

Association between household context and emergency hospital use

Based on administrative data in England

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Background

- Wider determinants of health, such as social isolation, housing, education and employment opportunities, are known to affect a person's health.
- However, this information is often not routinely recorded nor easily retrievable from health care records.
- The IAU developed two household context indicators for people aged 65 and over, using pseudonymised address information from a central database of national GP registration data and hospital records: 1. living alone and 2. living in a 2-person household with a person who is frail.
- The IAU investigated the association between these factors and emergency hospital use, by analysing ~4.9m people aged 65 and over living in households of 1-6 people in England.

Household context: proxies for added care need?

Living alone

- 1/3 of people of aged 65 or over live alone
- Although many people living alone have a network of friends and family, living alone is a risk factor for social isolation, particularly in older people, due to loss of physical or mental ability or death of close family or friends. It may also have a detrimental effect on a person's mobility, nutrition and medication compliance.

Living with someone with frailty

- This could imply informal caring responsibilities, which may lead to neglecting their own health and personal wellbeing, as well as being a risk factor for social isolation.
- Estimated >2million people aged 65 or older are carers in the UK (2019).

Research questions

- Understanding who lives alone and who lives with someone with frailty and their characteristics.
- Are these household context factors predictive of emergency hospital use?

Dreyer, K., Steventon, A., Fisher, R. *et al.* The association between living alone and health care utilisation in older adults: a retrospective cohort study of electronic health records from a London general practice. *BMC Geriatr* **18**, 269 (2018). <https://doi.org/10.1186/s12877-018-0939-4>

Data sources: Master Patient Index (MPI)

- Health data set based on GP registration data in England.
- Historically based on NHAIS data but now being created from PDS.
- The Minimised MPI (MMPI) we had access to contained:
 - Pseudonymised NHS number, linkable to hospital records.
 - Dates records are valid from and until (monthly extract dates).
 - Pseudonymised Unique Property Reference Number (UPRN).
 - Care home resident flag.
 - Approximate date of birth and date of death, if applicable.
 - GP practice and Lower Super Output Area (LSOA) code.

Methods (1)

- Study population:
 - aged 65 years or older and registered at a GP practice in England on 16 December 2018
 - living alone or in a household of up to 6 people
 - with a hospital admission record in the previous three years.
- Study follow-up period of one year unless censored because of death, moving into a care home / household of 7+ people / address where household number unknown.

Methods (2)

- Analysis of two household context indicators:
 - Living alone
 - No other person with same UPRN in study period
 - Living with someone with frailty
 - Defined as living with one other person who has any of the conditions or events in Soong et al's list of syndromes coded in inpatient records in the previous 3 years

Soong, J., Poots, A.J., Scott, S., Donald, K. and Bell, D., 2015. Developing and validating a risk prediction model for acute care based on frailty syndromes. *BMJ open*, 5(10), p.e008457.

Methods (3): Using the MMPI

- Identified patients who were 65 or over at our index date (16/12/18).
- Calculated at monthly intervals how many patients lived at each address occupied by the over 65s using the pseudonymised UPRN and linked the pseudonymised NHS numbers of patients they were cohabiting with.
- Flagged any patients living in a care home using the care home flag.
- Linked to the hospital episodes and spells data and emergency care records for each patient living at each UPRN in order to get historical and follow-up hospital use counts (for the over 65s) and comorbidities of their cohabitantes.

Methods (4)

- Described the characteristics of people living alone and people living in a 2-person household with someone with frailty
- Used multivariable regression to investigate the effect of these indicators on A&E attendances and emergency hospital admissions.
- Adjusted for a range of factors predictive of emergency hospital use.
- Living alone analysis carried out using the entire population; those living with someone with frailty to two person household only.
- Included as many variables as possible without overparamatising the model, which was a negative binomial model as the data were overdispersed.

Patient characteristics (1)

	Total population: n = 4,876,285		2-person households: n = 2,459,937	
	Living Alone	Not living alone	Living in 2-person household with someone with frailty	Cohabitee not recorded as frail
Total study population	1,464,379 (30.03%)	3,411,906 (69.97%)	255,312 (10.38%)	2,204,625 (89.62%)
Male	34.02%	52.63%	53.84%	52.28%
Age, median [IQR]	79 [72, 85]	74 [69, 79]	77 [71, 83]	74 [70, 80]
White	83.06%	80.06%	84.64%	82.64%
Black	1.11%	1.11%	0.54%	0.67%
Asian	1.12%	3.16%	1.38%	1.55%
Deprivation – most deprived quintile	18.80%	13.08%	13.95%	11.52%
Deprivation – least deprived quintile	19.71%	24.94%	24.52%	26.38%
Rural location	19.08%	23.64%	22.56%	25.32%

Patient characteristics (2)

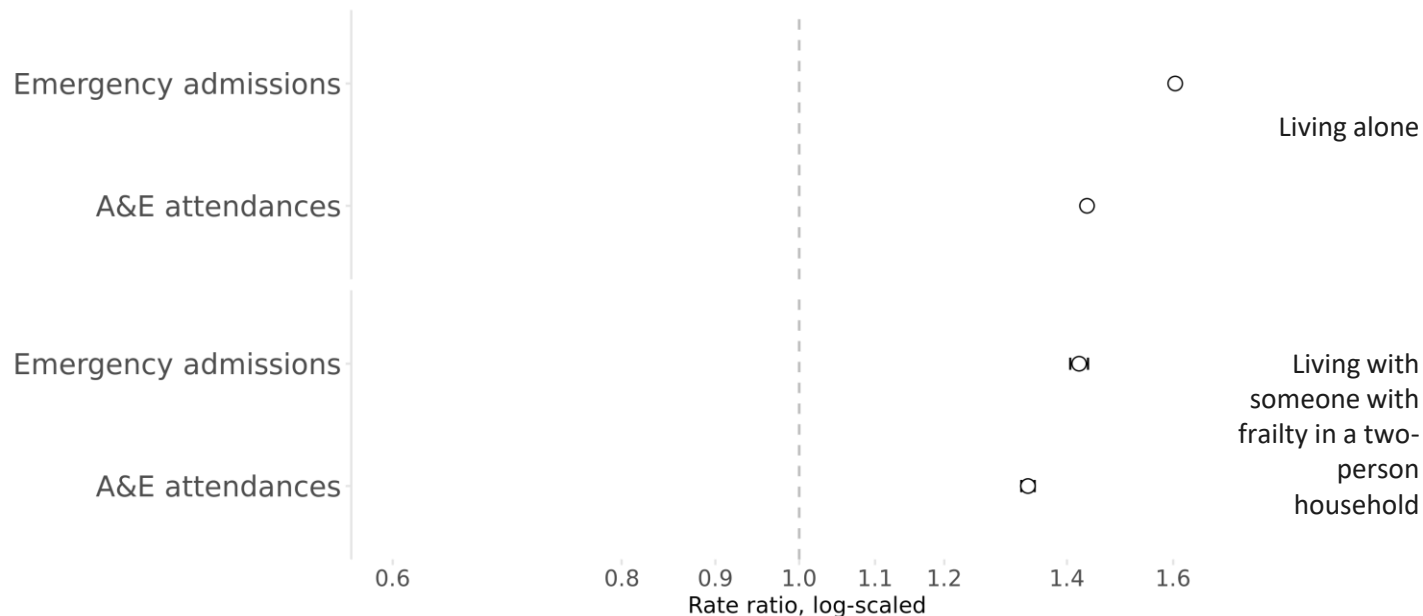
	Total population: n = 4,876,285		2-person households: n = 2,459,937	
	Living Alone	Not living alone	Living in 2-person household with someone with frailty	Cohabitee not recorded as frail
Diagnosis history (previous three years)				
No. frailty conditions, mean (sd)	0.51 (0.90)	0.30 (0.68)	0.40 (0.80)	0.28 (0.65)
No. comorbidities (Elixhauser), mean (sd)	2.30 (1.99)	1.97 (1.85)	2.22 (1.96)	1.92 (1.81)
Frailty (1 + frailty related condition)	32.72%	21.24%	26.90%	20.37%
Multimorbidity (2+ Elixhauser conditions)	58.93%	51.64%	57.09%	50.46%
History of mental ill health	26.18%	19.05%	22.27%	17.84%
Hospital Usage Previous 12 months				
A&E attendances, mean (SD)	0.74 (1.50)	0.56 (1.16)	0.67 (1.30)	0.53 (1.11)
Emergency admissions, mean (SD)	0.48 (1.01)	0.34 (0.81)	0.42 (0.93)	0.32 (0.79)

Crude rates of emergency hospital use

	People 65+ years living in households up to 6 people				People 65+ years living in households of 2 people			
	Living alone		Not living alone		Living with someone with frailty		Cohabitee not recorded as frail	
	Events	Crude rate*	Events	Crude rate*	Events	Crude rate*	Events	Crude rate*
Total number people	1,464,379		3,411,906		255,312		2,204,625	
Person-years of follow up	1,359,094		3,251,440		226,373		2,077,846	
A&E attendances	1,062,731	0.78	1,818,519	0.56	157,137	0.69	1,102,683	0.53
Emergency admissions	692,345	0.51	1,073,870	0.33	98,584	0.44	654,784	0.32

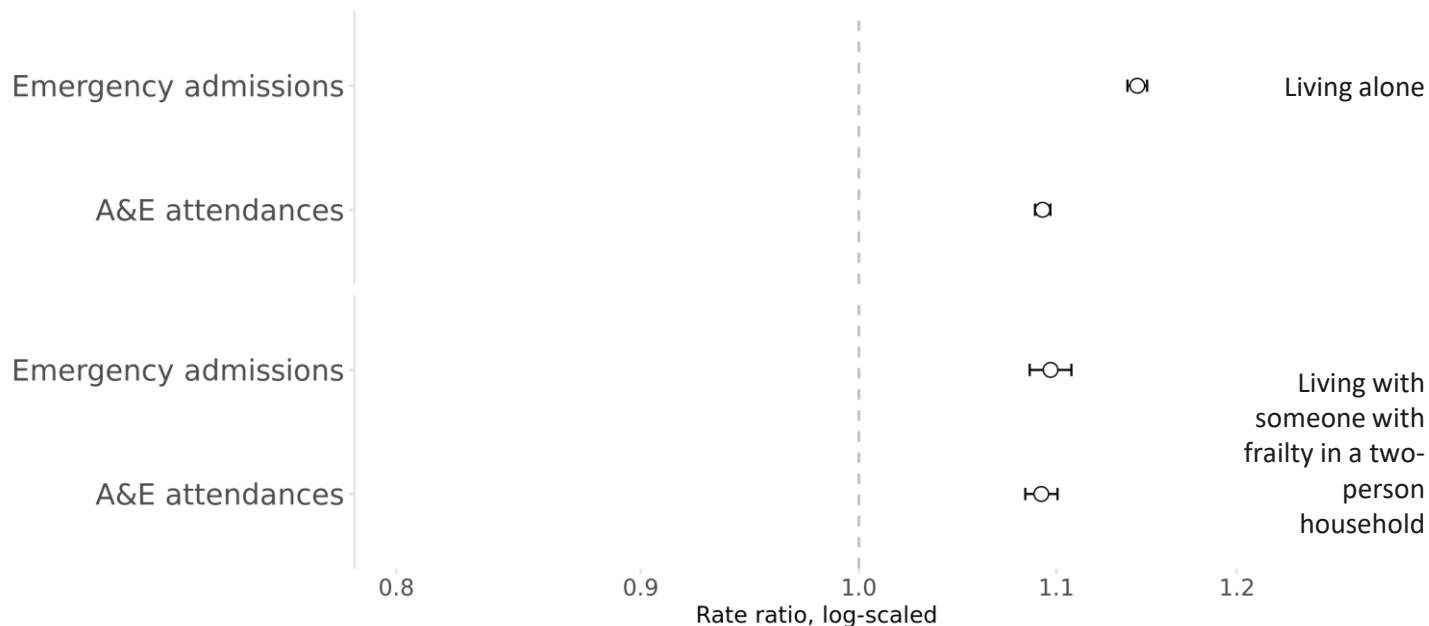
Unadjusted rate ratios (95% CI)

Rate ratios for each household context indicator (unadjusted) with 95% confidence intervals



Adjusted rate ratios (95% CI)

Rate ratios for each household context indicator, adjusted for key predictors, with 95% confidence intervals



Key findings

- People aged 65+ and living alone or living in a 2-person household with a person who was frail were on average more frail and had more long term conditions than others.
- Adjusting for a range of baseline characteristics predictive of emergency hospital use (age, gender, level of deprivation, frailty, long term conditions and prior emergency hospital use), **people living alone attended A&E 9% more often and were admitted to hospital in an emergency 14% more often** than those living in households of 2-6 people.
- Similarly, individuals **living with someone with frailty attended A&E 9% more often and were admitted to hospital as an emergency 10% more often** than others in a two-person household.

Interpretation

- We have demonstrated how household context metrics can be derived from administrative data.
- Both living alone and living with somebody with frailty were strongly associated with higher emergency hospital use in older people, even after correcting for other factors predictive of emergency hospital use.
- This analysis shows that these two household context factors are important in understanding patients' health and care needs and for planning their care.
- These household factors could also improve analyses, for example when adjusting for variables that could affect the outcomes.

Next steps

- Although not straightforward, it would be possible to develop these household context factors centrally and make these available to analysts, similar to the care home flag developed by the IAU and now available through NHS Digital.
- There is potential to develop other household context factors from the same data, e.g. recent bereavement.
- Compare reasons for admission to hospital for people living alone versus those in multi-person households to see if this might explain some of the differences in hospital usage.
- Currently finalising a re-evaluation of the effect of multidisciplinary care teams on emergency hospital use, where referral was based on clinical judgement, to see if including household context factors changed the results.

Paper

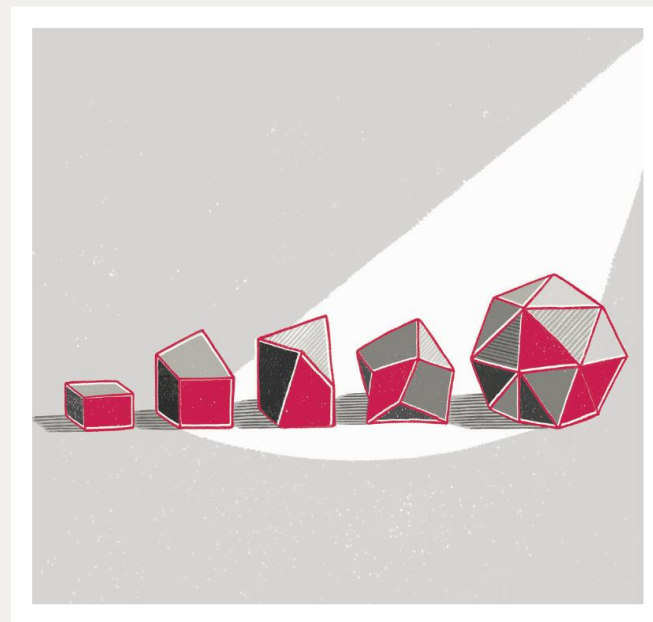
Association between household context and emergency hospital use in older people: a retrospective cohort study on indicators for people living alone or living with somebody with frailty, developed from routine healthcare data in England

BMJ Open 2022;**12**:e059371. doi: 10.1136/bmjopen-2021-059371

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