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Residential relocations among older people over the course of more than ten years

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Abstract

Objective—To describe the rates of residential relocations over the course of 10.5 years and evaluate differences in these relocation rates according to gender and decedent status.

Design—Prospective, longitudinal study with monthly telephone follow-up for up to 126 months.

Setting—Greater New Haven, Connecticut.

Participants—754 persons, aged 70 years or older, who were initially community-living and nondisabled in their basic activities of daily living.

Measurements—Residential location was assessed during monthly interviews and included: community, assisted living facility (AL) and nursing home (NH). A residential relocation was defined as a change of residential location for at least one week and included relocations within (e.g. community-community) or between (community-assisted living) locations. We calculated the rates of relocations/1000 patient-months and evaluated differences by gender and decedent status.

Results—Sixty-six percent of participants had at least one residential relocation (range 0–12). Women had lower rates of relocations from NH to community (rate ratio (RR) 0.59, $p=.02$); otherwise, there were no gender differences. Decedents had higher rates of relocation from community to AL (RR 1.71, $p=0.002$), from community to NH (RR 3.64, $p<.001$), between ALs (RR 3.65, $p<.001$) and from AL to NH (RR 2.5, $p<0.001$). In decedents, relocations from community to NH (RR 3.58, $p<.001$) and from AL to NH (RR 3.3, $p<.001$) were most often observed in the last year of life.

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Conclusions—A majority of older people relocated at least once during 10.5 years follow-up. Women had lower rates of relocation from NH to community. Decedents were more likely to relocate to a residential location providing a higher level of assistance, compared with non-decedents. Residential relocations were most common in the last year of life.

Keywords

residential location; relocations; housing; nursing home; assisted living facility longitudinal study; gender

Introduction

The rate of residential relocations among older adults varies from about 9% to 40% (1). The variability in rates is mostly attributable to differences in definition, duration and frequency of assessment. Further, declines in health are often considered an important predictor or precipitant for residential relocations, especially those to institutionalized settings (2, 3). Nevertheless, only 20% of older persons indicate that the sole reason for relocation is a deterioration in health (4). Other important factors linked to residential relocation include feelings of safety, financial situation, well-being and closeness to relatives (5, 6).

While it is well documented that residential relocations are common, several questions remain unsettled. For instance, little is known about gender differences for residential relocations in late life. In the US, more than two-thirds of residents in assisted living facilities (7) and nursing homes (8) are women. This could be due to women outliving men by five years (9), or because women have a higher rate of disability in activities of daily living (10, 11), and consequently, are more often institutionalized. Data on gender-specific patterns and frequencies of residential relocations are lacking, and most studies on residential relocations have included long follow-up intervals, e.g. one year, thereby overlooking short-term relocations (e.g., following hospital admission).

If residential relocations are driven largely by a decline in health, one might expect that they would be more common in those prior to death (hereafter referred to as decedents) than those surviving over a decade of observations (hereafter referred to as non-decedents), but this has not been previously investigated. Prior reports have focused primarily on care transitions (e.g. admission to the hospital, nursing home admission) in the last year of life (12).

Using data from a unique longitudinal study that includes monthly assessments for up to 10.5 years, we set out to describe the rate of residential relocations and time to first relocation in a cohort of initially non-disabled community-dwelling older persons. We were particularly interested in evaluating differences in these relocations between men and women and between decedents and non-decedents.

Methods

Study population

Participants were members of the Precipitating Events Project (PEP), a longitudinal study of 754 persons aged 70 years or older who were initially community-living and non-disabled in four basic activities of daily living (ADL: bathing, dressing, walking inside the house and transferring from a chair). All participants lived in the greater New Haven area, Connecticut, USA. Exclusion criteria included significant cognitive impairment with no available proxy, inability to speak English, diagnosis of a terminal illness with a life expectancy of less than twelve months, and a plan to move out of the New Haven area during the next 12 months.

The assembly of the cohort, which took place between March 1998 and October 1999, has been described in detail elsewhere (13, 14). In brief, potential participants were identified from a computerized list of 3,157 age-eligible members of a large health plan in greater New Haven, Connecticut. Eligibility was determined during a screening telephone interview and was confirmed during an in-home assessment. Only 4.6% of the 2,573 health plan members who were alive and could be contacted refused to complete the telephone interview, and 75.2% of those found to be eligible agreed to participate in the study. Persons who refused to participate did not differ significantly from those included according to gender and age. The study protocol was approved by the Yale Human Investigation Committee, and all participants provided verbal informed consent.

Data collection

A comprehensive, in-home assessment was conducted at baseline. Telephone interviews were completed monthly through 2009 with a completion rate of over 99%. For participants with significant cognitive impairment, the monthly interviews and relevant parts of the comprehensive assessment were completed with a designated proxy. Deaths were ascertained by review of local obituaries and/or from an informant during a subsequent telephone interview, with a completion rate of 100% (15).

Baseline in-home assessment

During the comprehensive baseline assessment, data were collected on demographic characteristics, including age, gender, race (Non-Hispanic white versus other), educational status, current marital status, and living situation (alone versus with others). Physician-diagnosed chronic conditions, assessed by self-report, included hypertension, myocardial infarction, congestive heart failure, stroke, diabetes mellitus, arthritis, hip fracture, chronic lung disease, and cancer. Cognitive status was assessed with the Folstein Mini-Mental State Examination (MMSE) (16). Based on the number of correct responses, the MMSE provides a total score, ranging from 0 to 30, with a score < 24 denoting cognitive impairment. Self-rated health was assessed on a five-item scale ranging from excellent to poor. Depressive symptoms were assessed by the 11-item version of the Center for Epidemiologic Studies Depression (CES-D) Scale (17). Scores for this shortened version was transformed to correspond to the standard 20-item scale. A score of 16 indicates depressive symptoms.

Assessment of residential location

Residential location was ascertained at baseline and subsequently every month during the telephone interview for 10.5 years or until death. We focused on three residential locations: community, assisted living facility and nursing home. Community included houses, apartments and non-age restricted apartments. Assisted living was defined according to the definition provided by the Assisted-Living Quality Coalition (18): a congregate residential setting that provides or coordinates personal services, 24-hour supervision and assistance, activities, and health related services. Age-restricted living facilities were included in this definition. Nursing home included subacute care and long-term care facilities. Because of the infrequent occurrence, an admission to a hospice inpatient facility was also classified as nursing home care.

Participants were asked whether they had been in an assisted living facility or nursing home during the past month or if they had moved to another location in the past month. At the end of each telephone interview, participants were asked if they expected to remain at the same residential location the following month. This would often prompt the participant to reveal plans for relocations. For participants who indicated that they were admitted to a nursing home during the past month, the interviewer verified whether the participant was currently in a nursing home. The accuracy of this information was almost perfect, with kappa = 0.96 (15).

Definition of residential relocation

Relocation was defined as a move, lasting more than one week, from one's current residential location to another residential location. This included the same type of residential location (e.g. participant moved between community settings) or a different type of residential location (e.g. from community to assisted living). Because of the large number of possible permutations, relocation types were collapsed first by same type patterns (e.g. community to community was classified as "community") and then by each relocation type repetition (nursing home to assisted living to nursing home to assisted living is classified as "nursing home to assisted living").

Statistical Analysis

Data were summarized as means and standard deviations for continuous variables and counts with percentages for categorical data. We compared the baseline characteristics of participants by gender and decedent status, using *t*-tests to evaluate differences in means, Wilcoxon Rank-sum test for non-normal measures and chi-square tests to evaluate differences in percentages.

We calculated the frequency distributions of the possible relocation patterns along with rates (per 1,000 person-months) for each type of relocation (from one residential type to another or between same residential locations). Rate ratios for each type of transition were derived by dividing the rate for females by that of males, the rate for decedents by that for non-decedents, and the rate (decedents only) for the period for the year prior to death by the rate for the preceding year (two years prior to death), respectively. Rate ratios were adjusted for repeated relocations within participant using a compound symmetry covariance structure.

Rate ratios differences were tested using a chi-square statistic. Survival curves were generated for time to first relocation (in months), comparing men with women and decedents with non-decedents by means of a log-rank test. Decedents are censored at the time of death if they died prior to relocation.

All statistical tests were two-tailed, using $p < 0.05$ for significance. Analyses were performed using SAS version 9.3 (©SAS Institute Inc., Cary, NC, USA).

Results

Table 1 provides the baseline characteristics of the 754 older persons in the cohort, by gender (267 men and 487 women) and decedent status (334 non-decedents and 420 decedents). Age and racial composition were comparable between men and women. A greater proportion of women than men lived alone, and women were more frequently widowed. There were no gender differences in the number of chronic conditions, cognitive status or self-rated health, but women were more likely than men to have depressive symptoms.

At baseline, those that died during follow-up were significantly older and had more chronic conditions, and were more likely to be widowed, to be living alone, and to have depressive symptoms, compared with those surviving the follow-up period.

Relocation rates by gender

Of the 754 participants, 65.6% had at least one residential relocation (range 0–12) over the course of 10.5 years. Overall, most person-months were spent in the community, followed by assisted living and nursing home.

Table 2 shows the relocation rates per 1000 person-months for the nine possible relocation types by gender. Women had lower rates than men for relocations from nursing home to community (risk ratio (RR) 0.59, $p < .001$); otherwise, there were no gender differences.

Relocation rates by decedent status

Table 3 shows the relocation rates per 1000 person-months for the nine possible relocation types by decedents status. Decedents had higher rates of relocation from community to assisted living (RR 1.71, $p = .002$), from community to nursing home (RR=3.64, $p < .001$), between assisted living facilities (RR 3.65, $p < .001$), and from assisted living to nursing home (RR 2.5, $p < .001$),

Table 4 shows the relocation rates for decedents only in the last year of life, versus two years prior to death. In the last year of life, relocations from community to nursing home (RR 3.58, $p < .001$) and from assisted living to nursing home (RR 3.30, $p < .001$) were higher compared to two years prior to death.

Time to first relocation by gender and decedent status

Figure 1a and 1b show time to first relocation in months by gender and decedent status, respectively. Median time to first relocation did not differ significantly ($p = .454$) between

men (59 months) and women (67 months), but was significantly shorter ($p<.001$) for decedents (44 months) than non-decedents (91 months).

Discussion

In this cohort of initially non-disabled, community-dwelling older persons, 66% relocated at least once during the course of 10.5 years follow-up. The most frequently observed relocations were from community to nursing home, from community to assisted living facility and from nursing home back to community. Relocations differed by gender only for nursing home back to the community, with lower rates for women than for men. Compared with non-decedents, decedents had higher rates of residential relocations from community to assisted living, community to nursing home, between assisted living facilities and from assisted living to nursing. Among decedents, residential relocations from community to nursing home and from assisted living to nursing home were most often observed in the last year prior to death, compared to two years prior to death.

Although a higher proportion of residents in assisted living facilities and nursing homes in the US are women (7, 8), men and women in the current study generally demonstrated comparable relocation rates over the course of more than ten years. Our results suggest that the preponderance of women in assisted living facilities and nursing homes is likely due to differences in survival, with women living longer than men, rather than relocation.

Overall, quite a high proportion of participants relocated from the nursing home back to the community. Men had a higher relocation rate from a nursing home back to the community. We hypothesize that the observed difference between men and women is due to the fact that male participants were less often living alone and more often were married, so they may have had someone to take care of them. Not living alone and being married have been shown to reduce the likelihood of long-term nursing home care (2, 3). In earlier studies, relocation from nursing home back to the community was often not captured, due to follow-up time intervals of one year or more (1), but is a very relevant relocation. It has been shown that a nursing home admission increases the probability of a second nursing home admission (2, 3).

In our study decedents had higher rates of residential relocations compared with non-decedents, in particular to residential locations where a higher level of assistance or care can be provided. It is well known that older people have the highest number of care transitions in the last year of their life (12, 20). These care transitions are often due to an increased burden of morbidities (21) and disability (22), in most cases leading to the need for a higher level of care. We observed a similar pattern for residential relocations in the last year of life, especially for the relocation to a nursing home. We hypothesize that the same underlying mechanisms (increased burden of morbidities and disabilities), that lead to care transitions also lead to residential relocations.

Strengths of the current study include the long duration of follow-up, monthly surveillance of relocations, and very low attrition, with completion of 99% of the follow-up interviews. This allowed us to provide a long-term and detailed perspective on residential relocations.

So far, this is one of the very few studies that included initially community-dwelling persons and demonstrated the course of relocations in late-life with very detailed and frequent follow-up measures. Most studies focus on yearly trends, but this does not necessarily provide information on how persons reside and make relocations while they age.

Our study also had limitations. Our participants resided in Connecticut, which has lower availability of assisted living facilities (23) and a higher proportion of nursing homes relative to many other states. This might lead to different relocation patterns, as the probability of relocating to a nursing home might be higher in a state where there is less availability of assisted living facilities. Moreover, we only focused on residential relocations and did not include care transitions. Although people can be hospitalized for more than one week, we did not define a hospitalization as a residential relocation. A hospitalization could have preceded relocation (24–26), but evaluating this possibility was beyond the scope of our study.

Further research could focus on factors that are associated with different types of residential relocations. To date, much of this research has focused on risk factors for nursing home placement, but as shown in the current study, older persons may relocate from a nursing home to the community and between community settings. A better understanding of factors that are associated with these relocations could lead to better targeted policy and health care interventions to support older people to live in the community as long as possible.

In conclusion, a high proportion of older persons relocate at least once over the course of more than a decade and relocations were most common in decedents. Relocations from a nursing home to the community were common and were observed significantly more frequent in men than in women. Decedents had higher rates of relocations to facilities that could provide higher levels of assistance or care. Further research should focus on other factors that are associated with different patterns of residential relocations to further promote ageing in place.

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Figure 1a

Figure 1b

Figure 1.

Figure 1a Time to first relocation comparing males and females.

The time to first relocation for males and females is plotted from inclusion in the cohort. Until 54 months the curve are similar; after 54 months males relocate slightly more frequently, however this is not a significant difference ($p=0.45$). The median time to first relocation is 59 months for males and 67 months for females. Participants are censored at the time of death if they died prior to relocations.

Figure 1b Time to first relocation for decedents and non-decedents.

The time to first relocation for decedents and non-decedents is plotted and is significantly earlier for decedents than for non-decedents. Median time to first relocation for decedents is 44 months and for non-decedents 91 months. Decedents are censored if they died prior to relocations.

Table 1

Baseline Characteristics by Gender and Decedent Status

Characteristic	Male		Female		p-value*		Non-decedent		Decedent		p-value		Total	
	N=267		N=487				N=334		N=420				N=754	
Age (years), mean (SD)	78.7 (5.1)		78.3 (5.3)		0.333		76.6 (4.4)		79.8 (5.4)		<.001		78.4 (5.3)	
Non-Hispanic White, n (%)	243 (91.0)		439 (90.1)		0.698		296 (88.6)		386 (91.9)		0.128		682 (90.4)	
Education														
Mean (SD)	12.3 (3.0)		11.8 (2.8)		0.025		12.0 (2.8)		12.0 (2.9)		0.926		12.0 (2.9)	
(> High School), n (%)	180 (67.4)		325 (66.7)		0.849		227 (68.0)		278 (66.2)		0.607		505 (67.0)	
Marital Status, N (%)														
Married	187 (70.0)		174 (35.7)		<.001		175 (52.4)		186 (44.3)		0.041		361 (47.9)	
Separated/Divorced	21 (7.9)		38 (7.8)				30 (9.0)		29 (6.9)				59 (7.8)	
Widowed	51 (19.1)		258 (53.0)				118 (35.3)		191 (45.5)				309 (41.0)	
Never Married	8 (3.0)		17 (3.5)				11 (3.3)		14 (3.3)				25 (3.3)	
Living Alone, N (%)	59 (22.1)		239 (49.1)		<.001		117 (35.0)		181 (43.1)		0.024		298 (39.5)	
Number of Chronic Conditions														
mean (SD)	1.7 (1.2)		1.8 (1.2)		0.641		1.5 (1.1)		2.0 (1.3)		<.001		1.8 (1.2)	
Cognitive Status														
MMSE <24, N (%)	34 (12.7)		52 (10.7)		0.396		31 (9.3)		55 (13.1)		0.102		86 (11.4)	
Psychological Status														
CESD 16, N (%)	34 (12.7)		122 (25.0)		<.001		58 (17.4)		98 (23.3)		0.044		156 (20.7)	

* t-test for continuous measures, Wilcoxon Rank-sum test for non-parametric measures, χ^2 test for proportions.

Table 2

Residential Relocations by gender

Relocation Type	Gender	Count ^a	Person-months	Rate/1000 person-month (95% CI)	Rate Ratio ^b	p-value
Community to community	Female	91	31,390	2.9 (2.3–3.7)	1.03	0.863
	Male	52	18,534	2.8 (2.1–3.8)		
Community to assisted living	Female	83	31,390	2.6 (2.1–3.3)	1.09	0.641
	Male	45	18,534	2.4 (1.8–3.2)		
Community to nursing home	Female	266	31,390	8.5 (7.3–9.9)	1.01	0.914
	Male	155	18,534	8.4 (7.0–10.0)		
Assisted living to community	Female	12	10,603	1.1 (0.6–2.0)	0.53	0.270
	Male	6	2,818	2.1 (0.8–5.6)		
Assisted living to assisted living	Female	42	10,603	4.0 (2.7–5.8)	0.86	0.631
	Male	13	2,818	4.6 (2.7–7.8)		
Assisted living to nursing home	Female	164	10,603	15.5 (12.9–18.6)	0.93	0.688
	Male	47	2,818	16.7 (12.1–23.0)		
Nursing home to community	Female	179	4,078	43.9 (33.8–57.0)	0.59	0.020
	Male	100	1,345	74.3 (51.5–107.2)		
Nursing home to assisted living	Female	92	4,078	22.6 (16.8–30.3)	1.17	0.609
	Male	26	1,345	19.3 (11.6–32.3)		
Nursing home to nursing home	Female	61	4,078	15.0 (11.0–20.3)	0.65	0.112
	Male	31	1,345	23.0 (14.9–35.7)		

^a Represents the number of this type of relocations, which may occur more than once within a participant.

^b Models is adjusted for repeated observations within participant.

Table 3

Residential relocation by decedent status

Relocation Type	Decedent Status	Count ^a	Person-months	Rate/1000 person months (95% CI)	Rate Ratio ^b	p-value
Community to community	Decedent	55	19,148	2.9 (2.2–3.8)	1.00	0.981
	Non-decedent	88	30,776	2.9 (2.2–3.6)		
Community to assisted living	Decedent	66	19,148	3.5 (2.7–4.4)	1.71	0.002
	Non-decedent	62	30,776	2.0 (1.6–2.6)		
Community to nursing home	Decedent	292	19,148	15.3 (13.4–17.4)	3.64	<0.001
	Non-decedent	129	30,776	4.2 (3.5–5.1)		
Assisted living to community	Decedent	10	5,375	1.9 (0.9–3.7)	1.87	0.215
	Non-decedent	8	8,046	1.0 (0.5–2.0)		
Assisted living to assisted living	Decedent	39	5,375	7.3 (4.9–10.6)	3.65	<0.001
	Non-decedent	16	8,046	2.0 (1.3–3.1)		
Assisted living to nursing home	Decedent	132	5,375	24.6 (20.1–30.0)	2.50	<0.001
	Non-decedent	79	8,046	9.8 (7.7–12.6)		
Nursing home to community	Decedent	175	3,479	50.3 (38.9–65.0)	0.94	0.792
	Non-decedent	104	1,944	53.5 (36.6–78.3)		
Nursing home to assisted living	Decedent	63	3,479	18.1 (13.1–25.1)	0.64	0.099
	Non-decedent	55	1,944	28.3 (18.6–43.0)		
Nursing home to nursing home	Decedent	68	3,479	19.6 (14.7–26.0)	1.58	0.107
	Non-decedent	24	1,944	12.4 (7.7–19.9)		

^a Represents the number of this type of relocations, which may occur more than once within a participant.^b Models is adjusted for repeated observations within participant.

Table 4

Residential relocations in the last year of life versus 1–2 years prior to death (decedents only)

Relocation Type	Year prior to death	Count ^a	Person-months	Rate/1000 person months (95% CI)	Rate Ratio ^b	p-value
Community to community	Last year before	6	2,003	3.0 (1.4–6.6)	0.83	0.735
	1–2 years before	9	2,500	3.6 (1.8–7.3)		
Community to assisted living	Last year before	8	2,003	4.0 (2.0–8.0)	0.59	0.215
	1–2 years before	17	2,500	6.8 (4.2–10.9)		
Community to nursing home	Last year before	106	2,003	52.9 (43.4–64.5)	3.58	<0.001
	1–2 years before	37	2,500	14.8 (10.8–20.4)		
Assisted living to community	Last year before	1	745	1.3 (0.2–9.5)	0.38	0.407
	1–2 years before	3	859	3.5 (1.1–11.0)		
Assisted living to assisted living	Last year before	7	745	9.4 (4.2–21.1)	0.81	0.675
	1–2 years before	10	859	11.6 (6.5–21.0)		
Assisted living to nursing home	Last year before	63	745	84.6 (65.2–109.8)	3.30	<0.001
	1–2 years before	22	859	25.6 (16.9–38.8)		
Nursing home to community	Last year before	48	1,360	35.3 (25.6–48.7)	1.18	0.554
	1–2 years before	23	769	29.9 (19.2–46.6)		
Nursing home to assisted living	Last year before	30	1,360	22.1 (15.0–32.4)	2.12	0.069
	1–2 years before	8	769	10.4 (5.1–21.2)		
Nursing home to nursing home	Last year before	32	1,360	23.5 (15.8–35.0)	1.13	0.735
	1–2 years before	16	769	20.8 (11.5–37.6)		

^a Represents the number of this type of relocations, which may occur more than once within a participant.^b Models is adjusted for repeated observations within participant.