a cohort study', *Age and Ageing* 43(1), 97–103.

Graverholt B, Riise T, Jamtvedt G, Ranhoff A, Krüger K and Nortvedt M (2011) 'Acute hospital admissions among nursing home residents: a population-based observational study', *BMC Health Services Research* 11, 126.

Gruneir A, Bell C, Bronskill S, Schull M, Anderson G and Rochon P (2010) 'Frequency and pattern of emergency department visits by long-term care residents – a population-based study', *Journal of the American Geriatrics Society* 58(3), 510–7.

Health and Social Care Information Centre (2014) *Hospital Episode Statistics*.

Intrator O, Zinn J and Mor V (2004) 'Nursing home characteristics and potentially preventable hospitalizations of long-stay residents', *Journal of the American Geriatrics Society* 52(10), 1730–6.

Maddams J, Utley M and Møller H (2011) 'Levels of acute health service use among cancer survivors in the United Kingdom', *European Journal of Cancer* 47(14), 2211–20.

Moore D and Hanratty B (2013) 'Out of sight, out of mind? A review of data available on the health of care home residents in longitudinal and nationally representative cross-sectional studies in the UK and Ireland', *Age and Ageing* 42(6), 798–803.

Office for National Statistics (2011a) *2011 Census for England and Wales*.

Office for National Statistics (2011b) *Mortality Statistics: Deaths registered in England and Wales by area of usual residence*.

Oliver D, Foot C and Humphries R (2014) *Making our Health and Care Systems Fit for an Ageing Population*. The King's Fund.

Pot A, Portrait F, Visser G, Puts M, van Groenou M and Deeg D (2009) 'Utilization of acute and long-term care in the last year of life: comparison with survivors in a population-based study', *BMC Health Services Research* 9, 139.

Sleeman K, Ho Y, Verne J, Gao W and Higginson I (2014) 'Reversal of English trend towards hospital death in dementia: a population-based study of place of death and associated individual and regional factors, 2001-2010', *BMC Neurology* 14, 59.

Smith P, Sherlaw-Johnson C, Ariti C and Bardsley M (2015) *Focus On: Hospital admissions from care homes – appendices*. The Health Foundation and Nuffield Trust.

Wittenberg R (2013) *Long Term Care for Older People: Economic issues*. Presented at the Myers JDC Brookdale Institute, Jerusalem, 25 December.

About the authors

Paul Smith is a Senior Research Analyst at the Nuffield Trust. He joined the Trust in 2013 and works on a variety of research projects, primarily harnessing large administrative datasets. He has over eight years' experience in complex quantitative and qualitative analysis and consultancy to NHS organisations.

With particular expertise in healthcare datasets and financial systems within the NHS, Paul has worked with several healthcare providers and commissioners, regulators, government bodies and academic institutions. Prior to joining the Trust, Paul worked for McKinsey and Company as a Healthcare Analyst. He has also worked for Humana Europe, the Care Quality Commission and Newchurch Limited.

Chris Sherlaw-Johnson is a Senior Research Analyst at the Nuffield Trust. He joined the Trust in January 2014 from the Care Quality Commission (CQC). At the CQC he ran a surveillance programme, which involved the continuous monitoring of quality of care indicators across health and social care in order to identify potentially concerning patterns of outcomes. This was a continuation of a programme he helped to set up at the Healthcare Commission, which prompted the decision to investigate Mid Staffordshire NHS Foundation Trust; he also led the statistical analysis that supported the Mid Staffordshire investigation.

Chris began his career at the Department of Trade and Industry, where he developed forecasting models of the civil aviation market in order to advise on funding decisions for British aerospace projects. He later joined the Clinical Operational Research Unit at University College London (UCL) where he helped to develop tools that hospitals could use for monitoring outcomes, including the now widely used Variable Life Adjusted Display (VLAD) approach.

Cono Ariti is a Senior Research Analyst at the Nuffield Trust. His research interests include the evaluation of complex community interventions using large administrative datasets in areas such as telehealth and predictive risk modelling. Cono joined the Trust in 2013 from the London School of Hygiene and Tropical Medicine (LSHTM), where he was a Lecturer in Medical Statistics. At LSHTM he worked on the planning, design and analysis of randomised clinical trials and observational studies in the areas of cardiovascular disease, malaria and tuberculosis. He was responsible for developing predictive risk models for cardiovascular disease and retains an Honorary Lectureship at LSHTM. Prior to joining LSHTM, Cono was Vice President of Statistics at Capital One Bank Europe, where he led the development and application of risk modelling tools.

Martin Bardsley is Director of Research at the Nuffield Trust. He leads a specialist team undertaking a range of quantitative research projects, most of which aim to exploit existing information systems in the NHS. He has over 20 years' experience in health services research and analysis. Before joining the Trust he worked in healthcare regulation. He was Assistant Director at the Commission for Health Improvement before moving to the Healthcare Commission, where he led its work on new ways to use information to target regulatory activity. This included groundbreaking work on the use of multiple indicators and time series analyses for surveillance.

Martin is a Fellow of the Faculty of Public Health and in the 1990s he established a London-wide resource on public health information. This work led to a number of reports on health in London, including the first Public Health Report for Greater London in 1998. Prior to that, Martin had worked on the application of outcome measurement, which formed the basis of his PhD. He was also involved in early stages of the application of Diagnostic Resource Groups in the UK – work that eventually led to Payment by Results. Martin is a member of the board of CLOSER, a project funded by the Medical Research Council on longitudinal surveys; and a member of the Peter Sowerby Commission.

Nuffield Trust

The Nuffield Trust is an authoritative and independent source of evidence-based research and policy analysis for improving health care in the UK. Our vision is to help provide the objective research and analysis that boosts the quality of health policy and practice, and ultimately improves the health and health care of people in the UK.

The Health Foundation

The Health Foundation is an independent charity working to improve the quality of healthcare in the UK. We want the UK to have a healthcare system of the highest possible quality – safe, effective, person-centred, timely, efficient and equitable. We conduct research and evaluation, put ideas into practice through a range of improvement programmes, support and develop leaders, and share evidence to drive wider change.

QualityWatch

QualityWatch, a Nuffield Trust and Health Foundation research programme, is providing independent scrutiny into how the quality of health and social care is changing over time.

Download this publication from our website:

www.qualitywatch.org.uk/care-homes

Find out more:

www.qualitywatch.org.uk

Subscribe to our newsletter:

www.qualitywatch.org.uk/newsletter

Follow us at:

Twitter.com/qualitywatch

Tell us your views:

feedback@qualitywatch.org.uk

The Health Foundation
90 Long Acre
London WC2E 9RA

020 7257 8000
info@health.org.uk

www.health.org.uk

Nuffield Trust
59 New Cavendish Street
London W1G 7LP

020 7631 8450
info@nuffieldtrust.org.uk

www.nuffieldtrust.org.uk