

Clinical Outcomes of Aging in Place

Karen Dorman Marek ▼ Lori Popejoy ▼ Greg Petroski
David Mehr ▼ Marilyn Rantz ▼ Wen-Chieh Lin

Editor's Note

Additional information, provided by the authors, expanding this article is on the editor's Web site at <http://nursing-research-editor.com>.

Marek, K. D., Popejoy, L., Petroski, G., Mehr, D., Rantz, M., & Lin, W.-C. (2005). Clinical Outcomes of Aging in Place. *Nursing Research*, 54(3), 202-211.

- ▶ **Background:** Programs such as Medicaid Home and Community-based Services (HCBS) have provided an alternative to institutionalization through community-based, long-term care services; however, there are limited studies on the clinical outcomes of participants in these programs as compared to nursing home (NH) residents.
- ▶ **Objective:** To compare clinical outcomes of individuals in a community-based, long-term care program to individuals of similar case mix in institutional-based, long-term care.
- ▶ **Methods:** A program called Aging in Place (AIP) was developed by the Sinclair School of Nursing in cooperation with the state of Missouri's HCBS program. The AIP intervention consisted of nurse coordination of the HCBS program and Medicare home health services. A total of 78 AIP participants were matched with 78 NH residents on admission period, activities of daily living (ADLs), cognitive status, and age. The Minimum Data Set (MDS) was collected on the AIP group at admission and every 6 months over a 30-month period. Cognition was measured by the MDS Cognitive Performance Scale (CPS), ADLs by the sum of 5 MDS ADL items, depression by the MDS-Depression Rating Scale, and incontinence by rating on 2 MDS items related to urinary continence. The Cochran-Mantel-Haenszel method was used to test the association between the AIP intervention and clinical outcomes.
- ▶ **Results:** The AIP group clinical outcomes were better at a statistically significant level (less than .05) for the following outcomes: (a) cognition at 6, 12, and 18 months ($p = .00$); (b) depression at 6 and 12 months ($p = .00$); (c) ADL at 6 ($p = .02$), 12 ($p = .04$), and 24 ($p = .00$) months; and (d) incontinence at 24 ($p = .02$) months. In all 4 outcome measures, the AIP group stabilized or improved outcome scores whereas the NH group's outcome scores deteriorated.
- ▶ **Discussion:** Study results suggest that community-based care with nurse coordination enhances clinical outcomes of long-term care participants.
- ▶ **Key Words:** home and community based services · long-term care · nursing case management

The aging of the United States' population is causing major changes in the healthcare system. Dramatic restructuring is needed to prepare for the needs of the growing older population. The most elderly population, those who are aged 85 and older, is expected to expand to more than 9 million by the year 2030 (U.S. Census Bureau, 2000). By the year 2020, 19% of adults aged 65 and older will have limitations in activities of daily living (ADLs) and approximately 4% will be severely disabled (Administration on Aging, 2001). It is estimated that as many as one half of the individuals aged more than 85 experience some type of cognitive deficit (Evans et al., 1989). Those individuals, who are aged 85 and older, will require the majority of long-term care services. New methods of delivering care are necessary and desired, especially in the area of long-term care. In this research article, the clinical outcomes of individuals in the Aging in Place (AIP) program will be compared to the clinical outcomes of individuals of similar case mix in institutional long-term care.

Older adults prefer to live in their own homes for as long as possible. Most elders prefer that they receive long-term care services in their home instead of in an assisted living facility or nursing home (NH; Mattimore et al., 1997). For many older adults, home-based services are a viable alternative to NH placement. Even with this alternative available, it is estimated that more than 15% of individuals residing in NHs are there inappropriately

Karen Dorman Marek, PhD, MBA, RN, FAAN, is an Associate Professor, University of Wisconsin-Milwaukee.

Lori Popejoy, APRN, BC, GCNS, is John A. Hartford Building Academic Geriatric Nursing Capacity Scholar, Research Coordinator, Boone Hospital Center, Columbia, MO.

Greg Petroski, MS, is a Statistician, School of Medicine, Office of Medical Research; David Mehr, MD, MS, is an Associate Professor, Family and Community Medicine; Marilyn Rantz, PhD, RN, FAAN, is a Professor, Sinclair School of Nursing and Family and Community Medicine, and Wen-Chieh Lin, PhD, is an Assistant Professor, Family and Community Medicine, University of Missouri-Columbia.

(Spector, Reschovsky, & Cohen, 1996). Reasons for inappropriate placement include (a) public financing that favors NHs over alternatives, (b) state regulations that reduce viable options, and (c) lack of consensus on the best clinical setting.

Recognition of the institutional bias of the Medicaid program prompted the creation of the Medicaid Home and Community-based Services (HCBS) Waiver program. This was established through the Omnibus Budget Reconciliation Act (OBRA) of 1981. The purpose of the HCBS Waiver program was to encourage states to develop alternative options to institutional care for those in need of long-term care services (Duckett & Guy, 2000). However, there is large variation from state to state in how these programs are organized and implemented (LeBlanc, Tonner, & Harrington, 2001). Evaluation of the effectiveness of the HCBS waiver programs is difficult because each state determines its own eligibility criteria, and unlike NH care, there is no standardized clinical assessment to allow clinical outcome comparisons between community and institutional long-term care.

The majority of studies conducted to compare community-based long-term care with institutional care have focused on comparing the cost of the two different approaches. Demonstration projects such as the Channeling Demonstrations of the early 1980s had disappointing results related to cost savings. It was found that the majority of the demonstration projects were more expensive than institutional care (Applebaum, Harrigan, & Kemper, 1986; Weissert, Cready, & Pawelak, 1988). One reason cited for the additional cost of the Channeling Demonstrations was that individuals targeted for the home care programs were not at high risk for NH placement. Therefore, services were provided to additional low-risk people rather than to those who were at high risk for institutional care. In addition, improvement in health outcomes was limited, usually benefiting only a handful of residents. Outcome measures in these studies often were based on service utilization such as the number of hospitalizations or emergency department visits. There was limited evidence of higher functioning in ADLs in community participants (Hughes, 1985).

Studies of community-based care in the postacute home health period, usually reimbursed by Medicare, have demonstrated home healthcare to be clinically efficacious during transition periods or short-time periods posthospitalization (Capitman, 2003). Kane et al. (2000) studied the result of four different venues of posthospital care (home, home healthcare, rehabilitation, and NH) on the functional status of Medicare beneficiaries ($n = 1,837$). Individuals who received home health and rehabilitation care had the highest functional status whereas participants who received NH care had significantly lower functional status at 6 weeks posthospitalization ($p < .05$). In another study, Hadley, Rabin, Epstein, Stein, and Rimes (2000) followed 2,127 nondisabled community-dwelling elderly Medicare beneficiaries who were hospitalized within a 6-month period and found that post-acute care improvement in functional status was 13% higher for those who received home healthcare than for those who did not.

In a study by Naylor et al. (1999), postacute home healthcare was enhanced by comprehensive discharge planning and follow-up visits by advanced practice nurses. A total of 363 patients were enrolled with 177 in the intervention group and 186 in the control group. Those who received the advanced practice nurse intervention had fewer hospital readmissions ($p < .001$) and fewer hospital days ($p < .001$); however, no difference was found in functional status between the experimental and control groups. Naylor et al. (2004) conducted a subsequent study of 239 (treatment, $n = 118$; control, $n = 121$) older adults discharged from acute care with heart failure. The treatment group not only had fewer hospital readmissions ($p = .047$) and lower costs ($p = .002$) but also demonstrated short-term improvement in overall quality of life at 12 weeks ($p < .05$). No significant difference was found in functional status between groups. However, Tinetti et al. (2002) implemented an enhanced postacute, home healthcare intervention via a restorative care model. Participants receiving care in this model scored higher than the comparison group on functional status of self-care ($p = .07$), home management ($p = .05$), and mobility ($p = .02$). In addition, the treatment group had fewer visits to the emergency department ($p < .001$) and were more likely to remain in their home ($p < .001$) than the comparison group.

Current federal initiatives, such as the Program for All Inclusive Care for the Elderly (PACE) and Social Health Maintenance Organizations, are designed to provide coordinated healthcare to individuals who are certified as NH eligible but are able to live safely in the community at the time of enrollment. Providers are paid at a capitated rate based on Medicare and state Medicaid rates. Outcomes of PACE programs have been positive, including good consumer satisfaction, reduction in use of institutional care, and cost savings to public and private payers of care (Eng, Padulla, Eleazer, McCann, & Fox, 1997). When compared to individuals who declined PACE participation ($n = 305$), PACE participants ($n = 790$) demonstrated a higher level of ADL functioning ($p < .10$) at 24 months and self-reported quality of life at 6 months ($p < .10$; Chatterji, Burstein, Kidder, & Wilte, 1998).

There have been concerns that long-term care of frail older adults in alternative settings to NHs can leave them vulnerable to poor care (General Accounting Office, 1999). In an effort to examine the effectiveness and safety of assisting living care in comparison to NH care, Frytak, Kane, Finch, Kane, and Maude-Griffin (2001) examined the outcome trajectories of functional status, pain and discomfort, and psychological well-being in a group of participants from assisted living ($n = 605$) and NH ($n = 610$) settings over a 12-month period. At baseline the NH group had a significantly higher ADL score (more impaired; $p < .001$), whereas there was no statistical difference in pain and discomfort or psychological well-being. No difference was found in the outcome trajectories of the three measures suggesting that a lower level of care provided in assisted living did not result in poorer outcomes of its residents. This study pointed to the need for additional studies that examine differences in multiple clinical outcome measures such as depression, cognition, and incontinence,

in addition to ADL measures, in older adults who are receiving long-term care in both community and institutional settings. The clinical outcome component of the evaluation of a community-based long-term care program called "Aging in Place" is described in the current research article.

Aging in Place Program

The state-funded HCBS program in Missouri is called Missouri Care Options (MCO). An individual is considered eligible for MCO if he or she (a) is "medically eligible" for nursing facility care, (b) reasonably could have care needs met outside a nursing facility, and (c) is qualified for Medicaid funding. Individuals are screened and assigned a level of care score by a MCO case manager who then authorizes services, otherwise known as the service plan. Services in the MCO program include basic personal care, advanced personal care, nurse visits, homemaker care, and respite care. An MCO caseworker authorizes a specified number of monthly units and the provider is reimbursed retrospectively on the authorized units provided.

Although the MCO program authorizes nurse visits, the major focus of the program is homemaking and personal care. The MCO participants who are assessed as requiring nursing care are provided a limited number of nursing visits per month. However, the reimbursement for nurse visits is very low, barely covering the labor cost of a visit, and there is no reimbursement for indirect care activities such as care coordination. With such poor reimbursement there is little incentive to coordinate the care of MCO participants. Participants receive only those services that can be handled easily within a short visit, such as medication box refills. In addition, the MCO caseworkers have large caseloads and are required to visit the MCO participant only once a year. Because of this, identification of health and/or service problems often is not completed in a timely manner. This is problematic, especially considering the frailty of the MCO participants.

To further complicate care management, if a participant requires Medicare home health services, a different agency or a separate department of an MCO-authorized agency provides the care. Often there is little or no coordination between Medicare home health and MCO service provider. This is due in part to the presence of different regulations and reimbursement methods under which each program functions. In Missouri, the Medicare Conditions of Participation are used as the guidelines for home health licensure. The Medicare Home Health benefit is limited to specific acute conditions and does not cover the care needs of most chronically ill, older people. An MCO participant who is acutely ill may receive Medicare home health services, but once the participant's condition stabilizes, Medicare home health services are discontinued. MCO services are under a different set of standards. The skilled services available and reimbursement for MCO services are substantially less than those in the Medicare program. The disconnect between these two types of home-based services is not conducive to providing the coordinated care needed for frail, chronically ill, older adults.

Working with the Missouri Department of Health and Senior Services, the University of Missouri Sinclair School of Nursing created an enhanced version of the MCO program called "Aging in Place." To implement the AIP program, a home care agency called Senior Care was formed. To provide the AIP intervention, Senior Care secured a home health license and Medicare certification and became a designated MCO provider. There were six MCO providers in the county area. The MCO case workers made referrals to MCO providers on a rotating basis. Unlike home healthcare participants, MCO participants enrolled in the AIP program generally were in need of personal care services or medication management, whereas Medicare home care admissions usually occurred following hospitalization or an acute health episode. In the AIP program, each participant was assigned a nurse care coordinator who completed a comprehensive admission assessment and created a care plan that coordinated both the participant's physician, nurse, and other prescribing professional's interventions for his or her clinical conditions and the MCO services of personal care and homemaking. Participants benefited from close nursing supervision of their clinical conditions with early detection of problems and communication with other healthcare providers such as their physician. In addition, if at any time while in the AIP program the participant qualified for more acute Medicare home healthcare services, the nurse care coordinator could provide Medicare home health skilled nursing as well as coordinate other services such as physical therapy. The participants benefited by keeping the same nurse and aide providers during their acute home care episode as they did when their condition was stabilized. If the participant stabilized and no longer required Medicare home health services, the nurse care coordinator remained engaged in the participant's care. Nurse visits to the AIP participants during the nonacute Medicare periods of care varied from once a week to once a month depending on the participant's care needs.

Conceptual Framework

An adaptation of the Medical Outcomes Study framework (Kelly, Huber, Johnson, McCloskey, & Maas, 1994; Tarlov et al., 1989) and Donabedian's (1980) quality assessment model were used to organize the evaluation. The framework is categorized using three major components: structure, process, and outcome (Figure 1). Structure components such as client characteristics, payment source, and living arrangements are inputs to the system. Structural components influence both process and outcome components of the framework. Process components have represented the content or configuration of care (Donabedian, 1980). In this study the two types of long-term care, institutionally based NH care and community based AIP with nurse care coordination, were examined. In the original Donabedian framework, site of care is viewed as a structural variable. However, for purposes of this evaluation, site of care is a component of the process of care and is incorporated into the process component. The final component of the framework is the outcome—the procedural end point or impact of the process component. Both process items

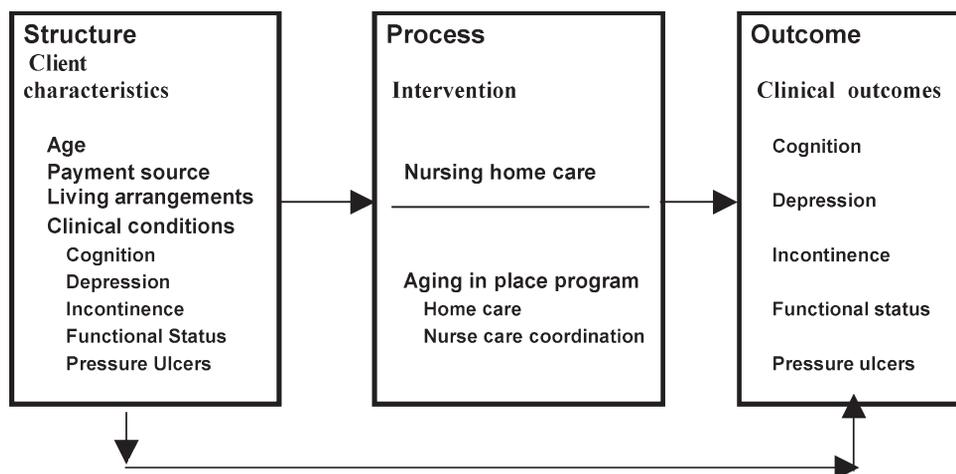


FIGURE 1. Aging in place evaluation framework.

and structural items can influence outcomes. The outcomes of interest in this study are clinical health outcomes or measures of the participant's health status at a designated point in time (Marek, 1997).

Methods

The purpose of this evaluation was to compare clinical outcomes between older adults who resided in NHs and a group of similar older adults who received services in the AIP program. The clinical outcomes of interest were ADLs, cognitive function, depression, incontinence, and pressure ulcers.

The design of the evaluation was quasi experimental, using an individually matched group of NH residents for comparison. The Missouri Minimum Data Set (MDS) data repository provided data to assist in identifying NH residents in mid-Missouri. A major criticism of community-based, long-term care programs is that individuals at low risk for NH placement often are enrolled. Matching the comparison group on key variables provided a comparison group with similar risk for clinical outcome decline. Variables included in the matching strategy were age, AIP enrollment date and NH admission date, ADLs, and cognitive function. The NH admission date, ADLs, and cognitive function were derived from the MDS.

Since MDS collection is not mandated on private pay NH residents, only participants with Medicaid as their payment source for long-term care were included in this evaluation. There were 93 participants enrolled in the AIP program who were Medicaid eligible also. To obtain a similar group of NH participants, AIP participants were matched on ADLs (within 2 points), cognitive performance (within 1 point), age (within 4 years), and admission date (within 90 days) to 1,038 Medicaid NH residents using data from the Missouri MDS repository. A total of 78 AIP participants were matched to 78 NH residents, using this process.

In the OBRA of 1987, Congress mandated the development of the MDS for resident assessment and care plan-

ning (Morris et al., 1990). This Act required routine assessment of all Medicare and Medicaid residents using the MDS, which is a part of the resident assessment instrument (RAI). The MDS data are used to develop a plan of care and also to determine payment for all Medicare NH residents using the resource utilization groups (RUGs; Fries & Cooney, 1985). The MDS data are used also to measure quality of care through the identification of key quality indicators or measures (Zimmerman et al., 1995). The MDS data are routinely collected upon admission, quarterly, at times of significant change of condition, and annually as mandated by OBRA of 1987. Reliability of the MDS items has been tested in multiple studies (Hawes et al., 1995; Mor, 2004; Morris et al., 1990, 1997). In a recent large field reliability trial, more than 85% of the MDS elements manifested adequate interrater reliability ($\kappa > 0.6$; Mor et al., 2003).

The research team identified the following five clinical conditions prevalent in both NH and home care: (a) cognitive decline, (b) decline in functional status, (c) depression, (d) pressure ulcers, and (e) incontinence. The MDS has data elements related to each of these clinical conditions such that comparison of AIP and NH groups was possible. The MDS has worked equally well in community and NH settings (Morris et al., 1997). The data elements were reviewed again to determine the appropriateness of the assessment for use in the community setting, because the assessment was initially designed for use in institutionally based care. The 1997 RUGS III quarterly had the data elements required to calculate the clinical outcomes of interest. The MDS quarterly data elements were collected on admission and every 6 months on all AIP program participants who entered the program from April 1, 2000, to December 31, 2002. Nursing staff were trained on the use of the MDS by an advanced practice nurse with significant training, research, and consultation experience using the MDS.

To measure functional status, MDS ADL items reflecting the need for assistance with bed mobility, transfers, locomotion, eating, and toilet use were summed. Each of

these items was scored 0 to 4 with 0 indicating independent functioning (*no need for help or oversight*) and 4 indicating total dependence (*full staff performance of the activity*). The summated scale thus had a range of 0–20 with larger values corresponding to greater impairment in ADL functioning. Coefficient alpha for this 5-item scale was .90 for both the AIP and NH groups.

Cognition was measured using the MDS Cognitive Performance Scale (CPS; Morris et al., 1994). The CPS is a 7-point ordinal scale with 0 indicating *intact cognitive status* and 6 indicating *severely impaired*. The CPS scale uses five MDS cognitive items (i.e., comatose, short-term memory, ability to make decisions, making self understood, and eating performance) within a single hierarchical cognitive rating scale creating seven categories of cognitive impairment. Validity and reliability of the CPS had substantial agreement with the MMSE in the identification of cognitive impairment (Hartmaier, Sloane, Guess, & Koch, 1994; Hartmaier, Sloane, Koch, Mitchell, & Phillips, 1995).

The MDS-based depression rating scale was used to measure depression in the study participants. This instrument is derived from the seven mood indicator items in the MDS. The items include (a) making use of negative statements; (b) persistent anger with self and others; (c) expressions of unrealistic fears; (d) repetitive health complaints; (e) repetitive anxious complaints; (f) sad, pained worried facial expressions; and (g) tearfulness and crying. Each item was rated on a scale of 0–2 based on frequency of the observed item. Construct validity and sensitivity of the MDS depression rating scale compared favorably to the 15-item Geriatric Depression Scale (Burrows, Morris, Simon, Hirdes, & Phillips, 2000).

Incontinence was measured by two categories. An individual scored 0 if always continent, 1 if usually continent (1 or fewer times a week) or occasionally incontinent (2+ times a week, but not daily), and 2 if frequently (incontinent daily but some control present) or always incontinent. The incontinence items in the MDS were tested and found to accurately identify incontinent NH residents (Crooks, Schnelle, Ouslander, & McNees, 1995). Pressure ulcers were defined as a rating of Stage 1 or higher on MDS item M2a.

Analysis

Outcome variables in this study were all ordinal scaled measures; thus, rank-based nonparametric methods were used. The Cochran–Mantel–Haenszel test with modified ridit scores (Stokes, Davis, & Koch, 2000) was used to compare groups at each follow-up point. The CMH test in combination with the rank transformation is a stratified version of the Kruskal–Wallis test (Agresti, 1990). In the analysis of each outcome the baseline value of that outcome was used as the stratifying variable. Although the NH group was constructed to be comparable to the AIP group, this analysis further adjusts for individual differences in initial status. The point of dropout was analyzed in relation to initial ADL and cognitive status. Groups were formed on the basis of the last follow-up point and the Kruskal–Wallis test was used to test for differences in these groups with respect to initial ADL and CPS scores.

Results

The age of participants ranged from 50 to 94 years ($M = 72$). The AIP group was more racially diverse with 26% Black versus 4% in the NH group. Also the AIP group was less likely to be married (Table 1). Because participants were enrolled over a 30-month period, the number of participants per time period not only is dependent on attrition, but also is related to time of enrollment. For example, 13 AIP participants were enrolled in the last 17 months of the study and therefore had outcome data collected only at baseline, 6 months, and 12 months. To control for the effect of time enrolled, groups were matched on quarter of enrollment, therefore allowing for each group to receive a similar “dose” of the intervention (Figure 2). A total of 9 (12%) of the AIP participants died, 7 (9%) were admitted to NHs, 6 (8%) moved, and 3 (4%) declined to participate for the entire study (Figure 2). There was no statistically significant relationship between initial ADL score ($p = .95$) or initial CPS score ($p = .42$) and the point at which an individual left the study.

As expected, both groups scored in the low range (higher functioning) on each of the clinical outcomes measured (Table 2). For example, the range of ADL scoring was 0 to 20. The mean baseline ADL score was 1.7 ($SD = 3.6$) for the AIP group and 2.1 ($SD = 3.6$) for the NH group. The AIP group had significantly better clinical outcomes in ADLs, cognition, depression, and incontinence in at least one time period. Cognition was significantly better at 6, 12, and 18 months. Depression, however, was significantly better only at 6 and 12 months. The ADL functioning was better than that in the NH group in all but the 18-month measurement period. At baseline, the AIP group had a significantly higher incidence of incontinence; however, at the remaining time periods, the NH group had a higher incidence of incontinence with a statistically higher incidence at 24 months. There were an insufficient number of participants with pressure ulcers, so group differences

TABLE 1. Demographics by Group (N = 156)

Variable	Aging in Place (n = 78)	Nursing Home (n = 78)
Age, years (M ± SD)	72.0 (±10.9)	72.2 (±10.6)
Number of females (%)	55 (71)	53 (68)
Race/ethnicity	n (%)	n (%)
Black	20 (26)	3 (4)
White	57 (73)	74 (95)
Hispanic	0 (0)	0 (0)
Other	1 (1)	1 (1)
Marital status		
Married	8 (10)	16 (21)
Widowed	35 (45)	33 (42)
Divorced/separated	23 (29)	21 (27)
Never married	12 (15)	8 (10)

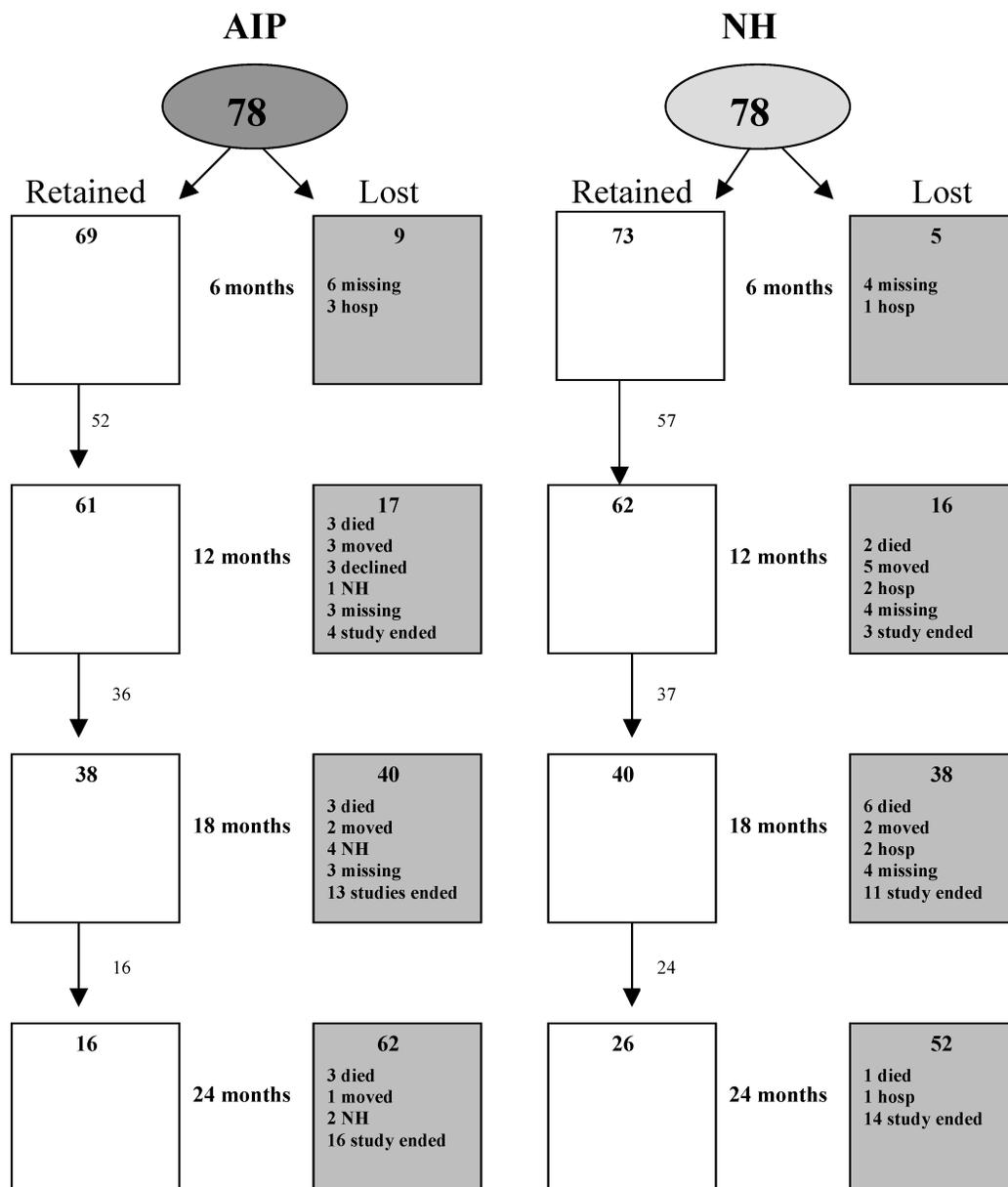


FIGURE 2. Study attrition by time period.

for this clinical outcome could not be analyzed. In the remaining four outcome measures, the AIP group stabilized or improved outcome scores whereas the NH group's outcome scores deteriorated (Figure 3).

Discussion

The results of this study are supportive of community-based care for some older adults in need of long-term care services. The decision to move to an NH is complex and influenced by many factors (Castle, 2003; Forbes, Hoffart, & Redford, 1997; Grando et al., 2002). However, little data is available regarding clinical outcomes if a person chooses to remain in his or her home with community-based services. The majority of cost comparison studies operate from the assumption that care is similar in both settings (Lee, 2000).

The difference in clinical outcomes between NH and AIP participants may suggest that care outcomes are not similar in both settings. Further research is needed to understand the effect of both the type or process of care delivered and the physical environment where care is delivered.

Declining ADL and cognitive functioning are two major factors related to institutionalization of older adults (Miller & Weissert, 2000). Postponing decline in both of these areas enables the older adult to remain at a less intensive level of care. However, compared to the study by Frytak et al. (2001) in which assisted living and NH residents had similar outcome trajectories, the persons in the AIP program had more positive outcome trajectories than did NH residents. Also, in the Frytak et al. study, the NH residents were significantly more functionally impaired at baseline. To account for the expected difference in

Table 2. Outcome by Group by Time Period

	Aging in Place				Nursing Home				<i>p</i>
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Med</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Med</i>	
Cognition									
Baseline	78	0.9	1.0	1.0	78	1.2	1.2	1.0	<i>na</i> ^a
6 months	69	0.8	1.0	0.0	73	1.4	1.4	1.0	.00
12 months	61	0.7	1.0	0.0	62	1.8	1.6	1.5	.00
18 months	38	0.6	1.0	0.0	40	1.8	1.7	1.5	.00
24 months	16	0.8	1.1	0.0	26	2.1	1.9	2.5	.38
Depression									
Baseline	78	0.7	1.1	0.0	78	1.1	1.9	0.0	.76 ^b
6 months	69	0.5	0.9	0.0	73	1.4	2.0	0.0	.00
12 months	61	0.3	0.6	0.0	62	1.5	1.9	1.0	.00
18 months	38	0.5	0.9	0.0	40	1.4	2.6	0.0	.14
24 months	16	0.4	0.7	0.0	26	1.3	2.1	0.0	.39
Activities of daily living (ADLs)									
Baseline	78	1.7	3.6	0.0	78	2.1	3.6	1.0	<i>na</i> ^c
6 months	69	1.3	3.2	0.0	73	3.2	4.9	1.0	.02
12 months	61	1.7	3.9	0.0	62	3.5	5.3	1.0	.04
18 months	38	1.4	3.7	0.0	40	3.8	4.6	2.0	.08
24 months	16	0.8	2.2	0.0	26	3.2	5.2	1.0	.00
Incontinence									
Baseline	78	1.0	1.5	0.0	78	0.5	0.9	0.0	.03 ^b
6 months	69	0.8	1.3	0.0	73	0.8	1.2	0.0	.12
12 months	61	0.8	1.4	0.0	62	0.9	1.3	0.0	.21
18 months	38	1.0	1.4	0.0	40	0.9	1.3	0.0	.28
24 months	16	0.6	1.1	0.0	26	1.1	1.4	0.0	.02

^aParticipants matched on admission Cognitive Performance Scale score.

^bWilcoxon rank sum test.

^cParticipants matched on admission ADL.

functional status between the AIP group and the NH group, groups were matched on functional and cognitive status.

Cognitive function and mental illness have been dynamically linked to decline in physical functioning (Leveille et al., 1998). It is interesting that ADL, cognitive status, and depression improved and then declined at a slower rate in the AIP group than in the NH comparison group. One explanation could be that remaining in one's home and maintaining independence contributes to the more positive outcomes.

Coordination between acute and long-term care systems prevents frail older adults from "falling through the cracks"; however, Medicaid does not usually reimburse for this care. Using the same providers for postacute home healthcare and chronic illness care provides an enhanced level of community-based care. Similar to institutional care where nursing care is required, AIP provides nursing care to facilitate communication and implementation of the older adult's healthcare plan.

Most state Medicaid programs do not reimburse for the extra care required to coordinate care. However, several states have initiated capitated systems for Medicaid payment for long-term care services (Stevenson, Murtaugh, Feldman, & Oberlink, 2000). The Arizona Long Term Care System (ALTCS) emphasizes HCBS, with incentives to avoid institutional placement. The ALTCS has decreased the state Medicaid expenditures on long-term care by 16% and lowered the growth rate. Other programs such as PACE and the Social Health Maintenance Organizations initiatives have shown limited financial savings with the capitation of both Medicare and Medicaid funds. Each of these programs has an increased level of care coordination; however, there is a lack of studies on clinical outcomes by site of care.

There are several methodological issues that require comment. The individual matching strategy was chosen to ensure that participants in the two groups were comparable at baseline. This previously has been shown to result in covariate balancing similar to complete randomization

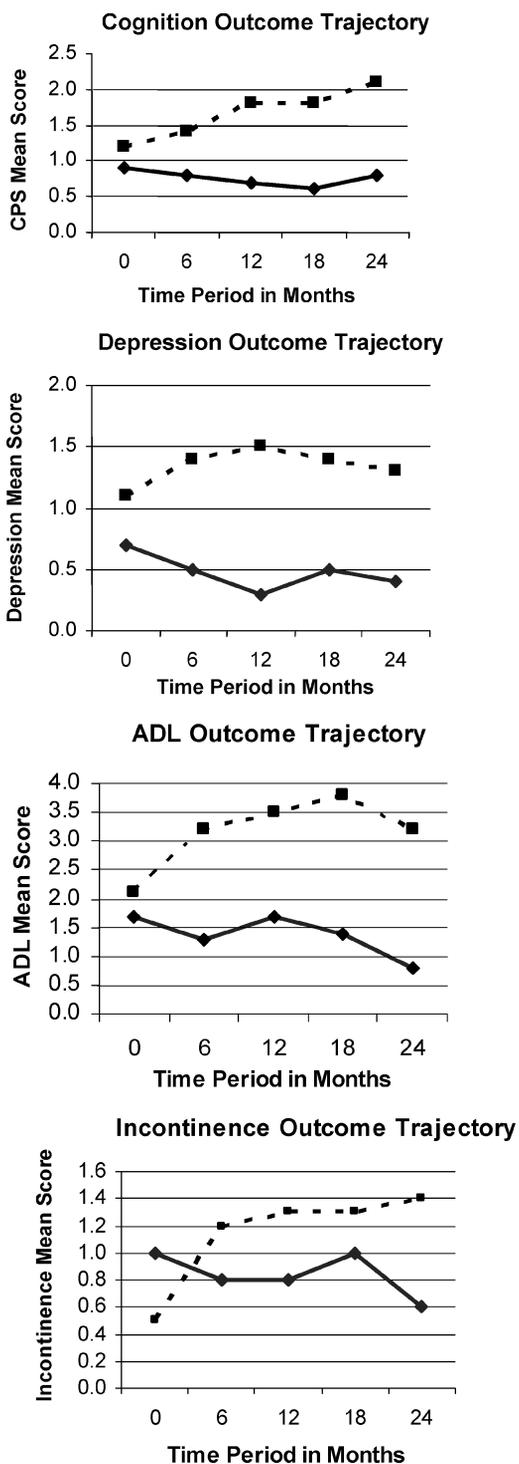


FIGURE 3. Outcome trajectory comparison by group. -◆- = AIP; ■ = NH.

(Inouye et al., 1999; Tinetti et al., 2002). Without randomization there is less confidence that participants were similar because all the variables were not known. However, the results of this study provide essential information for future randomized trials.

A total of 82% of the AIP participants were matched to NH residents within or near the AIP service area.

Because enrollment was over a 30-month period, the largest number of participants was available for the 6-month time period. A larger study that followed all participants for a 24-month period would provide more insight into attrition rates. The AIP program was conducted in only one agency; therefore, it cannot be generalized to all HCBS participants. However, using one agency provided control over implementation of an intervention that is organizationally based. Results from this study may provide direction for future HCBS programs. The MDS data were obtained by nurses providing clinical care that may threaten internal validity. However, the MDS has been used frequently for clinical and research purposes and reliability equivalent to standardized clinical assessment instrument (Mor, 2004). Comparison of the AIP group to participants in the standard MCO program would be the next logical step in evaluating the effectiveness of the AIP program.

This study indicates that participants of the AIP program had favorable clinical outcomes when compared to similar individuals receiving long-term care in an NH. Unique to this study was that the NH comparison group was matched to the AIP group. This minimized baseline differences in the groups, a problem identified in the majority of community-based care evaluations. Development of a standardized assessment similar to the MDS for HCBS participants is encouraged. Without such an assessment, quality comparison across sites is not possible. The AIP program shows promise as a viable option for frail older adults in need of long-term care. ▽

Accepted for publication January 22, 2005.

This research was supported in part by a grant from the Centers for Medicaid and Medicare Services, *Aging in Place: A New Model for Long Term Care*, Grant 18-C-91036. The research was also supported by the Robert Wood Johnson Executive Nurse Fellows Program Cohort 2000.

Corresponding author: Karen Dorman Marek, PhD, MBA, RN, FAAN, University of Wisconsin-Milwaukee, PO Box 413, Milwaukee, WI 53201 (e-mail: kmarek@uwm.edu).

References

Administration on Aging. (2001). *Aging into the 21st century*. Retrieved February 14, 2005, from http://www.aoa.gov/prof/Statistics/future_growth/aging21/health.asp

Agresti, A. (1990). *Categorical data analysis*. New York: Wiley.

Applebaum, R. A., Harrigan, M., & Kemper, P. (1986). *Evaluation of the national long term care demonstrations: Tables comparing channeling to other community care demonstrations* (Document No. 86-02). Princeton, NJ: Mathematica Policy Research.

Burrows, A. B., Morris, J. N., Simon, S. E., Hirdes, J. P., & Phillips, C. (2000). Development of a Minimum Data Set-based depression rating scale for use in nursing homes. *Age and Ageing*, 29, 165-172.

Capitman, J. (2003). Effective coordination of medical and supportive services. *Journal of Aging & Health*, 15(1), 124-164.

Castle, N. G. (2003). Searching for and selecting a nursing facility. *Medical Care Research and Review*, 60(2), 223-252.

Chatterji, P., Burstein, N. R., Kidder, D., & White, A. (1998). *Evaluation of the Program of All-Inclusive Care for the Elderly*

- (PACE) demonstration: The impact of PACE on participant outcomes. Cambridge, MA: Abt Associates.
- Crooks, V. C., Schnelle, J. F., Ouslander, J. P., & McNeese, M. P. (1995). Use of the Minimum Data Set to rate incontinence severity. *Journal of the American Geriatrics Society*, 43, 1363-1369.
- Donabedian, A. (1980). *Exploration in quality assessment and monitoring* (Vol. 1). Ann Arbor, MI: Health Administration Press.
- Duckett, M. J., & Guy, M. R. (2000). Home and community-based services waivers. *Health Care Financing Review*, 22(1), 123-125.
- Eng, C., Pedulla, J., Eleazer, G. P., McCann, R., & Fox, N. (1997). Program for All-inclusive Care the Elderly (PACE): An innovative model of integrated geriatric care and financing. *Journal of the American Geriatrics Society*, 45, 223-232.
- Evans, D. A., Funkenstein, H. H., Albert, M. S., Scherr, P. A., Cook, N. R., Chown, M. J., et al. (1989). Prevalence of Alzheimer's disease in a community population of older persons: Higher than previously reported. *JAMA*, 262, 2551-2556.
- Forbes, S. A., Hoffart, N., & Redford, L. J. (1997). Decision making by high functional status elders regarding nursing home placement. *Journal of Case Management*, 6(4), 166-173.
- Fries, B. E., & Cooney, L. M. (1985). Resource utilization groups. A patient classification system for long-term care. *Medical Care*, 23(2), 110-122.
- Frytak, J. R., Kane, R. A., Finch, M. D., Kane, R. L., & Maude-Griffin, R. (2001). Outcome trajectories for assisted living and nursing facility residents in Oregon. *Health Services Research*, 36(1), 91-111.
- General Accounting Office. (1999). *Assisted living: Quality-of-care and consumer protection issues in four states* (GAO/HEHS 99-27). Washington, DC: Government Printing Office.
- Grando, V. T., Mehr, D., Popejoy, L., Maas, M., Rantz, M., Wipke-Tevis, D. D., et al. (2002). Why older adults with light care needs enter and remain in nursing homes. *Journal of Gerontological Nursing*, 28(2), 47-53.
- Hadley, J., Rabin, D., Epstein, A., Stein, S., & Rimes, C. (2000). Post hospitalization home health care use and changes in functional status in a Medicare population. *Medical Care*, 38(5), 494-507.
- 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.
- Hartmaier, S. L., Sloane, P. D., Guess, H. A., Koch, G. G., Mitchell, C. M., & Phillips, C. D. (1995). Validation of the Minimum Data Set Cognitive Performance Scale: Agreement with the Mini-Mental State Examination. *Journal of Gerontology: Medical Sciences*, 50(2), M128-M133.
- 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). *Gerontologist*, 35(2), 172-178.
- Hughes, S. L. (1985). Apples and oranges? A review of evaluations of community-based long-term care. *Health Services Research*, 20(4), 461-488.
- Inouye, S. K., Bogardus, S. T., Jr., Charpentier, P. A., Leo-Summers, L., Acampora, D., Holford, T. R., et al. (1999). A multi-component intervention to prevent delirium in hospitalized older patients. *The New England Journal of Medicine*, 340(9), 669-676.
- Kane, R. L., Chen, Q., Finch, M., Blewett, L., Burns, R., & Moskowitz, M. (2000). The optimal outcomes of post-hospital care under Medicare. *Health Services Research*, 35(3), 615-661.
- Kelly, K. C., Huber, D. G., Johnson, M., McCloskey, J. C., & Maas, M. (1994). The Medical Outcomes Study: A nursing perspective. *Journal of Professional Nursing*, 10(4), 209-216.
- LeBlanc, A. J., Tonner, M. C., & Harrington, C. (2001). State Medicaid programs offering personal care services. *Health Care Financing Review*, 22(4), 155-173.
- Lee, T. (2000). The relationship between severity of physical impairment and costs of care in an elderly population. *Geriatric Nursing*, 21(2), 102-106.
- Leveille, S. G., Wagner, E. H., Davis, C., Davios, C., Grothaus, L., Wallace, J., et al. (1998). Preventing disability and managing chronic illness in frail older adults: A randomized trial of a community-based partnership with primary care. *Journal of American Geriatric Society*, 46, 1191-1198.
- Marek, K. D. (1997). Measuring the effectiveness of nursing care. *Outcomes Management for Nursing Practice*, 1(1), 8-11.
- Mattimore, R. J., Wenger, N. S., Desbiens, N. A., Teno, J. M., Hamel, M. B., Liu, H., et al. (1997). Surrogate and physician understanding of patients' preferences for living permanently in a nursing home. *Journal of the American Geriatrics Society*, 45(7), 818-824.
- Miller, E. A., & Weissert, W. G. (2000). Predicting elderly people's risk for nursing home placement, hospitalization, functional impairment, and mortality: A synthesis. *Medical Care Research and Review*, 57, 259-297.
- Mor, V. (2004). A comprehensive clinical assessment tool to inform policy and practice: Applications of the Minimum Data Set. *Medical Care*, 42(4), III-50-III-59.
- Mor, V., Berg, K., Angelelli, J., Gifford, D., Morris, J., & Moore, T. (2003). The quality of quality measurement in U.S. nursing homes. *Gerontologist*, 43(2), 37-46.
- Morris, J. N., Fries, B. E., Mehr, D. R., Hawes, C., Phillips, C., Mor, V., et al. (1994). MDS Cognitive Performance Scale. *Journal of Gerontology: Medical Sciences*, 49(4), M174-M182.
- Morris, J. N., Fries, B. E., Steel, K., Ikegami, N., Bernabei, R., Carpenter, G. I., et al. (1997). Comprehensive clinical assessment in community setting: Applicability of the MDS-HC. *Journal of the American Geriatrics Society*, 45(8), 1017-1024.
- Morris, J. N., Hawes, C., Fries, B. E., Phillips, C. D., Mor, V., Katz, S., et al. (1990). Designing the national resident assessment instrument for nursing homes. *Gerontologist*, 30(3), 293-307.
- Naylor, M. D., Brooten, D., Campbell, R., Jacobsen, B. S., Mezey, M. D., Pauly, M. V., et al. (1999). Comprehensive discharge planning and home follow-up of hospitalized elders: A randomized clinical trial. *JAMA*, 281(7), 613-620.
- Naylor, M. D., Brooten, D. A., Campbell, R. L., Maislin, G., McCauley, K. M., & Schwartz, J. S. (2004). Transitional care of older adults hospitalized with heart failure: A randomized controlled trial. *Journal of the American Geriatrics Society*, 52, 675-684.
- Spector, W. D., Reschovsky, J. D., & Cohen, J. W. (1996). Appropriate placement of nursing home residents in lower levels of care. *The Milbank Quarterly*, 74(1), 139-160.
- Stevenson, D. G., Murtaugh, C. M., Feldman, P. H., & Oberlink, M. (Fall/Winter 2000). Expanding publicly financed managed long-term care programs to provide greater access to home and community-based care. In *The Home Care Initiative: Policy Brief, Fall/Winter* (Vol. 2). New York: Center for Home Care Policy and Research Visiting Nurse Service of New York.
- Stokes, M. E., Davis, C. S., & Koch, G. G. (2000). *Categorical data analysis using the SAS system*. Cary, NC: SAS Institute.
- Tarlov, A. R., Ware, J. E., Greenfield, S., Nelson, E. C., Perrin, E., & Zubkoff, M. (1989). The Medical Outcomes Study: An

- application for methods for monitoring the results of medical care. *JAMA*, 262(7), 925–930.
- Tinetti, M. E., Baker, D., Gallo, W. T., Nanda, A., Charpentier, P., & O’Leary, J. (2002). Evaluation of restorative care vs usual care for older adults receiving an acute episode of home care. *JAMA*, 287(16), 2098–2105.
- U.S. Census Bureau. (2000). *Projections of the total resident population by 5-year age groups, and sex with special age categories: Middle series, 2011–2015 and 2025–2045*. Retrieved from <http://www.census.gov/population/projections/nation/summary>
- Weissert, W. G., Cready, C. M., & Pawelak, J. E. (1988). The past and future of home- and community-based long term care. *Milbank Quarterly*, 66, 309–388.
- Zimmerman, D. R., Karon, S. L., Arling, G., Ryther-Clark, B., Collins, T., Ross, B., et al. (1995). Development and testing of nursing home quality indicators. *Health Care Financing Review*, 16(4), 107–127.