

Health and Functional Outcomes and Health Care Utilization of Persons With Dementia in Residential Care and Assisted Living Facilities: Comparison With Nursing Homes

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Purpose: This study compares health and functional outcomes and health care utilization of persons with dementia residing in residential care/assisted living (RC/AL) facilities and nursing homes. **Design and Methods:** The study uses data from a longitudinal cohort study of 1,252 residents with dementia in 106 RC/AL facilities and 40 nursing homes in four states. **Results:** Rates of mortality; new or worsening morbidity; and change in activities of daily living, cognition, behavioral problems, depressive symptoms, social function, and withdrawal did not differ between the two settings. However, because of death or transfer, only about one half of the persons with mild dementia and one third of those with moderate to severe dementia remained in RC/AL facilities 1 year after enrollment. In addition, hospitalization rates were greater among individuals with mild dementia in RC/AL facilities, largely because of a medically unstable subgroup with high nursing-home-transfer rates. **Implications:** Many persons

with dementia can be served equally well in either setting; however, those with major medical care needs may benefit from nursing home residence.

Key Words: *Alzheimer's disease, Outcomes, Nursing homes, Assisted living, Residential care, Special care units*

Nursing homes have traditionally served the vast majority of institutionalized persons with Alzheimer's disease and related dementias; however, recent years have seen rapid expansion of residential care–assisted living (RC/AL), a model of care that claims to emphasize resident independence, autonomy, dignity, and privacy (Mollica, 1998; Zimmerman, Sloane, & Eckert, 2001). Over the past two decades, RC/AL has grown from a concept to an industry that cares for 1.25 million of America's elderly persons in more than 36,000 facilities nationwide (Galloro, 2001; Mollica, 2002; Sullivan, 1998). The opportunity for cost savings (Leon, Cheng & Neuman, 1998; Leon & Moyer, 1999) by using these facilities in place of nursing homes has put pressure on states to provide Medicaid funding for RC/AL, and, by 2003, 41 states provided some public funding for RC/AL (Mollica, 2002). Currently, approximately 60% of nursing home residents and nearly 40% of RC/AL residents suffer from some form of dementia (Magaziner, Zimmerman, Fox, & Burns, 1998; Mollica, 2001; Sloane, Zimmerman, & Ory, 2001; Sullivan), and nearly three fourths of individuals with Alzheimer's disease spend some time in one or another of these settings (Welsh, Walsh, & Larson, 1992).

Despite the recent growth of RC/AL, to our knowledge no large study has examined whether dementia care in these settings differs from that

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provided by nursing homes. Proponents of RC/AL claim that it provides a homelike atmosphere that may help maintain function, promote independence, improve resident outcomes, enhance family and staff satisfaction, and improve quality of life (Saxton, Silverman, Ricci, Keane, & Deeley, 1998). Others have noted, however, that because RC/AL homes often lack professional staff, they may not adequately address functional status needs, depression, comorbid conditions, and other causes of morbidity and mortality among persons with dementia (Pruchno & Rose, 2000). As a further complicating factor, specialized dementia care units and facilities have proliferated in RC/AL, adding one more subquestion to the debate (Davis et al., 2000).

Given that RC/AL and nursing homes often serve dementia residents with similar characteristics (Davis et al., 2000), an important policy and practice question is the extent to which outcomes of care may differ across settings. Among the outcomes of interest are mortality, rates of decline in functional status, and the incidence of new health events such as decubiti and infection (Galasko et al., 1995; National Institute on Aging/National Institutes of Health [NIH], 1999). In this article we compare health and functional outcomes and health care utilization of persons at similar stages of dementia, using data from a large, multistate cohort study of RC/AL facilities and nursing homes.

Methods

Participants

In these analyses we describe the 1-year outcomes of participants with dementia who were enrolled in the Collaborative Studies of Long-Term Care (CS-LTC), a longitudinal cohort study of a stratified random sample of RC/AL facilities and nursing homes in Florida, Maryland, New Jersey, and North Carolina. We chose the four states, after consulting with national experts and reviewing state regulations, because each had a well-developed RC/AL sector, and the four states varied in their regulatory approaches to the term *assisted living*. At the time, Florida contained nearly 10% of all such beds in the nation; North Carolina had the greatest Medicaid support for residents at this level of care; New Jersey was the third state in the nation to implement an Oregon-type “assisted living” licensure category; and Maryland’s regulations were less developed than those of the other three states (Zimmerman, Sloane, Eckert, Buie, et al., 2001). The study defined RC/AL as all residential long-term care facilities licensed by the states at a non-nursing-home level of care that provided room, board, 24-hr oversight, medication administration, and assistance with activities of daily living. This definition of assisted living included three separate facility licensure

categories in both Florida and New Jersey and two categories in both Maryland and North Carolina, five of which (all in NC and MD and one in NJ) were specifically designated as “assisted living” by state regulations.

To ensure adequate representation of the range of RC/AL types across the study states, we randomly sampled facilities in four strata and selected residents by using a strategy that was designed to enroll approximately equal numbers of participants in each stratum. The four sampling strata were (a) small (< 16 beds) RC/AL facilities; (b) new-model RC/AL facilities (≥ 16 beds, built after 1986, and with at least one of the following features of newer, health service intensive RC/AL: charges that varied by resident service need, having $\geq 20\%$ of residents who required assistance in transfer, having $\geq 25\%$ of residents who were incontinent daily, or having a licensed nurse on duty 24 hr/day); (c) “traditional” RC/AL facilities (≥ 16 beds, not meeting the new-model definition); and (d) nursing homes. We defined dementia special care units as areas within facilities (or entire facilities) that were self-designated as Alzheimer’s or dementia units, and within which at least three fourths of the residents had a diagnosis of Alzheimer’s disease or a related disorder. The facility recruitment rate was 59%; nonparticipating facilities did not differ from participating ones in proprietary status, age, size, or occupancy rate, or resident age or ethnicity–race. Further details of the study design are provided elsewhere (Zimmerman, Sloane, Eckert, Buie, et al., 2001).

Within study RC/AL facilities, we enrolled a random sample of residents. Within nursing homes, we drew a stratified random sample with the goal of enrolling approximately equal numbers of persons with mild dementia (i.e., who were ambulatory and had a dementia diagnosis) and with moderate to severe dementia (i.e., had dementia and required physical assistance with ambulation, transfer, or feeding); thus, enrollment criteria within nursing homes excluded individuals undergoing rehabilitation and oversampled ambulatory persons with dementia. Across facility types the recruitment rate for eligible resident participants was 92%. Each facility received an on-site data-collection visit on enrollment in the study (October 1997 through November 1998), during which a variety of facility- and resident-level data were obtained. Subsequently, we had each facility telephoned quarterly for 1 year to identify the incidence of new health events and changes in a variety of psychosocial and functional measures for each enrolled resident. Participants who were permanently transferred out of study facilities were censored at the time of discharge; in these cases, we gathered medical, functional, and health care utilization data about their status prior to discharge. This study was approved by the Institutional Review Board of the University of North Carolina at Chapel Hill.

Selection of Participants With Dementia

These analyses involved the 1,252 CS-LTC participants from 206 facilities who, on enrollment, met study criteria for dementia and whose level of dementia (mild, moderate, or severe) could be determined. We defined dementia to be present if, at baseline, (a) the medical record reported a diagnosis of Alzheimer's disease, senile dementia, organic brain syndrome, cerebral arteriosclerosis, multi-infarct dementia, subcortical dementia, Binswanger's disease, Pick's disease, Creutzfeldt-Jakob disease, Lewy body disease, or unspecified dementia; and (b) the participant received a score of ≥ 2 on the Minimum Data Set Cognition Scale (MDS-COGS; Hartmaier, Sloane, Guess, & Koch, 1994), which is roughly equivalent to a Mini-Mental State Examination score of < 23 (Gruber-Baldini, Zimmerman, Mortimore, & Magaziner, 2000; Hartmaier et al.). We assigned severity of dementia on the basis of impairment of three activities of daily living (ADLs): locomotion, transfer, and feeding. We classified participants meeting the study diagnosis of dementia who were independent in all three of these ADLs as having mild dementia; we classified those who required physical assistance with one or more of these ADLs as having moderate to severe dementia. This system of classification results in a moderate-severe category that roughly includes persons at stage 6 or 7 (severe or very severe cognitive impairment) on the Global Deterioration Scale (Reisberg, Ferris, de Leon, & Crook, 1982), stage 3 (severe dementia) on the Clinical Dementia Rating Scale (Hughes, Berg, Danzinger, Coben, & Martin, 1982), and a score of 5 or greater (moderate, severe, or very severe dementia) on the MDS-COGS (Hartmaier et al.). We excluded 30 enrolled participants with dementia from analyses because data were insufficient for us to determine the level of dementia.

Measures and Data Collection

Enrollment data were gathered on site by professional data collectors, the majority of whom were nurses. Follow-up data were gathered by telephone interview. All data collectors were trained and supervised by the study's principal investigators (P. Sloane and S. Zimmerman).

Data collectors collected basic demographic information on study participants, including age, gender, race or ethnicity, education, marital status, length of residence in the facility at baseline, and comorbid illness at baseline, from the resident or a staff member who was knowledgeable and familiar with the resident's health. For analysis purposes, we express comorbidity as a summary scale of the presence or absence of the following morbidities: peripheral vascular disease, congestive heart failure, hypertension, hypotension, myocardial infarction, other heart problems, Cushing's syndrome, diabetes,

hyperparathyroidism, thyroid or other glandular disorders, pituitary disorders, blindness, glaucoma, cataracts, or macular degeneration, liver disease, chronic renal disease, stomach or intestinal ulcers, AIDS, arthritis, fracture, osteoporosis, Paget's disease, cerebrovascular disease, hemiplegia, paraplegia, dizziness or imbalance, seizures, mental retardation, Parkinson's disease, chronic pulmonary disease, cancer, and mental or psychiatric illness.

We had all measures for which change would be recorded over time collected at baseline from staff interviews, thereby allowing for the same individuals (or, in cases of staff turnover, their replacements) to serve as respondents for follow-up data collection. We used the following measures to assess change in participant function over time:

1. We measured ADLs by using items from the nursing home Minimum Data Set. Inter-rater reliabilities for individual items exceed .90 (Hawes et al., 1995). We scaled items by using the Morris long scale (MDS ADL), which adds the 0–4 ratings (0 = *independent or no assistance*; 4 = *total dependence*) on seven ADLs (bed mobility, transfer, locomotion on unit, dressing, eating, toilet use, and personal hygiene; see Morris, Fries, & Morris, 1999).
2. We assessed cognitive status by using the MDS-COGS, a 10-point scale that assesses the presence and severity of cognitive impairment and that correlates ($r = -0.88$) with the Mini-Mental State Exam, and that has sensitivity, specificity, and chance-corrected agreement (kappa) above .80 (Hartmaier et al., 1994).
3. We measured behavioral problems by using the short version of the Cohen-Mansfield Agitation Inventory (CMAI; Cohen-Mansfield & Billig, 1986), a 14-item scale that identifies the frequency (on a 5-point scale) of agitated behaviors over the past 2 weeks on the basis of staff report. The CMAI includes factors of physically aggressive and physically nonaggressive behaviors, and verbally aggressive and verbally nonaggressive behaviors (Miller, Snowdon, & Vaughn, 1995).
4. We recorded depressive symptoms by using the Cornell Scale for Depression in Dementia, an observer-rated scale of depressive symptomatology designed to rate depression in individuals with dementia. This scale is the only depression scale validated for long-term care populations with dementia; inter-rater reliability is $\kappa = .67$ and internal consistency is $\alpha = .84$ (Alexopoulos, Abrams, Young, & Shamoian, 1988).
5. We assessed social function in the preceding 7 days by using items such as going to the barber or beauty shop, attending senior adult day care, and working on a hobby. We derived information on participation in social activities from questions asked in an earlier study of residential care facilities (Dittmar, 1989; Dittmar, Smith, Bell,

Jones, & Manzanares, 1983). These 17 items on participation (yes or no) encompass active-passive, solitary-group, and residential-community activities (House, Robbins & Metzner, 1982).

6. We assessed social withdrawal with a seven-item scale of the Multidimensional Observation Scale for Elderly Subjects (Helms, Csapo, & Short, 1987), which measures contact with and interest in people, events, and activities.

We had baseline data collected during site visits to each of the study facilities. We had follow-up interviews conducted quarterly by telephone so that we could assess whether or not residents had died, been discharged (including date and destination of discharge), been hospitalized, or experienced any new or worsening morbidity during the quarter. We defined new or worsening morbidity as the incidence or worsening of fracture, infection, stroke or paralysis, bleeding from the stomach or bowel, diabetes, heart condition, or skin ulcer; we chose these morbidities because they are relatively common in long-term care and have risk factors that can be modified through medical or nursing treatment. At the 1-year interview, or when a participant had been discharged during the quarter, the interviewers also administered the study measures of ADLs, cognitive status, behavior, depressive symptoms, social function, and withdrawal, determining 1-year status or that immediately prior to discharge.

Analysis

We calculated descriptive statistics by using appropriate programs from the Statistical Analysis System (SAS Institute, 2000). We modeled rates of mortality, hospitalization, and the incidence of new or worsening morbidity by using repeated measures analysis, in which we used generalized estimating equations (Liang & Zeger, 1986) to fit a Poisson regression model. For analytical purposes, we combined all new or worsening morbidities. We used Cox proportional hazards models to generate *p* values for differences between mean time to death. We modeled functional change by using generalized estimating equations to estimate differences in means. In additional analyses we compared outcomes of dementia special care unit residents with non-unit residents in RC/AL and nursing facilities, controlling for baseline resident characteristics.

To adjust for baseline differences between the RC/AL and nursing home samples, we (a) analyzed all models in two strata by degree of ADL impairment (independent or with some impairment of locomotion, transfer, or feeding), and (b) adjusted all models for the following resident baseline characteristics: age, gender, race, marital status, education, length of stay, MDS-COGS, and number

of comorbid conditions. To adjust for differential selection probabilities among the three facility types, we had all outcome analyses incorporate sampling weights (i.e., statewide proportions of residents and facilities in each sampling stratum, be it small, traditional, or new model).

Results

Characteristics of Study Facilities and Residents

A total of 206 facilities contributed participants to these analyses. Of these, 166 were RC/AL facilities (93 small, 34 traditional, and 39 new-model type) and 40 were nursing homes. Compared with nursing homes, the RC/AL facilities were smaller (mean bed size 30 vs 116; $p < .001$), newer (mean age 12 vs 24 years; $p < .001$), and more commonly for profit (83% vs 58%; $p = .004$). RC/AL facilities also provided fewer health ($p < .001$) and social or recreational ($p < .001$) services than nursing homes. Within these facilities, the analytic sample included 783 residents of RC/AL facilities and 489 residents of nursing homes; all of these individuals met study inclusion criteria for dementia.

Table 1 compares the RC/AL and nursing home samples in terms of selected demographic and health status characteristics measured on study enrollment. The RC/AL sample of individuals contained a higher proportion of participants who were White, widowed, had at least a high school education, and had mild dementia; nursing homes housed more African Americans, more persons who were divorced or separated, and more individuals with less than an eighth-grade education. The mean length of stay of the nursing home cohort at the time of study enrollment (896 days) was longer than that of the RC/AL participants (725 days). On average, the individuals in RC/AL, when compared with the individuals in the nursing homes, exhibited less severe cognitive impairment, fewer comorbid conditions, fewer impairments of ADLs, more depression, better social function, and less withdrawal; we noted no difference between the groups in the prevalence of problem behaviors.

Disposition of Study Sample at 1 Year

Table 2 shows the disposition of study participants at 1 year by facility type and dementia severity. Crude mortality rates of nursing home residents were higher than those of RC/AL residents among both mild and moderate to severe dementia subgroups. However, the residential care facilities discharged nearly one fourth of both mild and moderate to severe residents to nursing homes, where subsequent follow-up was not conducted. In contrast, fewer than 10% of nursing home participants were discharged or otherwise lost to

Table 1. Characteristics of Participants on Study Enrollment, by Facility Type

| Characteristic | Type of Facility | | <i>p</i> |
|---|----------------------------|-------------------------|----------|
| | RC/AL (<i>n</i> = 773) | NH (<i>n</i> = 479) | |
| Age, <i>M</i> (<i>SD</i>) | 84.4 (6.9) | 84.9 (7.5) | .195 |
| Female, % | 78.1 | 76.2 | .426 |
| Race, % | | | |
| Caucasian | 92.1 | 80.5 | .001 |
| African American | 5.2 | 17.8 | .001 |
| Other | 2.6 | 1.5 | .186 |
| Marital status, % | | | |
| Married | 13.8 | 15.3 | .446 |
| Widowed | 73.3 | 65.4 | .003 |
| Never married | 6.4 | 9.4 | .045 |
| Divorced or separated | 4.8 | 9.0 | .003 |
| Education in years, <i>M</i> (<i>SD</i>) | 12.3 (3.6) | 11.0 (4.9) | .001 |
| ≤ 8 th grade, % | 17.4 | 33.2 | .001 |
| 9 th –12 th grade, % | 44.7 | 37.8 | .035 |
| > 12 th grade, % | 37.9 | 29.0 | .006 |
| Dementia status, % | | | |
| Mild | 70.6 | 50.7 | .001 |
| Moderate or severe | 29.4 | 49.3 | .001 |
| Length of stay in facility (in days), <i>M</i> (<i>SD</i>) | 724.8 (740.8) | 896.0 (866.2) | .001 |
| No. of comorbid conditions, <i>M</i> (<i>SD</i>) | 3.6 (2.3) | 4.4 (2.2) | .001 |
| ADL impairment (MDS-ADL), <i>M</i> (<i>SD</i>) | 7.6 (7.9) | 11.9 (8.2) | .001 |
| Cognition (MDS-COGS), <i>M</i> (<i>SD</i>) | 5.3 (2.4) | 5.7 (2.3) | .005 |
| Behavior (CMAI), <i>M</i> (<i>SD</i>) | 19.7 (7.3) | 19.8 (7.1) | .821 |
| Depression (CSDD), <i>M</i> (<i>SD</i>) | 4.5 (4.8) | 3.6 (4.6) | .001 |
| Social functioning, <i>M</i> (<i>SD</i>) | 5.1 (3.0) | 4.2 (2.7) | .001 |
| Withdrawal (MOSES subscale), <i>M</i> (<i>SD</i>) | 18.0 (6.2) | 20.4 (5.6) | .001 |

Notes: RC/AL = residential care/assisted living; NH = nursing home; ADL = activity of daily living; MDS = Minimum Data Set; COGS = cognition; CMAI = Cohen-Mansfield Agitation Inventory; CSDD = Cornell Scale for Depression in Dementia; MOSES = Multidimensional Observation Scale for Elderly Subjects.

follow-up. As a result of death and transfer, only 52% of persons with mild dementia remained in RC/AL facilities after 1 year, compared with 71% of individuals at similar levels of dementia who resided in nursing homes at study entry. Among those with moderate to severe dementia, only 38% of the RC/AL cohort remained in the facility after 1 year, compared with 63% of the nursing home cohort.

Mortality, Hospitalization, and New or Worsening Morbidity

Table 3 displays the adjusted rates of mortality, hospitalization, new or worsening morbidity, and functional change for the RC/AL and nursing home cohorts, stratified by dementia status. To control for baseline differences between these cohorts, we adjusted for baseline age, gender, race, education,

marital status, length of stay on enrollment, cognitive status, and number of comorbid conditions in all analyses. Rates of mortality, hospitalization, and new or worsening morbidity are displayed per 100 residents per quarter, because quarterly follow-up data-collection interviews recorded the presence or absence of health events during the reporting period. These adjusted results identify no significant difference in mortality or incidence of new or worsening morbidity between RC/AL facilities and nursing homes for either individuals with mild dementia or moderate to severe dementia. Hospitalization rates were, however, significantly higher among RC/AL residents with mild dementia than among nursing home residents of similar dementia severity.

To further investigate the relationship between hospitalization and facility type, we studied the rates of hospitalization and new or worsening medical morbidity separately for RC/AL residents who, during the follow-up period, were (a) subsequently transferred to nursing homes (*n* = 179) and (b) retained in the facility (*n* = 558); we combined mild and moderate to severe subgroups for these analyses. The hospitalization rate for participants retained in RC/AL facilities (12.6%) did not differ significantly from that of all nursing home participants (10.1%; *p* = .218). For the group transferred from residential care to nursing homes, however, the hospitalization rate was 29.2%, which differed significantly from both other groups (*p* < .001). Similarly, the residential care group retained in the facilities had similar rates of new or worsening morbidity (20.6%) to the nursing home cohort (23.2%; *p* = .280), whereas the rate for participants transferred to nursing homes (34.6%) differed significantly from both the retained RC/AL group (*p* < .001) and the nursing home group (*p* < .002). Baseline comorbidity was not associated with hospitalization among RC/AL participants with mild dementia or moderate to severe dementia.

Rates of Functional Change

The lower portion of Table 3 displays the rates of functional change over 1 year for all study participants, adjusted for baseline age, gender, race, education, marital status, length of stay on enrollment, cognitive status, and comorbidity. All participants were included, with change scores for discharged or deceased participants calculated on the basis of reported status immediately prior to discharge. Mean rates of decline in ADL, cognitive, and social function did not differ between the facilities and nursing homes for either the mild dementia cohort or the moderate to severe dementia cohort. Similarly, we noted no statistically significant difference in rates of change in behavior, depressive symptoms, or withdrawal.

Table 2. One-Year Disposition Outcomes of Residents With Dementia, by Dementia Severity and Facility Type, as Percent of Enrolled Participants

| Disposition 1 Year After Study Entry | Mild Dementia | | Moderate or Severe Dementia | |
|---|-------------------------|----------------------|-----------------------------|----------------------|
| | RC/AL (<i>n</i> = 546) | NH (<i>n</i> = 243) | RC/AL (<i>n</i> = 227) | NH (<i>n</i> = 236) |
| Died, % (<i>N</i>) | 11.7 (64) | 17.7 (43) | 22.0 (50) | 27.5 (65) |
| Discharged to another setting, % (<i>N</i>) | | | | |
| NH | 22.2 (122) | 7.0 (17) | 25.1 (57) | 7.6 (18) |
| RC/AL | 6.6 (36) | 2.5 (6) | 6.2 (14) | 0.4 (1) |
| Home | 2.4 (13) | 0.4 (1) | 2.6 (6) | 1.3 (3) |
| Remaining in facility, % (<i>N</i>) | 52.2 (285) | 71.2 (173) | 38.3 (87) | 62.7 (148) |
| Other (hospital or street), % (<i>N</i>) | 1.1 (6) | 0.4 (1) | 2.6 (6) | 0.4 (1) |
| Unknown, % (<i>N</i>) | 3.7 (20) | 1.2 (3) | 3.1 (7) | 0 (0) |

Notes: RC/AL = residential care/assisted living; NH = nursing home.

Residence in Specialized Units

When we compared dementia special care units with nonspecialized settings, we observed few differences in outcomes (Table 4). In both RC/AL facilities and nursing homes, we noted no significant differences in mortality or in rates of change in cognition, behavioral problems, depression, social function, or withdrawal. Rates of hospitalization and of new or worsening morbidity were lower in nursing home special care units than in nonspecialized settings in nursing homes; however, we did not observe this relationship in RC/AL. ADL decline was more rapid in special care units than in nonspecialized settings in these facilities, largely as a result of an increased rate of decline among persons with moderate to severe dementia; however, we did not observe this association in nursing homes.

Discussion

The rapid growth of RC/AL in the United States has been accompanied by claims that this less medicalized form of long-term care can adequately serve many individuals traditionally housed in nursing homes. Because persons with dementia comprise the majority of nursing home residents and a growing proportion of RC/AL residents, an important question for policy makers, care providers, and families is whether or not assisted living can adequately serve some or all of the dementia residents who would otherwise be placed in nursing homes. The question has significant cost implications, because overall RC/AL costs may be significantly lower than those of nursing home care. According to Leon and Moyer (1999), if all dementia residents currently in nursing homes were shifted to residential care or assisted living, national long-term care expenditures would be reduced by 14%.

In this study we compared 12-month outcomes of a cohort of RC/AL residents with dementia with those of similar residents in nursing homes, controlling for baseline differences in subject age, gender,

race, education, marital status, length of stay, cognition, and comorbidity. These analyses indicate that, for both mild and moderate to severe dementia, health outcomes did not differ between these facilities and nursing homes. Adjusted models (Table 3) identified no significant difference in mortality, incidence of new or worsening health conditions, or rate of change in functional dependency, cognition, behavioral problems, depressive symptoms, social function, or social withdrawal. Thus, these results suggest that, in terms of the health outcomes studied, many persons with dementia can be served equally well in either setting.

The one area where outcomes clearly differed was hospitalization rates, which were 69% and 42% higher, respectively, for participants with mild and moderate to severe dementia in RC/AL than for similar participants in nursing homes (Table 3). Although they did not appear to cause an overall increase in mortality or functional decline, such persons were largely responsible for the nearly 25% annual rate of nursing home transfer among facility residents (Table 2). This finding suggests that RC/AL facilities tend to have difficulty managing residents with dementia who have or develop significant medical or nursing care needs, in spite of some claims that these facilities can allow aging in place through the addition of home health, hospice, and other services (Thompson & Marinaccio, 1997). This finding is consistent with the results of Carter and Porell (2003), who reported that underlying respiratory, genitourinary, or circulatory conditions among nursing home residents were associated with increased risk of hospitalization. Thus, it appears likely that persons with dementia who are medically stable may do well over long periods of time in residential care or assisted living facilities. For those who are medically unstable, however, nursing homes may be better able to avoid hospitalization and, therefore, to both reduce cost and prevent the functional deterioration that frequently follows hospitalization (Coleman, Barbaccia, & Croughan-Minihane, 1990).

Table 3. One-Year Health and Health Care Utilization Outcomes of Participants With Dementia, by Dementia Severity and Facility Type

| Health Outcomes During 1 Year | Mild Dementia | | <i>p</i> | Moderate or Severe Dementia | | |
|---|----------------------------|-------------------------|----------|-----------------------------|-------------------------|----------|
| | RC/AL (<i>n</i> = 546) | NH (<i>n</i> = 243) | | RC/AL (<i>n</i> = 227) | NH (<i>n</i> = 236) | <i>p</i> |
| Incidence rate per 100 participants per quarter | | | | | | |
| Mortality ^a | 3.2 | 4.2 | .409 | 3.7 | 4.2 | .683 |
| Hospitalization ^b | 14.2 | 8.4 | .009 | 14.2 | 10.0 | .115 |
| New or worsening morbidity ^b | 23.5 | 21.8 | .574 | 21.1 | 21.7 | .865 |
| Mean change per 12 months ^c | | | | | | |
| Increase in ADL dependency (MDS-ADL) | 4.29 | 5.80 | .059 | 0.87 | 1.13 | .807 |
| Increase in cognitive impairment (MDS-COGS) | 0.41 | 0.71 | .181 | -0.13 | 0.45 | .093 |
| Increase in behavior problems (CMAI) | 1.08 | 0.69 | .604 | 1.72 | 1.49 | .809 |
| Increase in depressive symptoms (CSDD) | 1.33 | 1.53 | .753 | 1.52 | 0.85 | .409 |
| Decrease in social function | 1.55 | 1.76 | .568 | 0.91 | 1.44 | .110 |
| Increased withdrawal from activities (MOSES subscale) | 2.84 | 2.24 | .364 | 2.55 | 1.78 | .307 |

Notes: RC/AL = residential care/assisted living; NH = nursing home; ADL = activity of daily living; MDS = Minimum Data Set; COGS = cognition; CMAI = Cohen-Mansfield Agitation Inventory; CSDD = Cornell Scale for Depression in Dementia; MOSES = Multidimensional Observation Scale for Elderly Subjects. All analyses were weighted, with RC/AL residents assigned weights based on probability of selection within each state. Nursing home participants were selected with equal probabilities of selection and therefore did not require weighting. All models were adjusted for baseline age, gender, race, education, marital status, length of stay, cognition (MDS-COGS), and number of comorbid conditions.

^aModeled using generalized estimating equations to fit a Poisson regression model; significance tests used Cox proportional hazards.

^bModeled using generalized estimating equations to fit a Poisson regression model.

^cModeled using generalized estimating equations to estimate differences in means, controlling for the baseline status of the variable being studied.

These analyses also found little difference in outcomes of dementia special care units when they were compared with nonspecialized settings (Table 4). In both nursing homes and RC/AL facilities, rates of mortality and of change in cognition, behavioral problems, depressive symptoms, social participation, and withdrawal did not differ between special care and nonspecial care units. Nursing home special care units did, however, appear to have reduced morbidity and hospitalization rates, and units in RC/AL to have higher rates of ADL decline. Although worthy of follow-up study, these isolated findings do not appear to represent a consistent pattern and, therefore, could well be spurious, considering the use of multiple comparisons in these analyses. Thus, the overall impression is that these findings add to a growing body of evidence that placement in a special care unit does not alter health and functional outcomes (Day, Carreon, & Stump, 2000; Phillips et al., 1997; Sloane, Lindeman, Phillips, Moritz, & Koch, 1995). Our study did not, however, evaluate psychosocial outcomes such as overall quality of life and resident and family satisfaction, and it is possible that these may have differed between special care units and nonspecialized settings.

Although we conducted the study and its analyses to minimize bias, several aspects of the study methods deserve comment. The selection of states and facilities, although designed to capture a wide range of facility types and residents, did result in a sample from which the unadjusted rates (Tables 1

and 2) cannot be generalized to either the study states or the nation. However, our outcome analyses (Tables 3 and 4) did adjust for sampling weights and, therefore, should be generalizable at least to the study states. The 41% facility refusal rate could constitute a source of bias; however, a survey of nonrespondent facilities identified few differences between responders and nonresponders (Zimmerman, Sloane, Eckert, Buie, et al., 2001). Because the outcome data were reported by facility staff, and licensed nurses are absent from some RC/AL settings, it is possible that reporting of certain health conditions differed across settings; however, the study used standardized instruments and measured outcomes, the majority of which do not require advanced medical training to recognize. Attrition of participants was common in both settings; however, we minimized the impact of attrition by gathering retrospective data on status just prior to discharge, including all observations, and weighting analyses per unit time that the participant resided in the facility. Finally, regarding the abundance of negative findings (i.e., differences not statistically significant at the 5% level) for the comparisons of outcomes between RC/AL facilities and nursing homes, as well as those between special care units and nonspecialized care settings, it is important to consider the magnitude of differences that could have been detected with reasonable power (i.e., at least 80%). Where the outcomes involved incidence

Table 4. One-Year Health and Health Care Utilization Outcomes of Participants With Dementia in Special Care Units Compared with Nonspecialized Units, by Facility Type

| Health Outcomes During 1 Year | RC/AL | | <i>p</i> | NH | | <i>p</i> |
|---|--------------------------|------------------------------|----------|-------------------------|------------------------------|----------|
| | SCU (<i>n</i> = 164) | Non-SCU (<i>n</i> = 607) | | SCU (<i>n</i> = 94) | Non-SCU (<i>n</i> = 385) | |
| Incidence rate per 100 participants per quarter | | | | | | |
| Mortality ^a | 7.0 | 4.0 | .116 | 3.4 | 4.0 | .540 |
| Hospitalization ^b | 17.3 | 14.4 | .430 | 3.9 | 9.6 | .006 |
| New or worsening morbidity ^b | 26.7 | 25.3 | .772 | 15.0 | 22.0 | .043 |
| Mean change per 12 months ^c | | | | | | |
| Increase in ADL dependency (MDS-ADL) | 5.64 | 2.91 | .029 | 3.00 | 3.19 | .886 |
| Increase in cognitive impairment (MDS-COGS) | 0.33 | 0.30 | .943 | 0.58 | 0.61 | .903 |
| Increase in behavior problems (CMAI) | -1.53 | -1.14 | .763 | -2.18 | -0.72 | .168 |
| Increase in depressive symptoms (CSDD) | 1.59 | 1.32 | .823 | 0.89 | 1.25 | .630 |
| Decrease in social function | 1.58 | 1.34 | .681 | 1.88 | 1.46 | .303 |
| Increased withdrawal from activities (MOSES subscale) | 3.48 | 2.58 | .409 | 2.22 | 1.77 | .604 |

Notes: RC/AL = residential care/assisted living; NH = nursing home; ADL = activity of daily living; MDS = Minimum Data Set; COGS = cognition; CMAI = Cohen-Mansfield Agitation Inventory; CSDD = Cornell Scale for Depression in Dementia; MOSES = Multidimensional Observation Scale for Elderly Subjects. All analyses were weighted, with RC/AL participants assigned weights based on probability of selection within each state. Nursing home participants were selected with equal probabilities of selection and therefore did not require weighting. All models were adjusted for baseline age, gender, race, education, marital status, length of stay, cognition (MDS-COGS), and number of comorbid conditions.

^aModeled using generalized estimating equations to fit a Poisson regression model; significance tests using Cox proportional hazards.

^bModeled using generalized estimating equations to fit a Poisson regression model.

^cModeled using generalized estimating equations to estimate differences in means, controlling for the baseline status of the variable being studied.

rates of death, hospitalization, and morbidity, the detectable differences were in the range of 5 to 15 events per 100 residents per quarter. Where the outcomes involved changes in physical, cognitive, and behavioral function, the detectable differences were in the range of 0.5 to 2 points on the various scales of measurement used, corresponding to standardized effect sizes in the range of 0.2 to 0.3. It therefore appears that the study was of sufficient size to detect outcome differences that are regarded to be relatively small in magnitude (Cohen, 1977).

In evaluating the difference between RC/AL and nursing home care, a key question is the extent to which health outcomes of chronic, progressive conditions such as Alzheimer's disease can be modified by the care setting. These analyses add additional weight to findings from other studies, which suggest that physiological factors have a far greater influence on health outcomes of long-term care populations than the care they receive, and that the influence of care settings on health and functioning is relatively minor. At the same time, they suggest that some facility types may be better able to reduce hospital use, thereby affecting overall care costs and limiting the need for residents and families to contend with transitions to another care setting.

Individual resident factors such as general physical health have successfully been used to create mortality risk indices that predict outcomes across facilities (Carlson et al., 2001). Studies also have

shown that resident baseline characteristics significantly predict resident outcomes such as cognitive functioning, agitation, and social or language skills after 1 year (Chappell & Reid, 2000). In contrast, facility characteristics appear to have a minimal impact on such outcomes (Chafetz, 1991; Holmes et al., 1990; Webber, Breuer, & Lindeman, 1995). Thus, it appears that, although facility type and design may be important for resident and family satisfaction, their impact on resident outcomes such as mortality, morbidity, and functional status is relatively minor. Such findings reinforce the current trend to focus more on quality of life and less on health outcomes in evaluating quality of care.

Finally, it should be kept in mind that RC/AL facilities, although quite heterogeneous, are generally designed to serve a population that on average is less impaired than nursing home residents (Zimmerman et al., 2003). The data presented in this article document a high morbidity burden among the growing population of RC/AL residents with dementia. Given the high risk of hospitalization, transfer to nursing homes, and mortality demonstrated in these analyses, and the relative lack of research to date, the RC/AL setting may present promising opportunities for the development of interventions that could reduce future disability, morbidity, and mortality in a population that is still quite functional but at high risk for decline. One component of such interventions would have to be better methods for the

prospective identification of individuals who are likely to become medically unstable, thereby improving the efficiency of placement of individuals with dementia in more or less medicalized settings.

References

- Alexopoulos, G. S., Abrams, R. C., Young, R. C., & Shamoian, C. A. (1988). Cornell Scale for Depression in Dementia. *Biological Psychiatry, 23*, 271–284.
- Carlson, M. C., Brandt, J., Steele, C., Baker, A., Stern, Y., & Lyketsos, C. G. (2001). Predictor index of mortality in dementia patients upon entry into long-term care. *Journal of Gerontology: Medical Sciences, 56A*, M567–M570.
- Carter, M. W., & Porell, F. W. (2003). Variations in hospitalization rates among nursing home residents: The role of facility and marked attributes. *The Gerontologist, 43*, 175–191.
- Chafetz, P. K. (1991). Behavioral and cognitive outcomes of SCU care. *Clinical Gerontology, 11*, 19–38.
- Chappell, N. L., & Reid, R. C. (2000). Dimensions of care for dementia sufferers in long-term care institutions: Are they related to outcomes? *Journal of Gerontology: Social Sciences, 55B*, S234–S244.
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences*. New York: Academic Press.
- Cohen-Mansfield, J., & Billig, N. (1986). Agitated behaviors in the elderly: A conceptual review. *Journal of the American Geriatrics Society, 34*, 711–721.
- Coleman, E. A., Barbaccia, J. C., & Croughan-Minihane, M. S. (1990). Hospitalization rates in nursing home residents with dementia: A pilot study of the impact of a special care unit. *Journal of the American Geriatrics Society, 38*, 108–112.
- Davis, K. J., Sloane, P. D., Mitchell, C. M., Preisser, J., Grant, L., Hawes, M. C., et al. (2000). Specialized dementia programs in residential care settings. *The Gerontologist, 40*, 32–42.
- Day, K., Carreon, D., & Stump, C. (2000). The therapeutic design of environments for people with dementia: A review of the empirical research. *The Gerontologist, 40*, 397–416.
- Dittmar, N. (1989). Facility and resident characteristics of board and care homes for the elderly. In M. Moon, G. Gaberlavage, & S. J. Newman (Eds.), *Preserving independence, supporting needs: The role of board and care homes*. Washington, DC: Public Policy Institute, American Association of Retired Persons.
- Dittmar, N. D., Smith, G. P., Bell, J. C., Jones, C. B. C., & Manzanares, D. L. (1983). *Board and care for elderly and mentally disabled populations* (Final report to Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services). Denver, CO: University of Denver, Denver Research Institute.
- Galasko, D., Edland, S. D., Morris, J. C., Clark, C., Mohs, R., & Koss, E. (1995). The consortium to establish a registry for Alzheimer's disease (CERAD). Part XI. Clinical milestones in patients with Alzheimer's disease followed over three years. *Neurology, 45*, 1451–1455.
- Galloro, V. (2001). In need of assistance: Widening quarterly losses a common theme in assisted living industry. *Modern Healthcare, 31*, 18–19.
- Gruber-Baldini, A. L., Zimmerman, S. I., Mortimore, E., & Magaziner, J. (2000). The validity of the Minimum Data Set in measuring the cognitive impairment of persons admitted to nursing homes. *Journal of the American Geriatrics Society, 48*, 1601–1606.
- Hartmaier, S. L., Sloane, P. D., Guess, H. A., & Koch, G. G. (1994). The MDS Cognition Scale: A valid instrument for identifying and staging nursing home residents with dementia using the minimum data set. *Journal of the American Geriatrics Society, 42*, 1173–1179.
- Hawes, C., Morris, J. N., Phillips, C. D., Mor, V., Fries, B. E., & Nonemaker, S. (1995). Reliability estimates for the Minimum Data Set for nursing home resident assessment and care screening (MDS). *The Gerontologist, 35*, 172–178.
- Helmes, E., Csapo, K. G., & Short, J. A. (1987). Standardization and validation of the Multidimensional Observation Scale for Elderly Subjects (MOSES). *Journal of Gerontology: Medical Sciences, 42*, 395–405.
- Holmes, D., Teresi, J., Weiner, A., Monaco, C., Ronch, J., & Vickers, R. (1990). Impacts associated with special care units in long-term care facilities. *The Gerontologist, 30*, 178–183.
- House, J. S., Robbins, C., & Metzner, H. L. (1982). The association of social relationships and activities with mortality: Prospective evidence from the Tecumseh Community Health Study. *American Journal of Epidemiology, 116*, 123–140.
- Hughes, C. P., Berg, L., Danzinger, W. L., Coben, L. A., & Martin, R. L. (1982). A new clinical scale for the staging of dementia. *British Journal of Psychiatry, 140*, 566–572.
- Leon, J., Cheng, C., & Neuman, P. J. (1998). Alzheimer's disease care: Cost and potential savings. *Health Affairs, 17*, 206–216.
- Leon, J., & Moyer, D. (1999). Potential cost savings in residential care for Alzheimer's disease patients. *The Gerontologist, 39*, 440–449.
- Liang, K. Y., & Zeger, S. L. (1986). Longitudinal data analysis using generalized linear models. *Biometrika, 73*, 13–22.
- Magaziner, J., Zimmerman, S. I., Fox, K. M., & Burns, B. J. (1998). Dementia in United States nursing homes: Descriptive epidemiology and implications for long-term care residential care. *Aging and Mental Health, 2*, 28–35.
- Miller, R. J., Snowdon, J., & Vaughn, R. (1995). The use of Cohen-Mansfield Agitation Inventory in the assessment of behavioral disorders in nursing homes. *Journal of the American Geriatrics Society, 43*, 546–549.
- Mollica, R. (1998). State regulation update: States are adopting new rules at a brisk pace. *Contemporary Long Term Care, 21*, 45–49.
- Mollica, R. (2001). State policy and regulation. In S. Zimmerman, P. D. Sloane, & J. K. Eckert (Eds.), *Assisted living: Needs, practices, and policies in residential care for the elderly* (pp. 9–33). Baltimore, MD: The Johns Hopkins University Press.
- Mollica, R. (2002). State assisted living policy, 2002. Retrieved June 10, 2004, from the National Academy of State Health Policy Web site, <http://www.nashp.org>.
- Morris, J. N., Fries, B. E., & Morris, S. A. (1999). Scaling ADLs within the MDS. *Journal of Gerontology: Medical Sciences, 54A*, M546–M553.
- National Institute on Aging/National Institute of Health. (1999). Progress report on Alzheimer's disease (NIH Publication No. 99-4664). Washington, DC: U.S. Department of Health and Human Services.
- Phillips, C. D., Hawes, C., Sloane, P. D., Koch, G., Han, J., Dunteman, G., et al. (1997). Effects of residence in Alzheimer's special care units (SCUs) on functional outcomes. *Journal of the American Medicine Association, 278*, 1340–1344.
- Pruchno, R. A., & Rose, M. S. (2000). The effect of long-term care environments on health outcomes. *The Gerontologist, 40*, 422–428.
- Reisberg, B., Ferris, S. H., de Leon, M. J., & Crook, T. (1982). The global deterioration scale for assessment of primary degenerative dementia. *American Journal of Psychiatry, 139*, 1136–1139.
- SAS Institute. (2000). SAS OnlineDoc(rtm) (Version 8). Retrieved August 20, 2004, from <http://v8doc.sas.com/sashtml/>
- Saxton, J., Silverman, M., Ricci, E., Keane, C., & Deeley, B. (1998). Maintenance of mobility in residents of an Alzheimer's special care facility. *International Psychogeriatrics, 10*, 213–224.
- Sloane, P. D., Lindeman, D. A., Phillips, C., Moritz, D. J., & Koch, G. (1995). Evaluating Alzheimer's special care units: Reviewing the evidence and identifying potential sources of study bias. *The Gerontologist, 35*, 103–111.
- Sloane, P. D., Zimmerman, S., & Ory, M. (2001). Care for persons with dementia. In S. Zimmerman, P. D. Sloane, & J. K. Eckert (Eds.), *Assisted living: Needs, practices, and policies in residential care for the elderly* (pp. 242–270). Baltimore, MD: The Johns Hopkins University Press.
- Sullivan, J. G. (1998). Redefining long-term care. *Contemporary Long Term Care, 21*(8), 60–64.
- Thompson, J. M., & Marinaccio, L. (1997). Improve continuity of care through collaboration: The growth of assisted living opportunities for nursing homes. *Balance, 1*, 14–15.
- Webber, P. A., Breuer, W., & Lindeman, D. A. (1995). Alzheimer's special care units vs. integrated nursing homes: A comparison of resident outcomes. *Journal of Clinical Geropsychology, 1*, 189–205.
- Welch, H., Walsh, J., & Larson, E. (1992). The cost of institutional care in Alzheimer's disease: Nursing home and hospital use in a prospective cohort. *Journal of the American Geriatrics Society, 40*, 221–224.
- Zimmerman, S., Gruber-Baldini, A. L., Sloane, P. D., Eckert, J. K., Hebel, J. R., Morgan, L. A., et al. (2003). Assisted living and nursing homes: Apples and oranges? *The Gerontologist, 32*, 107–117.
- Zimmerman, S. I., Sloane P. D., & Eckert J. K. (2001). The state and quality of assisted living. In L. Noelker & Z. Harel (Eds.), *Linking quality long-term care and quality of life* (pp. 117–135). New York: Springer.
- Zimmerman, S., Sloane, P. D., Eckert, J. K., Buie, V. C., Walsh, J., Hebel, J. R., et al. (2001). Overview of the collaborative studies of long-term care. In S. Zimmerman, P. D. Sloane, & J. K. Eckert (Eds.), *Assisted living: Needs, practices and policies in residential care for the elderly* (pp. 117–143). Baltimore MD: The Johns Hopkins University Press.

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