

Hospital Stays and Probable Dementia as Predictors of Relocation to Long-Term Care Facilities

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The relocation from community living to long-term care facilities (LTCFs) is a significant aspect of geriatric care in the US. It is estimated that each year, more than 1.3 million Americans 65 years or older relocate to long-term care, contributing to the total population of more than 1.4 million who make their home in nursing facilities nationwide.¹ These rates demonstrate the importance of understanding, planning, and managing this health care transition experience for older adults. Late-life relocations can be challenging but are often necessitated by the increased care requirements associated with age-related chronic health conditions (eg, cognitive impairment), limitations in physical function, and social support.²

The relocation from the community to an LTCF can be challenging for residents,³ increasing the risk of adverse outcomes such as social isolation, depression, loss of functional abilities, and loss of cognitive function, with a high risk of mortality.⁴⁻⁷ This relocation is a complex process involving the management of multiple factors, including chronic diseases, psychological well-being, social support, decline in caregiver health, and frequent hospital admissions.^{8,9} Older adults with recurrent hospital admissions often have complex health conditions that require a higher level of medical care and assistance than can be provided at home.¹⁰ Most older adults experience delayed discharge, increasing the cost of care, due to the lack of health care and social support required to meet their postacute care needs.¹¹ Hospitalization can increase the risk of transition to nursing homes or residential care facilities by 75.0% to 87.5% to 10 times among older adults when age is one of the predictors of this transition.^{9,12} The widely reported association between hospitalization and subsequent institutionalization can manifest through multiple interconnected causal pathways. An acute health issue, such as a stroke or myocardial infarction leading to hospitalization, can bring about lasting alterations in functional capacity, necessitating ongoing long-term care. Also, the hospitalization itself may lead to deconditioning, which, if not suitably prevented or managed, can lead to a decline in functionality and self-reliance.¹³ Lastly, after institutionalization, the risk of repeated hospitalization can increase, which, in turn, can increase the risk of returning to an LTCF.¹⁴

ABSTRACT

OBJECTIVES: This study aims to investigate the relocation of older adults in the US from community living to long-term care facilities (LTCFs). Specifically, it examines the predictive roles of possible and probable dementia and hospital stays in this complex health care transition.

STUDY DESIGN: Utilizing data from the National Health and Aging Trends Study, a longitudinal cohort study (2011-2019), we employed a panel data approach, which consists of multiple observations over time for the same participants, allowing us to account for both cross-sectional variations (differences between participants) and time-series variations (changes in the same participant over time).

METHODS: The analysis involved longitudinal logistic regression models. Using the AD8 dementia screening interview, clock drawing test, immediate and delayed word recall test, orientation, and history of dementia diagnosis, we placed participants into categories of having no dementia, possible dementia, and probable dementia. A survey asked about hospital stays in the past year. Relocation to LTCFs was examined based on the changes to the living location.

RESULTS: The proportion of individuals transitioning to LTCFs tripled between 2011 and 2019, emphasizing the need to understand and manage this health care transition. Hospital stays significantly increased the probability of moving to LTCFs, especially nursing homes. Probable dementia demonstrated a 3-fold increase, aligning with the rising prevalence of Alzheimer disease. Difficulty walking and climbing stairs significantly increased relocation probabilities.

CONCLUSIONS: The study findings emphasize complexity in late-life relocations influenced by dementia and hospital stays. Screening for cognitive function among community-dwelling older adults, particularly those with a history of hospital stays and mobility difficulties, can inform interventions and policies. Implications extend to health care policy, geriatric care, and the imperative for targeted interventions considering demographic variations. Future research should explore additional variables and address limitations to refine our understanding of the relocation process.

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TAKEAWAY POINTS

- ▶ Understanding late-life relocations is crucial for managing health care transitions.
- ▶ Hospital stays significantly increase the probability of moving to long-term care facilities, particularly nursing homes.
- ▶ Screening for cognitive function in older adults, especially those with a history of hospital admissions and mobility challenges, informs targeted interventions.
- ▶ Findings emphasize the multifaceted nature of relocations influenced by dementia.
- ▶ Implications extend to health care policy and geriatric care practices, informing decisions on aging in place.
- ▶ The study results contribute valuable insights for clinical and policy decisions, emphasizing the need for nuanced interventions in the context of evolving demographic trends and health care reform.

In the US, 1 in 3 individuals 85 years or older has Alzheimer disease or related dementia (ADRD),¹⁵ and the number is expected to increase to 9 million by 2050. Hence, relocation from the community to LTCFs will become more prevalent, warranting the need for ongoing research and effective health policy directives. Moreover, cognitive impairment, interacting with chronic health problems such as myocardial infarction and diabetes, can increase the risk of hospital admissions¹⁶ and extended or repeated readmissions,^{17,18} which can cause more complexity in transitioning from the community to an LTCF.

Successful posttransition adaptation (from establishing new social contacts to navigating the new environment) requires cognitive preservation and function.^{19,20} Individuals with cognitive impairment, ranging from mild cognitive impairment (MCI) to severe dementia, may experience additional challenges during this transition, depending on the cognitive impairment stage.⁶ Furthermore, cognitive impairment can increase the risk of anxiety and depression,²¹ creating a vicious cycle that exacerbates the pace of losing cognitive function.^{22,23} Nonetheless, MCI is a transitional status; although many people return to normal status, approximately 10% to 28%, depending on age, progress to dementia.²⁴ Hence, using the possibility of dementia would reduce the noise caused by this transition period in studies. Nonetheless, to our knowledge, no study has controlled for the impact of possible dementia on such relocation from the community to LTCFs.

The intricate interplay between frequent hospitalization and the transition from community to LTCF underscores a critical juncture in the continuum of care for vulnerable populations. Access to health services is another contributing factor to relocating people with cognitive impairment. Some interventions, such as dementia care programs where a nurse and a physician coordinate the care with caregivers continuously, can reduce relocation to LTCF among individuals with dementia.²⁵ Nonetheless, few studies have investigated the predictors of relocation from the community to LTCF, controlling for the effect of hospital stays and cognitive function using longitudinal data. This study examined the correlation between hospital stays and cognitive impairment affecting relocation to LTCF among community-dwelling older adults using 2011-2019

data from the longitudinal National Health and Aging Trends Study (NHATS).

METHODS

We used only the NHATS, a cohort study that surveys older adults eligible for Medicare, and no additional data collection took place. The NHATS uses a stratified sample in 3 stages to develop a nationally representative sample. The primary sample is formed by selecting a group of counties in each state of the US followed by select zip codes in each county based on the number of Medicare beneficiaries in the county and zip code. The last stage selects the participants based on the proportion of race and ethnicity of the population in each zip code. In the first wave (2011), the weighted response rate was approximately 70%, as 8245 participants completed the surveys,²⁶ and in 2019, it was 97.6% (n = 2548).²⁷ Although the NHATS included new participants in the cohort in 2015, we excluded the newly included participants for this study; hence, all the participants completed 9 years of surveys (2011-2019). Because an individual can have multiple hospital stays followed by a temporary transition to an LTCF (**Table 1**), we used the events of transfer as the unit of analysis; hence, the long data set format was used. All 9 waves were appended and then balanced by excluding those who had not participated in all the waves.

Measurement

NHATS data differentiate residential statuses within LTCFs using CMS' Minimum Data Set records. NHATS algorithms distinguish between long-term nursing home residency and temporary skilled nursing facility stays, with the latter potentially representing postacute care following a hospital discharge, with high sensitivity and specificity.²⁶

The transition from community to LTCF was the dependent variable measured using participants' residential status in different waves. In the initial data collection round, participants' residential status was determined using a 2-step process. First, the Housing Type section of the Sample Person Interview identified the general living arrangement. If the setting was not a private residence, the Facility Questionnaire was administered to further classify the type of LTCF, differentiating between nursing homes and other residential care settings. This process was underpinned by specific criteria, including the structure of the facility, the level of care provided, and the availability of nursing services, to ensure a precise classification. The details are published elsewhere.^{28,29} The NHATS categorizes the residential status into 8 categories, except wave 1 (4 categories): community, residential care but not nursing home (Sample Person Interview), residential care but not nursing home (Facility Questionnaire), nursing home (Sample Person Interview), nursing home (Facility Questionnaire), deceased, non-nursing

TABLE 1. Frequency of Living Location, Hospital Stays, Dementia, and Control Variables Among Older Adults (2011-2019), n (%)

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Living status | | | | | | | | | |
| Community | 2424 (95.25) | 2409 (94.58) | 2386 (93.64) | 2354 (92.42) | 2342 (91.92) | 2313 (90.78) | 2259 (88.66) | 2223 (87.24) | 2234 (87.78) |
| LTCF | 121 (4.75) | 138 (5.42) | 162 (6.36) | 193 (7.58) | 206 (8.08) | 235 (9.22) | 289 (11.34) | 325 (12.76) | 311 (12.22) |
| Nursing home | 30 (24.79) | 38 (27.54) | 51 (31.48) | 62 (32.12) | 67 (32.52) | 80 (34.04) | 108 (37.37) | 123 (37.85) | 114 (36.66) |
| Non-nursing home | 91 (75.21) | 100 (72.46) | 111 (68.52) | 131 (67.88) | 139 (67.48) | 155 (65.96) | 181 (62.63) | 202 (62.15) | 197 (63.34) |
| Hospital stay | 442 (17.69) | 507 (20.45) | 516 (20.80) | 518 (20.95) | 464 (18.81) | 505 (20.55) | 563 (22.97) | 604 (24.70) | 550 (24.35) |
| Dementia | | | | | | | | | |
| No dementia | 2161 (86.51) | 2160 (86.96) | 2148 (86.47) | 2004 (80.87) | 2059 (83.39) | 2016 (81.78) | 1940 (79.80) | 1861 (75.84) | 1686 (74.54) |
| Possible dementia | 229 (9.17) | 191 (7.69) | 179 (7.21) | 261 (10.53) | 188 (7.61) | 185 (7.51) | 225 (9.26) | 213 (8.68) | 191 (8.44) |
| Probable dementia | 108 (4.32) | 133 (5.35) | 157 (6.32) | 213 (8.60) | 222 (8.99) | 264 (10.71) | 266 (10.94) | 380 (15.48) | 385 (17.02) |
| Difficulty | | | | | | | | | |
| Walking 6 blocks | 711 (28.67) | 759 (30.80) | 812 (33.17) | 850 (34.91) | 900 (37.07) | 991 (40.80) | 1074 (44.45) | 1187 (49.33) | 1110 (49.82) |
| Climbing 20 stairs | 550 (22.16) | 573 (23.41) | 616 (25.29) | 679 (28.01) | 690 (28.44) | 778 (32.20) | 824 (34.16) | 918 (38.06) | 898 (40.38) |
| Sex (female) | 1542 (60.52) | | | | | | | | |
| Race/ethnicity | | | | | | | | | |
| Non-Hispanic White | 1836 (72.06) | | | | | | | | |
| Black | 517 (20.29) | | | | | | | | |
| Hispanic | 125 (4.91) | | | | | | | | |
| Other | 70 (2.75) | | | | | | | | |

LTCF, long-term care facility.

home residential care in waves 1 and 5, and nursing home in waves 1 and 5. We created a new variable collapsing noncommunity residents into 1 category. The variable has 2 values (0, community resident; 1, resident of facilities, including nursing homes and others) (Table 1 and Table 2). To analyze the differences in transitions, a new variable was created to categorize individuals moving from the community (1), nursing homes (2), or other non-nursing home facilities (3). Then dummy variables were created and entered into 2 models (Table 3). Those who died during the study time were excluded from the data set.

Hospital stays were measured using the survey questions. The NHATS asked the participants whether they had had overnight hospital stays within the past 12 months. The answers are coded as a binary variable (0, no; 1, yes).

Three cognitive function domains were tested using the clock drawing test (CDT) for executive function, immediate and delayed word recall tests for memory, and orientation (date, month, year, day of the week, and naming the president and vice president of the US).

For the CDT, participants were asked to draw a given time (eg, 11:10) on a piece of paper. They received a score of 0 to 5, where 0 indicates severe impairment and 5 indicates no error, based on the number of errors.³⁰ The immediate word recall test (IWRT) and the delayed word recall test (DWRT) with a 10-word list were used to measure immediate and delayed memory function.^{31,32} The IWRT (ie, in which participants listened to a list of 10 words and were asked to repeat them immediately) was given before the CDT to measure immediate memory. After the CDT, participants were asked to repeat the words

(ie, DWRT) to test delayed memory. They received a score of 0 to 20 (1 point for each correct answer in both the IWRT and the DWRT), summing the scores of IWRT and DWRT. For orientation, they received a score between 0 and 8. If the score was at least 1.5 SD lower than the mean for self-respondents, it was considered an impairment. The AD8 dementia screening interview, comprising 8 items, evaluates memory, temporal orientation, judgment, and function with 90% sensitivity and 60% specificity, and it effectively and consistently distinguishes between individuals without dementia and those with dementia. The details of the AD8 criteria are published elsewhere.³³

The participants were categorized as having probable dementia, using the above measures in addition to the history of dementia diagnosis, if they met at least 1 of the following criteria: had received a diagnosis of dementia, had not received a diagnosis of dementia but met AD8 criteria, or had scores at least 1.5 SD lower than the mean in at least 2 of the cognitive function domains (ie, executive function, memory, and orientation).

Those who had not received a dementia diagnosis and did not meet AD8 criteria but had a score at least 1.5 SD lower than the mean in 1 domain were categorized as having possible dementia. Otherwise, they were in the no dementia category. The details of the method are published elsewhere.³⁴

Controlling for function, we used the NHATS survey, which asked participants if they had difficulties in bathing, eating, dressing, using the toilet, taking a shower, getting out of bed, moving inside the house, going out, managing a bank account, preparing meals, shopping, doing the laundry, walking 6 blocks, and climbing 20 stairs.

TABLE 2. Hospital Stays and Dementia Predicting Transition From Community to LTCF Among Older Adults (2011-2019)^a

| | Model 1 | | Model 2 | |
|--------------------------------|---|--------------|--|--------------|
| | OR (SE) | 95% CI | OR (SE) | 95% CI |
| Hospital stays | 1.377 [0.193]* | 1.046-1.812 | 1.330 [0.188]* | 1.009-1.755 |
| Possible dementia ^b | 1.130 (0.261) | 0.719-1.777 | 1.112 (0.257) | 0.707-1.750 |
| Probable dementia ^b | 10.603 [2.597]*** | 6.561-17.136 | 9.934 [2.429]*** | 6.151-16.042 |
| Difficulty walking 6 blocks | — | — | 1.992 [0.377]*** | 1.374-2.888 |
| Age | 1.326 [0.032]*** | 1.265-1.389 | 1.310 [0.030]*** | 1.252-1.370 |
| Sex (female) ^c | 3.218 [0.965]*** | 1.788-5.793 | 2.896 [0.855]*** | 1.624-5.165 |
| Race/ethnicity ^d | | | | |
| Black | 0.193 [0.077]*** | 0.088-0.421 | 0.175 [0.068]*** | 0.082-0.376 |
| Hispanic | 0.041 [0.039]** | 0.006-0.269 | 0.038 [0.034]*** | 0.007-0.221 |
| Other | 2.585 [1.819] | 0.651-10.269 | 2.568 [1.815] | 0.642-10.264 |
| Year | 1.460 [0.054]*** | 1.358-1.570 | 1.433 [0.053]*** | 1.332-1.541 |
| | Wald $\chi^2_9 = 609.66$ *** Log likelihood = -2040.4653 n = 21,976 | | Wald $\chi^2_{10} = 628.15$ *** Log likelihood = -2007.2002 n = 21,655 | |

LTCF, long-term care facility.

* $P < .05$; ** $P < .01$; *** $P < .001$.

^aMultivariable longitudinal logistic regression was used for both models 1 and 2.

^bNo dementia is the reference group.

^cMale is the reference group.

^dNon-Hispanic White is the reference group.

TABLE 3. Hospital Stays and Dementia Predicting Transition to Nursing Home and Non-Nursing Home Compared With Community Among Older Adults (2011-2019)^a

| | Model 1 | | Model 2 | |
|--------------------------------|--|--------------|--|------------------|
| | Community vs non-nursing home | | Community vs nursing home | |
| | OR (SE) | 95% CI | OR (SE) | 95% CI |
| Hospital stays | 1.075 [0.170] | 0.789-1.467 | 4.186 [1.742]** | 1.867-9.385 |
| Possible dementia ^b | 0.994 [0.248] | 0.609-1.621 | 4.903 [3.683]* | 1.125-21.670 |
| Probable dementia ^b | 4.803 [1.299]*** | 2.827-8.161 | 1539.822 [1192.926]*** | 337.331-7029.278 |
| Difficulty walking 6 blocks | 1.315 [0.291] | 0.852-2.028 | 13.706 [16.258]* | 1.340-140.150 |
| Difficulty climbing 20 stairs | 1.744 [0.347]** | 1.181-2.577 | 35.764 [30.982]*** | 6.547-195.358 |
| Age | 1.312 [0.031]*** | 1.252-1.374 | 1.332 [0.078]*** | 1.188-1.493 |
| Sex (female) ^c | 2.443 [0.747]** | 1.342-4.449 | 3.755 [3.055] | 0.762-18.496 |
| Race/ethnicity ^d | | | | |
| Black | 0.055 [0.028]*** | 0.020-0.150 | 0.781 [0.654] | 0.198-3.832 |
| Hispanic | 0.017 [0.019]*** | 0.002-0.150 | 0.035 [0.074] | 0.001-2.252 |
| Other | 3.285 [2.242] | 0.862-12.581 | 1.803 [3.331] | 0.048-67.361 |
| Year | 1.303 [0.049]*** | 1.210-1.402 | 3.178 [0.473]*** | 2.374-4.253 |
| | Wald $\chi^2_{11} = 488.07$ *** Log likelihood = -1680.2971 n = 21,077 | | Wald $\chi^2_{11} = 233.43$ *** Log likelihood = -512.181 n = 20,355 | |

* $P < .05$; ** $P < .01$; *** $P < .001$.

^aMultivariable longitudinal logistic regression was used for both models 1 and 2.

^bNo dementia is the reference group.

^cMale is the reference group.

^dNon-Hispanic White is the reference group.

After cleaning the data, we transformed these variables into dichotomous (yes/no) variables. Using stepwise longitudinal logistic regression, we tested the relationship between transition to an LTCF with each function variable. In the final models, we used only those that remained statistically significant (ie, difficulty in walking 6 blocks and climbing 20 stairs) throughout this process. We also controlled for age (a continuous variable), race/ethnicity (ie, non-Hispanic White, Black, Hispanic White, and other), and sex in the statistical model.

Stata 17.0 (StataCorp LLC) was used for the data analysis. We used longitudinal multivariable logistic regression models (random-effect specification) to examine the relationship between our binary dependent variable and multiple dependent variables after creating a long model (panel data) by appending 9 waves (2011-2019) of the data sets. A panel data set consists of multiple observations over time for the same participants, which allowed us to account for both cross-sectional variations (differences between participants) and time-series variations (changes within the same participant over time). After setting year as the time variable and excluding the participants meeting the exclusion criteria mentioned above, 2548 participants remained in each wave, for a total of 22,932 participants. Although the xtlogit model in Stata does not directly accommodate complex sample weights, we thoroughly considered alternative modeling strategies. Despite attempts with both mixed-effect and marginal-effect logistic regression models, which are capable of integrating sample weights but encountered convergence issues, we proceeded with xtlogit and supplemented our analysis with sensitivity checks. These checks involved comparing unweighted and weighted model outcomes, ensuring the robustness of our results about the relationship between dementia (possible and probable) and transition from community to LTCF. This approach, alongside a rigorous discussion of the limitations, has been detailed in the Methods section to provide clarity on our analytical choices and the robustness of our findings.

Table 1 shows the descriptive analysis. Table 2 model 1 focused on the impact of hospital stays and dementia on the transition from living in the community to LTCF, adjusting

for age, sex, race/ethnicity, and year. After testing for correlations between functions and transition to LTCF, Table 2 model 2 included difficulty walking 6 blocks, the only physical functioning measure significantly correlated with moving from the community to LTCF. For the analysis presented in Table 3, we utilized similar models to differentiate between transitions to nursing homes and non-nursing home settings, with adjustments for additional variables such as difficulty climbing 20 stairs, the only physical functioning measure significantly correlated with the transition to nursing homes.

RESULTS

In our analysis, we used the *xtset spid year* command in Stata to define the panel structure of our data set, specifying unique identifiers (ie, *spid*) for cross-sectional units and time periods (ie, years) to facilitate appropriate panel data analysis. The results indicated that all 2548 sample persons participated in all 9 waves (ie, strongly balanced).

In 2011, of 2545 participants, 4.75% (n = 121) of participants were living in facilities, of whom 91 were in non-nursing homes and 30 were in nursing homes, and 95.25% were in the community; within 9 years of this study, the proportion of those living in facilities significantly increased to 12.22% (n = 311 of 2545 participants) in 2019, with an average increase of approximately 1% each year. The proportion of participants in non-nursing home residential care centers changed from 3.62% (n = 91 of 2515) in 2011 to 8.10% (n = 197 of 2431) in 2019; the same increasing trend was observed for nursing homes (1.22% to 4.86%) from 2011 to 2019, but with a higher rate (approximately 4 times). Hospital stays had some fluctuations; however, the overall trend increased from 17.69% (n = 442 of 2498) in 2011 to 24.35% (n = 550 of 2259) in 2019. In regard to dementia, 4.32% (n = 108 of 2498) and 9.17% (n = 229) had probable and possible dementia in 2011, respectively. The proportion with probable dementia increased to 17.02% (n = 385 of 2262) in 2019, whereas the proportion with possible dementia declined to 8.44% (n = 191 of 2262) in 2019. It is important to consider the changes in the no dementia category, which showed a decreasing trend from 86.51% in 2011 to 74.54% in 2019, with some fluctuations. More than 72% of participants were non-Hispanic White, 20.29% were non-Hispanic Black, 4.91% were Hispanic, and approximately 2.7% were other races. The mean (SD) age of the participants was 75.83 (0.135) years in 2011, and 39.48% were male (Table 1).

The longitudinal multivariable logistic regression in Table 2 model 1 analyzed the effects of hospital stays, dementia status (possible and probable), age, sex, race/ethnicity, and yearly trends on the likelihood of transition from community to LTCF. It shows that a hospital stay can significantly increase the probability of transfer from community to LTCF by approximately 38%. Possible dementia and probable dementia can increase this probability by 13% and 10 times (ie, compared with those who have no dementia), respectively; possible dementia was not statistically significant. As people grow older, 1 year can significantly increase the probability

of moving from community to LTCF by approximately 33%; older women are 3 times more likely to move to an LTCF than older men. Regarding race and ethnicity, Black and Hispanic White individuals are significantly less likely to transfer to an LTCF compared with non-Hispanic White individuals (Table 2).

Among physical functioning factors, difficulty in walking 6 blocks was significantly correlated with moving from the community to an LTCF. Adding difficulty in walking 6 blocks in the second model of Table 2 shows a slight change in other factors but is not significant. However, those participants who had difficulty in this physical activity were 99% more likely to move from the community to an LTCF (Table 2 model 2).

We used the multivariable longitudinal logistic regression in Table 3 models 1 and 2 to examine the possibility of moving from community to non-nursing homes and nursing homes. Table 3 model 1 shows hospital stays can increase the probability of moving to non-nursing homes by 7.5%, which is not statistically significant. Compared with no dementia, probable dementia can increase this risk by approximately 5 times. The ability to climb 20 stairs can significantly predict the possibility of moving from community to non-nursing home facilities, as those with difficulty performing this task are 74% more likely to transfer to non-nursing home facilities. Older women are more than 2 times more likely to move from community to non-nursing home facilities compared with older men. Similar to the Table 2 models, a 1-year increase in age can increase this risk by 31%.

Table 3 model 2 shows the predictors of moving from community to nursing homes. Hospital stays are associated with a more than 4-fold increase in the likelihood of transitioning to a nursing home compared with non-nursing home transitions (OR, 4.186; 95% CI, 1.867-9.385). Using the fixed-effect model showed that hospital stays can significantly increase the probability of moving to nursing homes by more than 8 times. Difficulty walking 6 blocks can significantly increase the risk of transferring to nursing homes by more than 13 times. Difficulty climbing 20 stairs can significantly increase the risk of moving to nursing homes by more than 35 times.

DISCUSSION

Our study delved into the intricate dynamics surrounding the relocation of older adults from community living to LTCFs, focusing on the predictive roles of possible and probable dementia and hospital stays. As the US population grows older, the prevalence of residency in LTCFs increases,¹ and LTCF services in general, and nursing homes specifically, are very expensive (ie, estimated US spending for long-term care in 2020 was \$361.6 billion) and funded mainly by governmental and social support, which are limited in the US compared with other high-income countries.³⁵ Reviewing a 9-year duration of the NHATS, our findings underscore a substantial increase in the proportion of individuals transitioning to LTCFs, as the proportion of participants residing in LTCFs approximately tripled within the 9 years of this study, highlighting the significance

of understanding and managing this complex health care transition experience for the aging population.

Because provided services in LTCFs vary in different areas and the covered services are not the same for every individual, understanding the predictors of moving from community to these institutions can help to reduce the disparity and increase the chance of aging in place, hence reducing the cost and burden on family members.^{25,36,37} Moreover, relocation can increase stress and risk of depression,³⁸ which are correlated with the risk of dementia among older adults.³⁹

Hospitalization has been studied as one of the predictors of transferring to nursing homes⁴⁰ or other LTCFs.⁴¹ Our results align with existing literature emphasizing the multifaceted nature of late-life relocations influenced by dementia and hospital admissions. Hainstock et al reported that more than 87% of the participants in their study who moved from community to residential care centers had a history of hospital stays,⁹ and Goodwin et al reported that the risk of posthospitalization admission to skilled nursing homes would be 10 times higher than for those who had no hospitalization.¹² These reports indicate a wide range of risks, although the destinations (ie, residential care facilities vs skilled nursing homes) are different. In our study, hospital stays continuously increased, with slight fluctuations in the middle (2015). Our findings reveal that hospital stays should be considered one of the significant predictors for moving to LTCFs, but more importantly for nursing homes, as they can increase the risk of relocation more than 4 times. Repeated hospital stays can increase the risk of losing function and mobility¹³ and also increase the risk of cognitive impairment^{13,16}; conversely, residing in an LTCF can increase the risk of repeated hospital admission¹⁵ and create a vicious cycle. Hence, reducing the trend of repeated hospital admissions can reduce the probability of relocation to LTCFs and the cost of care.

Based on our findings, the proportion with possible dementia did not show considerable changes when the proportion with no dementia decreased, and probable dementia showed a 3-fold increase. This growing trend is congruent with the increase in the prevalence of ADRD in the US.⁴² As Hajek et al reported, with increasing risk of losing cognitive function, the probability of moving from community to residential institutions rises when dementia can increase this risk by 154 times.⁴³ Our findings show that probable dementia can increase this risk by approximately 10 times; however, because the level of care is different in LTCFs,⁴⁴ it is critical to separate nursing homes from non-nursing homes. Greiner et al reported that Alzheimer disease can increase the risk of relocation to nursing homes by 30%.² Our findings shed light on this difference when probable dementia can increase the risk of moving from community to non-nursing homes approximately 5 times, whereas this risk can be 1539 times greater than for nursing homes. The observed rise in relocation rates parallels the anticipated surge in ADRD cases, emphasizing the growing relevance of our investigation in the context of evolving demographic trends.

Hajek and colleagues reported mobility impairments (ie, walking) as one of the significant predictors of institutionalization using longitudinal data.⁴³ Our findings also showed that difficulty in

walking 6 blocks could increase the probability of moving to an LTCF by 99%; this risk was more than 13 times higher for nursing homes. Another mobility factor we examined was difficulty climbing 20 stairs, which has not been reported to the best of our knowledge. This difficulty can increase the risk of moving to non-nursing home facilities by 74% and to nursing homes by more than 35 times.

Our exploration of race/ethnicity and sex disparities in relocation probabilities adds a layer of complexity to the discussion. The increased likelihood of women moving to LTCFs compared with men and the differential impact on various racial and ethnic groups point toward the need for targeted interventions that consider these demographic variations. Chaulagain et al reported family support and sociopsychological factors mediated by economic factors as predictors of relocation to LTCFs.⁸ Fennell et al reported that Hispanic individuals are more likely to receive poor-quality care in low-rated nursing homes due to financial barriers.³⁷ Considering social support, cultural values, and language barriers in different races and ethnic groups as some of the factors affecting relocation from the community to LTCFs and the quality of care is critical in future studies.

The implications of our findings extend to health care policy and geriatric care practices. Interventions to prevent repeated hospitalization, improve dementia care, and maintain physical function (eg, physical therapy to improve walking and stair climbing, which may delay relocation to nursing homes) can offer potential avenues for mitigating relocation risks. The role of health care professionals, including nurses and physicians,⁴⁰ in coordinating care and reducing relocation rates among individuals with a history of hospitalization and cognitive impairment becomes particularly salient.

Limitations

Despite the robustness of our study, we acknowledge certain limitations. The reliance on retrospective data and the exclusion of newly included participants may impact the generalizability of our findings. Future research could address these limitations and further refine our understanding of the relocation process. Certainly, the limitations of our study include the inability of xtlogit models to incorporate sample weights, a restriction that could impact the representativeness of our findings. Despite attempts with alternative modeling approaches, convergence issues necessitated the use of xtlogit without weights, and although sensitivity analyses suggest that our results are robust, the findings should be interpreted with caution.

Future research could explore additional variables, such as social support networks and caregiver health, to advance the understanding of the factors influencing relocation. Longitudinal studies with expanded cohorts could provide a more comprehensive view of the complexities of late-life relocations.

CONCLUSIONS

Our study sheds light on the critical interplay among hospital stays, cognitive impairment, and relocation to LTCFs in older adults. By elucidating these dynamics, we contribute to the evolving discourse on

geriatric care and health policy, providing valuable insights for future research, interventions, and policy directives. With the significant correlations between hospital stays and probable dementia with relocation to nursing homes, we recommend programs to screen for cognitive function among community-dwelling older adults, in particular those who have a history of hospital admissions and mobility difficulty. ■

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