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DOI: https://doi.org/10.3399/BJGPO.2022.0142

To access the most recent version of this article, please click the DOI URL in the line above.

Received 15 September 2022
Revised 10 January 2023
Accepted 15 January 2023

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Osteoporosis-related characteristics in care home population of England: a retrospective cohort study

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ABSTRACT

Background The characteristics of care home populations with respect to fracture risk factors have not been well-defined.

Aim To describe osteoporosis-related characteristics among care home residents in England, including fracture risk factors, fracture rates, post-fracture outcomes, and osteoporosis treatment duration.

Design A descriptive cohort study of care home residents aged ≥60 years (N=8,366) and a matched cohort of non-care home residents (N=16,143) using the Clinical Practice Research Datalink (CPRD) and linked Hospital Episode Statistics (HES).

Methods The characteristics were assessed using descriptive statistics. Fracture risk factors and fracture rates were described in both the care home and matched population. In the care home population, Kaplan-Meier curves were plotted to assess osteoporosis treatment duration.

Results At index, fracture risk factors were more common in care home residents vs matched cohort, including BMI<18.5 (12% vs 5%), history of falls (49% vs 31%), prior fracture (27% vs 11%), and prior hip fracture (17% vs 6%). Fracture rate (95%CI) was 43.5 (39.7-47.5) in care home residents and 28.0 (26.3-29.9) per 1,000 person-years in the matched cohort. Overall, osteoporosis treatment was initiated in 3.6% (225/6,265) care home residents and 46% remained on treatment at 12-months. Among care home residents who experienced fracture, 21.9% (72/329) received an osteoporosis diagnosis; 21.0% (63/297) initiated osteoporosis treatment post-hip fracture.

Conclusion Care home residents had more fracture risk factors and higher fracture rates than matched cohort; however, osteoporosis diagnosis, treatment rates, and treatment duration were low. There is an opportunity to improve osteoporosis management in this vulnerable population.

Keywords Homes for the Aged, Osteoporotic Fractures, General Practice

How this fits in

The characteristics of care home populations with respect to fracture risk factors have not been well-studied, and limited information is available from England. Our study shows that care home residents have more fracture risk factors and experience higher fracture rates than the general population but had low initiation and short duration of osteoporotic treatment. There is an opportunity for clinicians to reduce the gap in osteoporosis diagnosis and treatment.
INTRODUCTION
In England, an estimated 418,710 people reside in care homes (3.3% of the population 65+ years) (1). Care homes include both residential (providing personal care to people with some independence but possibly not fully mobile and unable to live independently) and nursing homes (additionally offering on-site nursing care). Some care homes provide a mixture of residential and nursing care. Residents of care homes are likely to be frailer than the general population, have more comorbidities and more complex medical needs (2, 3).

Osteoporosis prevalence increases with age (4), hence the burden of osteoporosis is high in the care home population. Many fracture risk factors are more common in care home populations than the general population, for example: low body mass index (BMI), lack of physical activity, dementia, and conditions increasing fall risk including muscle weakness, balance problems, impaired vision, and stroke (5-7). Moreover, previous fracture is a risk factor for subsequent fracture (8), particularly hip fractures, which lead to nursing home admission in 17% of individuals (9).

The care home population therefore represents a population at potentially high risk of fracture, who may benefit from targeted fracture-risk screening and prevention. However, the characteristics of care home populations with respect to fracture risk and subsequent care have not been well-defined in the UK.

Our study aimed to describe osteoporosis-related characteristics among care home residents in England, including risk factors for osteoporotic fracture, fracture incidence, and post-fracture management and outcomes. To place the care home population and its fracture risk into context, we also described the clinical characteristics and fracture rates of a matched non-care home population.
METHODS

Study design and data sources
We conducted a descriptive cohort study of English care home residents compared to a matched (age, sex, practice) cohort of non-care-home residents. We described fracture risk factors, fracture rates, and patterns of care in care-home residents. To place the care home population and its fracture risk into context, we also described the clinical characteristics and fracture rates of a matched non-care home population.

We used primary care electronic health record data from the Clinical Practice Research Datalink (CPRD) GOLD (10), linked hospital admissions data from Hospital Episode Statistics (HES) (11), and linked Office for National Statistics (ONS) death data (12). The study was approved by CPRD’s Independent Scientific Advisory Committee (Protocol number: 20_199RA).

The index date was the first date an individual was recorded as having care home residency during the cohort identification period (1 January 2012 to 31 December 2018). The follow-up period began at the index date and ended at the first of: record of residency outside care home; death; no longer registered with practice; GP practice no longer contributing to CPRD; or end of study period (31 December 2019).

Study participants
Care home residents had to be ≥60 years at index date, resident within a care home during cohort identification period (January 2012 to December 2018), acceptable data quality, registered with practice for at least 1 year before index date, and eligible for HES/ONS linkage. We excluded individuals with a care home residency record in the 24 months prior to index date. Using the same inclusion/exclusion criteria, we matched up to two non-care home residents for every care home resident on year of birth, sex, and general practice, in calendar date order. Non-care home residents were assigned the same index date as their matched care home resident.

Variables
Care home residency (nursing or residential care homes) was identified through primary care morbidity coding for specific place of residence (13). Individuals were assumed to remain in the care home unless otherwise indicated.
Demographic and clinical characteristics were identified using primary care records in the 24 months prior to index date. Demographic characteristics included age, sex, and ethnicity (White, South Asian, Black, Mixed, Other). Clinical characteristics included BMI (calculated using height and weight measurements); smoking status (never, current, ex); alcohol use (current, ex, never). Ethnicity, smoking status and alcohol use were identified using morbidity coding.

All other fracture risk factors, including history of falls, history of fracture, comorbidities (osteoporosis, rheumatoid arthritis, diabetes mellitus, chronic kidney disease, chronic obstructive pulmonary disease, dementia, Parkinson’s disease, cardiovascular disease, cerebrovascular disease, cancer), use of osteoporosis medications and glucocorticoids were assessed at any point prior to index date using primary care morbidity coding, prescriptions (Supplementary Boxes 1 & 2) and International Classification of Diseases version 10 (ICD-10) codes (fracture history) in HES Data. Osteoporosis treatments included: bisphosphonates (oral and parenteral separately); denosumab; raloxifene; teriparatide; and strontium ranelate.

Post-index fractures were identified using ICD-10 codes recorded in hospital admissions (HES) data (Supplementary Box 3) and categorized by type: hip; vertebral; non-hip non-vertebral; any (hip, clinical vertebral, non-hip non-vertebral). Fracture rates were calculated for each type of fracture, based on the initial fracture, i.e., a fracture that occurred after the index date with no fracture at the same site in the 180-days prior (i.e., wash-out period). We excluded transport accident-related fractures (recorded on the same day or within seven days after the accident) to focus on osteoporotic fracture outcomes. Cumulative Incidence Competing Risk (CICR) estimates of fracture (any, and hip fracture) were also calculated to account for competing risk of death.

Amongst care home residents only, post-fracture management and outcomes including osteoporosis diagnosis and treatment initiation, length of hospitalisation, one-year mortality, and osteoporosis treatment duration were assessed. Osteoporosis diagnosis and treatments were identified using primary care morbidity coding and prescriptions (Supplementary Boxes 1 & 2) during the 12 months after the fracture. Duration of hospital stay in HES was used to determine length of hospitalisation. ONS death date was used to identify deaths.

We defined treatment duration as time from osteoporosis treatment initiation to first treatment gap of 60 days or more. The gap was counted from the end of first prescription (based on days supplied) to date of subsequent prescription. If an individual received another
prescription before the end of one prescription, then that end date was disregarded and a new end date was estimated for the subsequent prescription.

**Statistical methods**

All statistical analyses were performed using SAS version 9.4. Demographic and clinical characteristics of the care home residents and matched cohort were summarised using descriptive statistics. Charlson comorbidity index was calculated using updated comorbidity weights (14, 15).

Crude fracture rates (per 1,000 person-years) during follow-up, and 95% confidence intervals (95%CI), were calculated for care home residents and the matched cohort. CICR estimates of fracture (any type, and hip fracture), and 95%CI, were calculated in care home and matched cohorts (16). In the care home population, we calculated the proportions of care home residents experiencing fracture who went on to receive a diagnosis of osteoporosis and initiated osteoporosis treatment in the 12 months post fracture. We also calculated median length of first hospitalisation in the 90 days following fracture diagnosis, and one-year mortality. All outcomes were assessed after initial fracture, and by fracture type.

We assessed treatment duration among care home residents initiating osteoporosis treatment after index date with no treatment record prior to index date. We used Kaplan-Meier curves to visualise osteoporosis treatment duration in care home residents. Individuals were censored at death, no longer registered with practice, or practice no longer contributing to CPRD. Probability of remaining on treatment and 95%CIs were reported at 1, 2, and 4 years after treatment initiation.

In subgroup analyses, we calculated probability of remaining on treatment for those with and without a fracture within 12 months prior to treatment initiation.
RESULTS

We identified 8,366 care home residents and 16,143 matched individuals (Figure 1). Median follow-up for care home residents was 328 days (IQR 133; 674) and 603 days (IQR 292; 1,184) for the matched cohort.
Figure 1. Study population flow diagram

1 CPRD = Clinical Practice Research Datalink, 2 HES = Hospital Episode Statistics, 3 ONS = Office for National Statistics, 4 matched on age, sex, GP practice
In both care-home resident and matched cohort mean age was approximately 84 with nearly 70% women (Table 1).

Fracture risk factors were more common in care home residents than matched cohort, with lower mean BMI (24.2, SD 5.7 vs 25.7 SD 5.0), and a high proportion with history of falls (48.9% vs 30.7%), any fracture (26.5% vs 10.8%), and hip fracture (17.1% vs 5.8%). Care home residents, in contrast to the matched population, had higher proportions of osteoporosis diagnoses (20.6% vs 16.4%); prior osteoporosis medication use (25.1% vs 20.9%); dementia (46.5% vs 6.8%); stroke (26.7% vs 13.8%); and Parkinson’s disease (4.6 vs 0.9%).

There were no notable differences in fracture risk factors between nursing and residential care home residents (Table S1).
Table 1. Baseline characteristics of care home residents and matched non-care home cohort in England in 2012-2018

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Care home residents</th>
<th>Non-care home residents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total, N (%)¹</td>
<td>Total, N (%)¹</td>
</tr>
<tr>
<td>Total</td>
<td>8,366</td>
<td>16,143</td>
</tr>
<tr>
<td>Age, Mean ± SD</td>
<td>84.6 ± 8.3</td>
<td>84.3 ± 8.2</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>5,839 (69.8)</td>
<td>11,220 (69.5)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>7,968 (95.2)</td>
<td>14,486 (89.7)</td>
</tr>
<tr>
<td>South Asian</td>
<td>33 (0.4)</td>
<td>200 (1.2)</td>
</tr>
<tr>
<td>Black</td>
<td>53 (0.6)</td>
<td>97 (0.6)</td>
</tr>
<tr>
<td>Mixed</td>
<td>7 (0.1)</td>
<td>32 (0.2)</td>
</tr>
<tr>
<td>Other</td>
<td>57 (0.7)</td>
<td>81 (0.5)</td>
</tr>
<tr>
<td>Missing</td>
<td>248 (3.0)</td>
<td>1,247 (7.7)</td>
</tr>
<tr>
<td>Body Mass index (kg/m²), Mean ± SD</td>
<td>24.2 ± 5.7</td>
<td>25.7 ± 5.0</td>
</tr>
<tr>
<td>Missing</td>
<td>1,436 (17.2)</td>
<td>1,076 (6.7)</td>
</tr>
<tr>
<td>Alcohol drinking status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>3,293 (39.4)</td>
<td>9,774 (60.5)</td>
</tr>
<tr>
<td>Ex</td>
<td>862 (10.3)</td>
<td>809 (5.0)</td>
</tr>
<tr>
<td>Never</td>
<td>2,677 (32.0)</td>
<td>4,354 (27.0)</td>
</tr>
<tr>
<td>Missing</td>
<td>1,534 (18.3)</td>
<td>1,206 (7.5)</td>
</tr>
<tr>
<td>Smoking status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>2,995 (35.8)</td>
<td>7,198 (44.6)</td>
</tr>
<tr>
<td>Ex</td>
<td>2,420 (28.9)</td>
<td>5,170 (32.0)</td>
</tr>
<tr>
<td>Never</td>
<td>2,837 (33.9)</td>
<td>3,608 (22.4)</td>
</tr>
<tr>
<td>Missing</td>
<td>114 (1.4)</td>
<td>167 (1.0)</td>
</tr>
<tr>
<td>History of falls</td>
<td>4,090 (48.9)</td>
<td>4,961 (30.7)</td>
</tr>
<tr>
<td>History of fracture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any</td>
<td>2,221 (26.5)</td>
<td>1,738 (10.8)</td>
</tr>
<tr>
<td>Hip</td>
<td>1,430 (17.1)</td>
<td>934 (5.8)</td>
</tr>
<tr>
<td>Vertebral</td>
<td>209 (2.5)</td>
<td>135 (0.8)</td>
</tr>
<tr>
<td>Non-hip, non-vertebral</td>
<td>972 (11.6)</td>
<td>881 (5.5)</td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>1,724 (20.6)</td>
<td>2,646 (16.4)</td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>198 (2.4)</td>
<td>334 (2.1)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>1,612 (19.3)</td>
<td>2,661 (16.5)</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>2,846 (34.0)</td>
<td>5,386 (33.4)</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>670 (8.0)</td>
<td>1,174 (7.3)</td>
</tr>
<tr>
<td>Dementia</td>
<td>3,887 (46.5)</td>
<td>1,102 (6.8)</td>
</tr>
<tr>
<td>Parkinson’s disease</td>
<td>384 (4.6)</td>
<td>150 (0.9)</td>
</tr>
<tr>
<td>Cardiovascular disease²</td>
<td>3,622 (43.3)</td>
<td>7,132 (44.2)</td>
</tr>
<tr>
<td>Cerebrovascular disease³</td>
<td>2,230 (26.7)</td>
<td>2,226 (13.8)</td>
</tr>
<tr>
<td>Specific cancers</td>
<td>1,174 (14.0)</td>
<td>2,247 (13.9)</td>
</tr>
<tr>
<td>Charlson Comorbidity Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>2.9 ± 2.1</td>
<td>2.3 ± 2.0</td>
</tr>
</tbody>
</table>
Anti-osteoporosis medications

<table>
<thead>
<tr>
<th></th>
<th>N (%)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any</td>
<td>2,101 (25.1)</td>
<td>3,369 (20.9)</td>
</tr>
<tr>
<td>Oral Bisphosphonates</td>
<td>2,005 (24.0)</td>
<td>3,273 (20.3)</td>
</tr>
<tr>
<td>Parenteral Bisphosphonates</td>
<td>67 (0.8)</td>
<td>158 (1.0)</td>
</tr>
<tr>
<td>Denosumab</td>
<td>12 (0.1)</td>
<td>25 (0.2)</td>
</tr>
<tr>
<td>Raloxifene</td>
<td>32 (0.4)</td>
<td>78 (0.5)</td>
</tr>
<tr>
<td>Teriparatide</td>
<td>4 (0.0)</td>
<td>3 (0.0)</td>
</tr>
<tr>
<td>Strontium ranelate</td>
<td>175 (2.1)</td>
<td>231 (1.4)</td>
</tr>
<tr>
<td>Glucocorticoids</td>
<td>2,737 (32.7)</td>
<td>6,429 (39.8)</td>
</tr>
</tbody>
</table>

1 Figures are N (%) unless otherwise noted
2 Cardiovascular disease includes diagnoses of myocardial infarction, heart failure, sudden cardiac death, stable angina, unstable angina, acute coronary syndrome, percutaneous coronary intervention, coronary artery bypass graft, coronary thrombolysis, coronary heart disease not otherwise specified.
3 Stroke and non-stroke cerebrovascular disease
Fracture rates

Fracture rates were higher among care home residents than the matched cohort (Figure 2, Table S2). Overall fracture rates (95%CI) were 43.5 (39.7-47.5) per 1,000 person-years in care home residents and 28.0 (26.3-29.9) in the matched cohort. Women had consistently higher fracture rates than men (women: care home 49.8 [45.0-55.0] per 1,000 person-years, matched cohort 34.3 [32.0-36.8]; men: care home 27.6 [22.1-34.1], matched cohort 14.7 [12.5-17.2]). Fracture rates increased with age in both cohorts and were higher among care home residents aged 70-89 than matched cohort.

The higher fracture rates in the care home population were driven by hip fractures. Hip fracture rate (95%CI) in care home residents was 28.4 (25.3-31.8) per 1,000 person-years, compared to 15.0 (13.7-16.3) in the matched cohort. Hip fracture rate (95%CI) in female care home residents (31.9 [28.0-36.2] per 1,000 person-years) was higher than male care home residents (19.9 [15.2-25.5]).

Rates of other fracture types were lower than hip fracture, and similar in both the care home resident and matched cohort (Table S2).

There was no notable difference in fracture rates between nursing and residential care homes (Tables S3-6).

The results of CICR analysis showed higher cumulative incidence of fracture for up to 2 years after the index date: incidence of any fracture after 18 months was 5.0% (95% CI 4.5 - 5.5) in the care home populations and 3.6% (3.3 - 3.9) in the matched cohort; incidence of hip fracture was 3.8% (3.3 - 4.3) in the care home population and 2.7% (2.4 - 3.0) in the matched cohort (Tables S7-8). There was a notable reduction in number of care residents at risk for fracture over time leading to similar CICR estimates in care home and matched population at later time points.
Figure 2. Crude fracture rates (error bars represent 95% confidence intervals) per 1,000 person-years among care home residents and matched non-care home cohort in England in 2012-2019.
Care home residents: Post-fracture management and outcomes

The majority (79.4%, 6,642/8,366) of care home residents had no osteoporosis diagnosis at first record of care home residency. Of the care home residents with no osteoporosis diagnosis, 5.0% (329/6,642) experienced fracture during follow-up, 21.9% (72/329) of whom had an osteoporosis diagnosis recorded post-fracture (Figure 3).

Overall, osteoporosis treatment was initiated in 16.7% (77/462) of care home residents post-fracture. By fracture type, osteoporosis treatment was initiated in: 21.2% (63/297) post hip fracture, 4% (2/50) post vertebral fracture, and 11% (14/127) post non-hip non-vertebral fracture.

Figure 3. Osteoporosis diagnosis and treatment after fracture among care home residents in England in 2012-2018

Among care home residents, median (IQR) hospital stay in the 90 days after fracture was 11 (6-22) days. Hip fractures resulted in a median (IQR) hospital stay of 12 (8-22) days, vertebral fractures 8.5 (4-16) days, and non-hip non-vertebral 7.5 (1-23) days.
Overall, 40.5% (187/462) of care home residents died in the year post-fracture. One-year mortality (95%CI) was higher in men than women after any type of fracture (56.0% [44.7-66.8] vs 37.0% [32.2-41.1]), and after hip fracture (60.0% [46.5-72.4] vs 38.0% [31.8-44.5]). One-year mortality was similar for individuals living in residential and nursing care homes (Table S9).

**Care home residents: Treatment duration**

In total, 2% (225/8,366) of care home residents were new users of osteoporosis treatment after first care home residency record. Most (96%, [216/225]) new users received oral bisphosphonates, with the remaining individuals receiving: parenteral bisphosphonates, 1.3% (3/225); the RANKL inhibitor denosumab, 1.8% (4/225); or strontium ranelate, 1.8% (4/225).

The proportion (95%CI) of care home residents who persisted with osteoporosis treatment 12 months after treatment initiation was 45.9% (38.6-52.9) (Figure 4), dropping to 25.7% (19.3-32.6) after 24 and 5.1% (2.2-9.8) after 48 months. Median (IQR) osteoporosis treatment duration was 10.5 (4.1-24.6) months. Treatment duration was similar among care home residents who did and did not experience fracture within 12-months prior to treatment initiation (Table S10).
Discussion

Summary
We found fracture risk factors (8), such as lower BMI, prior fracture, prior hip fracture, and history of falls, were more common among care home residents than in a matched cohort of non-care home residents. In addition, fracture rates were higher in the care home population, predominantly due to an increased rate of hip fracture. Post-fracture osteoporosis diagnosis and treatment rates were low, with short duration of osteoporosis treatment.

Strengths and limitations
CPRD is a well-established longitudinal database representative of the UK population (10). Moreover, CPRD level of completeness of residency recording has been found to be
comparable with English Census data (13). Our study demonstrates that CPRD can be used to assess clinical outcomes in care home populations.

Our main analysis used crude fracture rates per 1,000 person-years to show that rates of fracture were higher in the care home population, which was mainly driven by increased hip fracture. In older populations with substantial comorbidities, estimations of clinical outcomes can be overestimated due to high mortality rates or differences in mortality rates between groups (16). In our study, the length of follow-up in the care homes was about half that of the control group suggesting a discrepancy. To account for this potential bias, we estimated the cumulative incidence of any fracture and hip fracture with death as a competing risk. The cumulative incidence of fracture was higher in the care home group for up to 2 years, after which time only 10% of the care home population remained in the analysis and confidence intervals around the point estimates began to widen. Our results indicate fracture rates in the care home population are higher than matched counterparts even when their increased risk of mortality is taken into account.

We used morbidity codes to identify care home residency and assign an index date. The date of first coded care home residency recording is unlikely to reflect the precise date of care home entry, it is more likely to capture the first GP interaction during care home residency. It is likely that we only captured clinical vertebral fractures as most vertebral fractures are asymptomatic and remain undiagnosed. Only treatments prescribed in primary care are captured in CPRD; therefore, treatments administered in secondary care may not be captured. However, both oral bisphosphonates and RANKL inhibitor denosumab can be prescribed by GPs (although denosumab is more likely to be initiated in secondary care) so it is unlikely that osteoporosis treatment rates were underestimated.

Comparison with existing literature

Our findings are consistent with a previous study reporting more chronic diseases, including cerebrovascular disease and dementia, in care home residents in the UK primary care population (7). Consistent with the same study, the proportion of care home residents in our study with comorbidities (including cardiovascular disease, cancer, diabetes, chronic obstructive pulmonary disease) was similar between nursing and residential care populations. We found a higher prevalence of Parkinson’s disease in care home residents than non-care home residents, with a similar proportion of non-care home residents with Parkinson’s disease to that reported in CPRD (17, 18).
Consistent with increased fracture risk factors, we found higher fracture rates among care home residents than our matched non-care home cohort. Reassuringly, hip fracture rates in our study were similar to those among US nursing facility residents (19).

The National Institute for Health and Care Excellence (NICE) guidelines recommend oral bisphosphonates as a first-line treatment for osteoporosis (20). Consistent with these guidelines, most care home residents receiving osteoporosis therapy in our study were treated with oral bisphosphonates. However, oral bisphosphonates are known to have gastrointestinal tolerability issues that may reduce uptake among care home residents with a wide range of comorbidities and prescribed multiple other medications (21). We also observed short duration of osteoporosis treatment (46% on treatment at 12 months), which is consistent with that previously reported in the general CPRD population (22).

**Implications for practice and research**

There are well-established risk factors for osteoporotic fracture (23-28), many of which are used in the Fracture risk assessment tool (FRAX) algorithm (29-31). Compared to non-care home residents, we found that care home residents were more likely to have several FRAX risk factors, including lower BMI, history of falls, and prior fracture, indicating care home residents are a high-fracture-risk population.

Our findings of higher fracture rates in the care home population indicate that, while care homes can provide a physically safer environment and closer monitoring of health and nutrition, this may not be sufficient to overcome the numerous comorbidities in the population that translate to high fracture risk.

The increased fracture rate we observed was largely driven by hip fracture, the most clinically serious fracture, carrying the highest burden for individuals and healthcare systems (32-34). We found median initial hospital stay duration among care home residents with hip fracture was 12.0 days (with lower median stays of 8.5 days for vertebral and 7.5 days for non-hip non-vertebral fractures) indicating that care home residency does not eliminate the burden of hospital care in cases of clinically meaningful fractures.

While randomised controlled trials and real-world evidence show osteoporosis treatments are effective in reducing fracture incidence (35, 36), only 16.7% of care home residents in our study received osteoporosis treatment post-fracture. High prevalence of chronic kidney disease (contraindication for the oral bisphosphonate use) in our study population could
contribute to low overall osteoporosis treatment rates. A large treatment gap in osteoporosis has been previously reported (37, 38), it is particularly striking in our elderly, post-fracture population. Our study further highlights an opportunity for improved treatment choices in individuals with multiple osteoporosis and fracture risk factors. We found only 22% of care home residents to have a diagnosis of osteoporosis recorded following a fracture. Low osteoporosis diagnosis rates are associated with low treatment rates and contribute to the osteoporosis treatment gap in primary care (39, 40).

Conclusions

We found elderly care home residents in England had more fractures, particularly hip fractures, than elderly people in the community. While a large proportion of the care home population are at high risk of fracture, a large osteoporosis treatment gap remains, and the opportunity exists to improve screening, diagnosis and management of osteoporosis in this vulnerable population.

Funding: Study sponsored by Amgen. RM is supported by Barts Charity (MGU0504)

Ethical approval: Provided by the MHRA Independent Scientific Advisory Committee (ISAC) (superseded by Research Data Governance process on June 1, 2021). ISAC Protocol number: 20_199RA

Competing interests: VG, DN and JO: Amgen employment and stock ownership; RM and KM: consultancy fees from Amgen

Acknowledgements: The authors would like to thank to the employees of Data Analytics Center at Amgen for their collaboration developing statistical analysis plan, creating code lists, programming, quality control, and reviewing the analysis outputs.
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