Supplementary Materials

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1. Additional methods

Indexing and linkage methodology

The 10-digit unique identifier, the CHI number, is stored in the nationally-held CHI register (population spine), which includes all individuals in Scotland registered with a general practitioner.[1] The SCHC does not collect the resident's CHI number, but includes other personal identifiers which can be used to assign individuals to their CHI number, in a process known as indexing. Indexing of the SCHC to the CHI Register was undertaken separately from the research team, by analysts from National Records of Scotland. The method and results of the linkage exercise are reported in detail elsewhere.[2] In summary, not all records were sufficiently complete in terms of available identifiers (name, date of birth and address) to enable them to be indexed to CHI. However, there were no biases around age, sex or deprivation status in the ability of records to be successfully indexed[2]. Records in the SCHC which could not be indexed to CHI were excluded.

Data were extracted by the team at the electronic Data Research and Innovation Service (eDRIS), part of Public Health Scotland (PHS). They received extracts from the Scottish Care Home Census (SCHC) of individuals with a record of care home admission in the study period. They then obtained extracts from National Records of Scotland (mortality data), the Scottish Morbidity Records and Prescribing Information System to obtain variables about the individuals identified in the SCHC. All records received an individual person-level identifier, so the same person could be found across all extracts if they had records in those data sources. All identifiable information was removed, including names, dates of birth and CHI numbers. Data extracts, by data source, were made available in the National Safe Haven for remote researcher access and analysis. The data were linked by the research team.

2. Rules for manual review of cases where hospital date of discharge is after care home date of admission or date of discharge missing for one or more stay and the hospital stay has potential overlap with care home stay

1. Check last location – if this is not a hospital location code [ending in H] – check previous episodes to confirm, moving-in to Care Home from hospital
    a. This includes NHS care homes in Scottish Morbidity Records (SMR) (see further below)
    b. This includes NHS hospices/private hospitals recorded in SMR
2. Timing of overlap – primary analysis definition allows care home admission to be -1 to -3 days before hospital discharge – if fits then classify as within_10
3. Review Scottish Care Home Census (SCHC) source of admission variable and hospital discharge coding (numerical variables)
    a. If SCHC states hospital or other/unknown and hospital discharge coding is to care home, institution, transfer (without a further hospital stay), temporary resident, usual place of residence institution, private residence – supported – essentially where SCHC and hospital coding matches – assign as discharged from hospital provided SCHC date of admission within -90 days of hospital discharge
4. Where date of hospital discharge is missing
    a. Check for subsequent hospital stays – may be clear the person was discharged (on unknown date) and later presents at hospital, discrete from stay before care home admission
    b. If no collateral information available – use SCHC source of admission variable
5. Remaining cases – SCHC and hospital coding do not match; SCHC date of admission >90 days before hospital discharge; death in hospital; overlapping episodes of hospital care covering hospital stay including missing dates of discharge – EXCLUDED as unable to reconcile information and allocate to group with confidence

3. Rules for manual review of cases where last episode location is not an NHS hospital location (non-H code)

1. Check sequence of episodes correctly identifies last episode of admission
2. If non-hospital location – check lookup table to identify if NHS hospice/private hospital – assign to moving-in from hospital group for primary analysis
3. If non-hospital location code – compare care home admission date with date of discharge within previous episodes – often the episode someone moves from the NHS hospital into the care home are included in the inpatient stay and the dates align. This can also identify if someone moves into another care home before moving to the care home where SCHC record is completed.

4. Additional methods

Hospital episode linkage

In SMR01/04/50 hospital admissions are composed of episodes of care (based on moving ward/department/hospital) and each episode of an inpatient stay has a location code. The episode data were linked into a single complete admission using the Continuous Inpatient Stay marker within the data, joining episodes ordered based on date of discharge. NHS Scotland data use common institution codes to classify hospitals, care homes, schools, prisons and other institutions in national datasets.[3] The last episode location before hospital discharge was checked against the institution code lookup for all those moving-in to a care home from hospital. This was done to ensure the last location was an NHS Hospital or Hospice and to identify NHS Care Home Locations which are included in national data. All NHS Hospital locations were further categorised into: Acute (hospitals with emergency departments), Acute – island (rural hospitals with emergency departments), Hospice or NHS Continuing Care (for individuals who require complex NHS-funded care in specialist facilities), Psychiatry and Rehabilitation & Community Hospitals.

5. ICD-10 codes for conditions in Scottish Morbidity Record Datasets

Anxiety disorders (F40, F41)
Arm fractures (S42, S52, S62)
Any fracture (S02, S12, S22, S32, S42, S52, S62, S72, S82, S92)
Bipolar affective disorder (F31)
Cancer (C00 to C97)
Chronic cardiovascular diseases including Heart Failure (I05-09, I25, I27, I34-7, I44-45, I48-9, I50)
Chronic kidney disease (N03, N04, N11, N18)
Chronic liver disease (K70, K72.1, K73, K74)
Chronic respiratory disease (J40-47, J60-70, J92, J96.1)
Confusion (disorientation, unspecified) (R41.0)
Delirium (F05)
Delirium superimposed on dementia (F05.1)
Dementia (F00, F01, F02, F03, G30, G31)
Depression (F32 & F33)
Diabetes (E10-E14)
Falls (W00-W19, R29.6)
Epilepsy (G40, G41)
Hip fracture (S72)
Incontinence (N39.3, N39.4, R15, R32)

Intracranial injury (S06)
Leg (non-hip) fractures (S82, S92)
Mental and behavioural disorders due to use of alcohol (F10)
Mental and behavioural disorders due to use of psychoactive substances (F11-19)
Neurodegenerative disease including Parkinson's Disease (A81.0, F02.1, F02.2, G10-14, G20-26, G35-37, G70-73, G90-95)
Osteoporosis & fractures (M80)
Schizophrenia (F20) & Schizoaffective disorders (F25)
Stroke (I61, I63, I64)
Subarachnoid haemorrhage (I60)
Syncope and collapse (R55)
Vertebral and pelvic fracture (S12, S22, S32, M48.5, M49.5)

6. Additional results

Cohort definition

The analysis cohort was defined using the linked dataset. Individuals without SMR records were divided into those moving-in from the community or those moving-in from another care home. For individuals with SMR records, the definitions described above were applied. However, we identified individuals whose date of care home admission was before their date of hospital discharge (n=1,416) and those whose date of hospital discharge was missing for one episode within their hospital stay (n=26). A further 350 individuals had a non-hospital location code as their last location before moving-in to the care home. These 1,792 admissions (7.2% of those with SMR records) underwent additional manual review with rules applied, defined in Supplementary materials. Following this process 252 individuals (1.0% of those with SMR records) were removed from the analysis cohort as there was no way to reconcile the dates and data presented (e.g., date of care home admission >90 days before hospital discharge; deaths in hospital overlapping with period of care home admission; mismatch between SCHC source of admission and hospital discharge coding; death before recorded date of care home admission). These excluded records came from 203 care homes with a median of one (range one to three) record(s) per care home being excluded.

Supplementary Table 1: Full cohort description of those moving-in to care homes from hospital and from the community

	Whole analysis cohort N = 23,892 people (%)	**Moving-in from hospital** N = 13,564 people (%)	**Moving-in from community** N = 10,328 people (%)
Census financial year moving-in to care home			
2013/14	8,282 (34.7)	4,701 (34.7)	3,582 (34.7)
2014/15	8,085 (33.8)	4,565 (33.6)	3,520 (34.1)
2015/16	7,524 (31.5)	4,298 (31.7)	3,226 (31.2)
Mean age moving-in to care home [SD]	82 years [11.96]	83 years [10.45]	82 years [13.65]
Range of ages moving into care home	18-107 years	18-108 years	18-106 years
Age band moving-in to care home			
<60 years	1,168 (4.9)	475 (3.5)	693 (6.7)
60-69	1,101 (4.6)	679 (5.0)	422 (4.1)
70-79	4,274 (17.9)	2,468 (18.2)	1,806 (17.5)
80-89	11,087 (46.4)	6,413 (47.3)	4,674 (45.3)
90-99	6,029 (25.2)	3,404 (25.1)	2,625 (25.4)
>100 years	233 (1.0)	125 (0.9)	108 (1.0)
Male sex	8,299 (34.7)	4,996 (36.8)	3,303 (32.0)
Female sex	15,593 (65.3)	8,568 (63.2)	7,025 (68.0)
White Ethnic Group	23,003 (96.3)	13,071 (96.4)	9.932 (96.2)
Other Ethnic Group	427 (1.8)	235 (1.7)	192 (1.9)
Ethnic Group not reported	462 (1.9)	258 (1.9)	204 (1.9)
Mainly NHS funding	612 (2.6)	552 (4.1)	60 (0.6)
Mainly Local Authority funding	15,670 (65.6)	8,729 (64.3)	6,941 (67.2)
Mainly Private funding	7,588 (31.8)	4,276 (31.5)	3,312 (32.1)
Funding status missing	22 (0.1)	7 (0.1)	15 (0.1)
Receiving personal care allowance	6,597 (27.6)	3,791 (27.9)	2,806 (27.2)
Not receiving personal care allowance	999 (4.2)	489 (3.6)	510 (4.9)
Not applicable[1]	16,255 (68.0)	9,266 (68.3)	6,989 (67.7)
Personal care allowance receipt missing	41 (0.2)	18 (0.1)	23 (0.2)
Receiving nursing care allowance	4,345 (18.2)	2,803 (20.7)	1,542 (14.9)
Not receiving nursing care allowance	3,213 (13.5)	1,453 (10.7)	1,760 (17.0)
Not applicable[1]	16,256 (68.0)	9,266 (68.3)	6,990 (67.7)
Nursing care allowance receipt missing	78 (0.3)	42 (0.3)	36 (0.4)
Receives nursing care	15,532 (65.0)	9,900 (73.0)	5,632 (54.5)
Not receiving nursing care	8,342 (34.9)	3,654 (26.9)	4,688 (45.4)
Nursing care receipt variable missing	18 (0.1)	10 (0.1)	8 (0.1)

	Whole analysis cohort	Moving-in from hospital	Moving-in from community
Conditions in Scottish Care Home Census			
Acquired brain injury	384 (1.6)	269 (2.0)	115 (1.1)
Dementia diagnosed	12,274 (51.4)	6,715 (49.5)	5,559 (53.8)
Dementia (not medically diagnosed)	1,918 (8.0)	1,078 (8.0)	840 (8.1)
Hearing impairment	2,512 (10.5)	1,413 (10.4)	1,099 (10.6)
Learning disability	505 (2.1)	165 (1.2)	340 (3.3)
Mental health problems excluding dementia	1,443 (6.0)	907 (6.7)	536 (5.2)
Other physical disability or chronic illness	10,402 (43.5)	6,583 (48.5)	3,819 (37.0)
Visual impairment	3,743 (15.7)	2,089 (15.4)	1,654 (16.0)
None of the Scottish Care Home Census conditions[2]	1,664 (7.0)	929 (6.9)	735 (7.1)
Inpatient Hospital Diagnoses in three years before moving-in to care home			
Any fracture	4,441 (18.6)	3,238 (23.9)	1,203 (11.6)
Arm fractures	1,228 (5.1)	873 (6.4)	355 (3.4)
Cancer	1,774 (7.4)	1,312 (9.7)	462 (4.5)
Chronic cardiovascular disease (including heart failure)	7,763 (32.5)	5,423 (40.0)	2,340 (22.7)
Chronic kidney disease	3,147 (13.2)	2,245 (16.6)	902 (8.7)
Chronic liver disease	204 (0.9)	143 (1.1)	61 (0.6)
Chronic respiratory disease	3,355 (14.0)	2,376 (17.5)	979 (9.5)
Delirium	2,970 (12.4)	2,235 (16.5)	735 (7.1)
Delirium superimposed on dementia	0	0	0
Dementia	7,700 (32.2)	5,319 (39.2)	2,381 (23.1)
Depression	859 (3.6)	621 (4.6)	238 (2.3)
Diabetes	3,062 (12.8)	2,147 (15.8)	915 (8.9)
Epilepsy	582 (2.4)	383 (2.8)	199 (1.9)
Falls	6,570 (27.5)	4,648 (34.3)	1,922 (18.6)
Hip fracture	2,431 (10.2)	1,819 (13.4)	612 (5.9)
Incontinence	917 (3.8)	689 (5.1)	228 (2.2)
Intracranial injury	280 (1.2)	220 (1.6)	60 (0.6)
Leg (non-hip) fractures	400 (1.7)	277 (2.0)	123 (1.2)
Mental and behavioural disorders due to use of alcohol	991 (4.2)	672 (4.9)	319 (3.1)
Neurodegenerative conditions (including Parkinson's disease)	1,475 (6.2)	1,033 (7.6)	442 (4.3)
Osteoporosis & fractures	267 (1.1)	191 (1.4)	76 (0.7)
Stroke	1,998 (8.4)	1,592 (11.7)	406 (3.9)
Subarachnoid haemorrhage	61 (0.3)	49 (0.4)	12 (0.1)
Syncope and collapse	2,028 (8.5)	1,356 (10.0)	672 (6.5)
Vertebral and pelvic fracture	983 (4.1)	730 (5.4)	253 (2.5)

	Whole analysis cohort	Moving-in from hospital	Moving-in from community
Inpatient Psychiatry Diagnoses in three years before moving-in to care home			
Anxiety disorders	116 (0.5)	100 (0.7)	16 (0.2)
Bipolar affective disorder	102 (0.4)	73 (0.5)	29 (0.3)
Delirium	86 (0.4)	64 (0.5)	22 (0.2)
Delirium superimposed on dementia	0	0	0
Dementia	1,786 (7.5)	1,570 (11.6)	216 (2.1)
Depression	292 (1.2)	230 (1.7)	62 (0.6)
Mental and behavioural disorders due to use of alcohol	285 (1.2)	202 (1.5)	83 (0.8)
Mental and behavioural disorders due to use of psychoactive substances	57 (0.2)	31 (0.2)	26 (0.3)
Schizophrenia & Schizoaffective disorders	241 (1.0)	185 (1.4)	56 (0.5)
Hospital use and significant events in six months before moving-in to care home			
Mean number of hospital admissions per person [SD]	1.2 admissions [1.15]	1.7 admissions [1.06]	0.6 admissions [0.92]
Median cumulative length of hospital stay per person [IQR]	70 days [34-116]	84 days [51-131]	21 days [8-50]
Hospital discharge from in-patient psychiatry	2,239 (9.4)	2,032 (15.0)	207 (2.0)
Hospital discharge with diagnosis of cancer	1,247 (5.2)	1,020 (7.5)	227 (2.2)
Hospital discharge with diagnosis of dementia	6,740 (28.2)	5,436 (40.1)	1,304 (12.6)
Hospital discharge with diagnosis of delirium	2,035 (8.5)	1,656 (12.2)	379 (3.7)
Hospital discharge with diagnosis of fracture	2,545 (10.7)	2,157 (15.9)	388 (3.8)
Hospital discharge with diagnosis of stroke	1,260 (9.4)	1,133 (8.4)	127 (1.2)
Community medication use in three years before moving-in to care home			
Mean frequency of prescriptions [SD]	29.2 days [33.36]	29.2 days [31.85]	29.3 days [35.24]
Range frequency of prescriptions	0 to 1,076 days	0 to 966 days	0 to 1,076 days
Mean dispensed items/month [SD]	6.5 items [5.18]	6.6 items [5.24]	6.3 items [5.10]
Range dispensed items per month	0 to 84 items	0 to 84 items	0 to 78 items
Hospital Frailty Risk Score before moving-in to care home			
Incalculable – no hospital admissions in prior three years	1,961 (8.2)	-	1,961 (19.0)
Low Risk (<5)	5,856 (24.5)	2,155 (15.9)	3,701 (35.8)
Intermediate Risk (5-15)	9,663 (40.4)	6,504 (48.0)	3,159 (30.6)
High Risk (>15)	6,412 (26.8)	4,905 (36.2)	1,507 (14.6)
Charlson Index before moving-in to care home			
Incalculable – no hospital admissions in prior three years	1,961 (8.2)	-	1,961 (19.0)
0 comorbidities	6,761 (28.3)	2,880 (21.2)	3,881 (37.6)
1 comorbidity	7,279 (30.5)	4,969 (36.6)	2,310 (22.3)
>1 comorbidities	7,891 (33.0)	5,715 (42.1)	2,176 (21.1)

Footnotes 1. Variable on personal and nursing care only collected for those whose main funding source is private

2. Scottish Care Home Census also collects alcohol-related problems, drugs-related problems which were not requested as variables for analysis in this project – thus this category applies to those without any of the conditions specified in the Census

Supplementary Table 2: Sensitivity analysis results *(Moving-in from hospital group includes only those whose hospital date of discharge is an exact match to the date of moving-in to the care home, excluding manual matching)*

Factors	Moving-in from hospital (% of analysis cohort)	Adjusted Odds Ratio (95% Confidence Interval)	Comparison with main analysis cohort results
Age band moving-in to care home			
<60	475 (40.7)	**0.63 (0.52-0.76)**	Consistent
60-69	679 (61.7)	1.06 (0.89-1.27)	Consistent
70-79	2,468 (57.7)	**0.88 (0.80-0.97)**	SA becomes statistically significant
80-89 (*reference*)	6,413 (57.8)	-	-
90-99	3,404 (56.5)	**1.09 (1.01-1.18)**	SA becomes statistically significant
>100	125 (53.6)	1.17 (0.84-1.62)	Consistent
Sex			
Female (*reference*)	8,568 (54.9)	-	-
Male	4,996 (60.2)	**1.13 (1.05-1.22)**	Consistent
Funding[1]			
NHS and Local Authority (*reference*)	9,281 (57.0)	-	-
Private	4,276 (56.4)	**1.08 (1.01-1.16)**	SA becomes statistically significant
Receiving nursing care			
No or missing (*reference*)	3,664 (39.4)	-	-
Yes	9,900 (67.8)	**1.74 (1.63-1.87)**	Consistent
Dementia (from SCHC (medically diagnosed) OR hospital discharge diagnosis in three years before moving-in to care home)	8,371 (57.3)	**0.89 (0.83-0.96)**	Consistent
Hospital discharge with diagnosis in three years before moving-in to care home			
Cancer	1,312 (74.0)	**1.92 (1.69-2.20)**	Consistent
Chronic cardiovascular disease (including heart failure)	5,423 (69.9)	**1.30 (1.21-1.40)**	Consistent
Chronic respiratory disease	2,376 (70.8)	**1.19 (1.08-1.31)**	Consistent
Diabetes	2,147 (70.1)	**1.26 (1.14-1.40)**	Consistent
Falls	4,648 (70.7)	**0.85 (0.78-0.93)**	Consistent
Incontinence	689 (75.1)	**1.35 (1.14-1.61)**	Consistent
Mental and behavioural disorders due to use of alcohol	672 (67.8)	1.19 (0.99-1.42)	Consistent
Neurodegenerative disease (including Parkinson's disease)	1,033 (70.0)	**1.46 (1.27-1.68)**	Consistent
Hospital discharge in six months before moving-in to care home			
Hospital discharge from in-patient psychiatry	2,032 (90.8)	**22.68 (19.18-26.69)**	Consistent
Hospital discharge with diagnosis of any fracture	2,157 (84.8)	**4.06 (3.54-4.65)**	Consistent
Hospital discharge with diagnosis of delirium	1,656 (81.4)	**1.90 (1.67-2.16)**	Consistent
Hospital discharge with diagnosis of stroke	1,133 (89.9)	**8.95 (7.30-10.97)**	Consistent

Factors (continued)	**Moving-in from hospital (% of analysis cohort)**	**Adjusted Odds Ratio (95% Confidence Interval)**	**Comparison with main analysis cohort results**
Number of hospitalisations in six months before moving-in to care home			
0-1 hospital admissions (*reference*)	7,037 (44.1)	-	-
2-4 hospital admissions	6,242 (82.1)	**2.83 (2.61-3.06)**	Consistent
≥5 hospital admissions	285 (86.4)	**3.48 (2.47-4.91)**	Consistent
Number prescription drugs dispensed per month			
0 items dispensed	196 (39.3)	1.03 (0.80-1.33)	Consistent
1-4 items dispensed (*reference*)	5,315 (56.4)	-	-
5-10 items dispensed	5,642 (56.8)	**0.86 (0.80-0.93)**	Consistent
>10 items dispensed	2,411 (59.6)	**0.76 (0.69-0.84)**	Consistent
Hospital Frailty Risk Score before moving-in to care home			
Low risk (<5) (*reference*)[2]	2,155 (27.6)	-	-
Intermediate risk (5-15)	6,504 (67.3)	**4.32 (3.96-4.72)**	Consistent
High risk (>15)	4,905 (76.5)	**5.53 (4.95-6.17)**	Consistent

Footnotes

SA: sensitivity analysis result

1. Excludes 22 individuals where funding status is unknown

2. Low risk group includes 1,961 individuals with no hospital data to calculate Hospital Frailty Risk Score

7. Data availability

The linked data for this project (1516-0438) are held in the NHS Scotland National Safe Haven managed by the electronic Data Research and Innovation Service (eDRIS), part of Public Health Scotland. Application to the Public Benefit and Privacy Panel for approval is required to request access to the data used here. The data controllers for the data sources are: Public Health Scotland, Scottish Government and National Records of Scotland. Access to programming code would be reviewed on an individual basis by contacting the research team and is subject to Disclosure Control by the eDRIS team.

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