

The Relationship of Community-Based Nurse Care Coordination to Costs in the Medicare and Medicaid Programs

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Abstract: The purpose of this evaluation was to study the relationship of nurse care coordination (NCC) to the costs of Medicare and Medicaid in a community-based care program called Missouri Care Options (MCO). A retrospective cohort design was used comparing 57 MCO clients with NCC to 80 MCO clients without NCC. Total cost was measured using Medicare and Medicaid claims databases. Fixed effects analysis was used to estimate the relationship of the NCC intervention to costs. Controlling for high resource use on admission, monthly Medicare costs were lower (\$686) in the 12 months of NCC intervention ($p = .04$) while Medicaid costs were higher (\$203; $p = .03$) for the NCC group when compared to the costs of MCO group. © 2010 Wiley Periodicals, Inc. *Res Nurs Health* 33:235–242, 2010

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Spending on long-term care services is expected to increase by more than two and a half times between 2000 and 2040 to \$379 billion (Government Accountability Office 2005). A major driver of the Medicaid program is long-term care services. For the program to be financially viable, efficient and effective systems of care for the elderly and persons with disabilities must be created (Shirk, 2006). It is estimated that as many as 2.3 million adults living in home or community-based settings are at risk of institutionalization because of their need for assistance with self care activities (GAO, 2001). Furthermore, the number of disabled elderly who will require assistance with basic activities of daily living is expected to more than double resulting in a major increase in the demand for long-term care (Houser, Fox-Grage, & Gibson, 2009). To meet this challenge, innovation in the delivery of health care services to older adults is critical. It is clear that current systems of care delivery are not capable of meeting the expansive need for long-term care required in the near future. When given a choice the majority of older adults prefer care in their own home as opposed to the nursing home (Mattimore et al., 1997). Changes in institutional care will not be enough, and community-based options for long-term care services merit greater attention.

SIGNIFICANCE

Many older adults in the United States believe that the Medicare benefit will provide home health services if they become chronically ill. The Medicare Home Health care benefit is designed to provide home care services to older adults for short episodes of acute illness. To receive Medicare Home Health services an individual must: (a) have a physician's order for home care; (b) require skilled nursing care, physical therapy, speech-language therapy, or continued occupational therapy; and (c) be homebound or normally unable to leave home without help (Medicare, 2009). Services covered by the Medicare Home Health benefit are: (a) skilled nursing care; (b) home health aide services, but only if receiving a skilled nursing or therapy service; (c) physical, speech-language, and occupational therapies; (d) medical social services; (e) certain medical supplies, like wound dressings; (d) durable medical equipment (DME) such as a walker or wheelchair; and (e) Food and Drug Administration approved injectable osteoporosis drugs in specific circumstances. Once an illness is determined to be stable, the Medicare Home Health

benefit is usually no longer available to older adults. One goal of care for persons with chronic illness is to reduce the number of exacerbations of acute illness. This requires ongoing care including frequent monitoring of health status to identify and treat problems before they deteriorate into major health events. In addition, personal care services are in high demand for frail older adults as they struggle to remain independent in their home setting. Komisar, Feder, and Kasper (2005) found that 58% of dual eligible adults (Medicare and Medicaid eligible) living in the community reported unmet needs for help with activities of daily living (ADLs).

In the early 1980s, the Medicaid Home and Community-Based services (HCBS) waiver program was legislated to provide a public financing mechanism for community-based long-term care services. Medicaid provides payment for health care services to low-income individuals and families who fit into an eligibility group determined by federal and state law (United States Department of Health and Human Services, 2009). The national percentage of Medicaid spending on HCBS more than doubled from 19% in 1995 to 41% in 2007, however, nursing homes remain the major location for provision of 70% of Medicaid long-term care services (Ng, Harrington, & O'Malley, 2008). Services provided by HCBS programs vary state to state.

In Missouri the HCBS program is called MCO. To receive MCO services an individual must be a Medicaid beneficiary or potentially eligible for Medicaid and in need of long-term care services at a level usually provided in a nursing home (Department of Health and Senior Services, 2009). MCO services include assistance with ADLs, help with complex physical needs, companion care to relieve family caregivers, help with housekeeping, laundry, meal preparation, shopping and other services, and supervised adult day care programs (Department of Health and Senior Services). Although skilled nursing services are a component of the MCO program, not all clients receive approval for skilled nursing services, and when they do, the number of visits are quite limited, usually less than once a month. The MCO program is based on a social model of care, and the MCO case managers are not nurses. Clients' service needs are evaluated by case managers who then authorize the services that will be received. The caseloads of the MCO case managers are very high, making it difficult to adequately manage complex, chronically ill participants.

The Medicare Home Health benefit and Medicaid HCBS programs focus on obtaining specific covered services rather than managing ongoing acute and chronic health care needs of frail older adults. Even though case management is a component of Medicaid HCBS, the case manager is not responsible for enrollees when they become acutely ill and require more intensive hospital or skilled nursing services. This lack of coordination increases the likelihood that individuals will not return to the community after an acute care episode (Grabowski, 2007). A recent report from the GAO (2003) questioned the adequacy of case management services in the HCBS programs. Recipients of both Medicare Home Health services and HCBS typically have care delivered from different health care service providers, from different organizations, or departments within organizations. This increases the number of individuals providing services and adds to the lack of continuity in both care providers and coordination of services.

Two examples of programs developed to coordinate care across acute and long-term care venues for both Medicare and Medicaid payment are the Program for All-Inclusive Care for the Elderly (PACE) and Minnesota Senior Health Options Program. In PACE, a multidisciplinary team coordinates long-term care services across providers, and the majority of services are usually delivered in an adult day health center co-located with a primary care clinic (Eng, Pedulla, Eleazer, McCann, & Fox, 1997; Lynch, Hernandez, & Estes, 2008). Evaluations of PACE programs have identified improved quality outcomes for enrollees (Chatterji, Burstein, Kidder, & White, 1998); however, analyses of cost savings to the Medicaid and Medicare programs have had mixed results (Foster, Schmitz, & Kemper, 2007; Lynch et al., 2008; White, Abel, & Kidder, 2000).

The Minnesota Senior Health Options Program is a voluntary demonstration program that uses geriatric evaluation and management, outpatient group care, and extensive use of geriatric nurse practitioners. Implementation of these elements varies across plans and enrollees. In evaluation, Medicare and Medicaid costs for participants were found to be higher than the fee-for-service control group. However, program enrollees had significantly fewer preventable hospital admissions and significantly fewer preventable emergency services than the control group. In addition, the program appeared to be more effective for nursing home enrollees than for community enrollees (Kane & Homyak, 2002).

Aging in Place Program

Similar to the previous programs discussed, the Aging in Place (AIP) program was created at the University of Missouri to test an alternative delivery model of community-based long-term care. In this program, participants were assigned a nurse care coordinator who coordinated both Medicare Home Health and Medicaid HCBS for frail older adults. To conduct this project a home care agency called Senior Care was formed, licensed as a home health provider, and Medicare certified. In addition, the agency procured HCBS provider status in the MCO program. This provided the AIP program the ability to deliver HCBS, such as personal care and homemaking to individuals who were nursing-home-eligible and Medicaid-eligible.

An essential service provided by the AIP program was NCC. The NCC program was directed by an advanced practice nurse, with registered nurses specially trained in care of older adults providing the care coordination intervention. All AIP participants received both an individualized assessment of their health care needs and a plan of care that was reviewed with participants and their families no less than monthly during a home visit. Additional nursing interventions were provided to monitor and coordinate the participant's health care, and, unlike other MCO agencies, the same nurse coordinated services for both MCO and Medicare Home Health. If participants required acute care and/or hospitalization they were followed by their nurse care coordinator who worked with hospital discharge planners and participant families on older adults' post-hospital plan of care. Because the nurse care coordinators were familiar with AIP participants' level of functioning before hospitalization, they often were able to advocate for older adults' return to their homes with appropriate services in place.

In a previous evaluation of the AIP program, the clinical outcomes of its participants were compared to MCO clients in a neighboring county who did not receive NCC. At 12 months, the AIP group scored significantly better ($p < .05$) in the clinical outcomes of pain, dyspnea, and ADLs (Marek, Popejoy, Petroski, & Rantz, 2006). Results of that study suggest that the addition of NCC to the MCO program contributed to more positive clinical outcomes than MCO alone. In our study we compared Medicare and Medicaid costs of MCO participants who received NCC (NCC group) to MCO participants who did not (MCO group).

METHODS

Study Population

In Missouri, an MCO caseworker assigns MCO participants to a state recognized MCO provider. The assignment is rotated among all MCO providers in participants' service area. All MCO participants in the Boone County area during the period 2000 to 2002 were included in this evaluation. Senior Care, the provider of the NCC intervention, was one of the Boone County MCO providers.

Design

The purpose of this evaluation was to study the relationship of NCC to the costs of Medicare and Medicaid in the MCO program. The evaluation used a retrospective cohort design, matching participants on similar time periods. Only individuals whose primary payer for long-term care services was Medicaid and who resided in Boone County were included in the evaluation. In institutional long-term care the Minimum Data Set for Long-term Care is available on all Medicaid residents. Such a data set was not available for clients in the MCO program, so participants were not matched on demographic and or clinical characteristics. We secured the Medicare and Medicaid claims data files during the 3-year period of 2000–2002 for 275 Boone County residents who received MCO services (93 of whom received MCO plus NCC). We limited the analysis to those who had received at least 12 months of service and had both Medicare and Medicaid claims available over the study period, for a total of 57 in the NCC group and 80 in the MCO only group.

Analyses

The perspective of the cost analysis was considered as the cost to payers, primarily the public payers (Medicare and Medicaid). For benefits under Medicare Part A or Part B, we used Medicare allowable charges (Medicare payments plus co-insurance and deductibles as they apply to different benefits). For benefits only available under Medicaid (prescription drugs, certain institutional, and non-institutional long-term care costs) we used Medicaid allowable charges. We also separately considered just Medicare and

Medicaid payments. Medicare costs were calculated from the Medicare Standard Analytical Files. Medicare divides these into “institutional” (e.g., inpatient and outpatient hospital services) and “non-institutional” (e.g., physician services) costs. Medicare institutional costs were drawn from the Standard Analytical Files for inpatient services, outpatient care, home health visits, and skilled nursing care. Non-institutional costs included reimbursements to physicians calculated from the Physician/Supplier Standard Analytical Files, and costs of durable medical equipment (DME) drawn from the DME Standard Analytical Files. Total cost to Medicare was the sum of these seven cost items.

Medicaid costs were calculated from the Medicaid Management Information System files. The Missouri Division of Medical Services provided to the University of Missouri cost data on all MCO participants in Boone County for years 2000–2002. Medicare and Medicaid average per month costs were analyzed over an 18 month period (months were measured as 30-day periods), starting the 6 months (180 days) prior to NCC intervention and continuing for 12 months (360 days) after the start of the NCC intervention. The start of the 12-month intervention period for NCC patients was clear, but it was less clear when to assign the hypothetical intervention start for the MCO comparison group. The decision was made to construct the hypothetical intervention start date for the MCO comparison group using the midpoint of the NCC group program start dates. That midpoint was in January of 2001. So, we considered the hypothetical start date for MCO clients to be January 1, 2001. This serves as the counterfactual or control for what NCC cost changes might have been absent intervention.

We experimented with different hypothetical start dates for the MCO group. Moving the start date up or back 1 month had no substantive effects on the results. Moving the start date to 6 months earlier (July 2000) resulted in stronger Medicare savings from the AIP intervention than those reported. Moving the start date to 6 months later (June 2001), however, resulted in limited Medicare cost savings. This is not surprising. Moving the start date to 6 months earlier reduces the MCO costs included in the control sample substantially and moving the start date to 6 months later increases the costs measured in the sample. These are likely not representative of what the average AIP patient would cost absent intervention. Thus, the midpoint is likely the only sensible counterfactual against which the

significance of changes in costs for the AIP group can be tested.

There were no significant changes in payment for Medicare Home Health or MCO services during the study period. The MCO program authorized up to four additional nursing visits per month for the NCC participants. Reimbursement for the additional nursing visits was included in the Medicaid costs.

To capture the relationship of the intervention to costs in the NCC versus MCO control group, we conducted regressions on the pooled sample of monthly costs for NCC and MCO clients. The dependent variables were per-month costs from each cost category. The regression covariates included a control for pre study hospitalization (measured as a dummy variable for positive inpatient costs in the pre-intervention period) and a dummy variable for each individual in the sample (an individual fixed effect). These fixed effects captured factors that related to an individual's per-month costs that did not vary over time, such as age at time of study, sex, and race. To capture the relationship of the intervention to costs in the NCC group, we then included an interaction between a post-treatment dummy (the 12 months of actual treatment in the NCC and hypothetical treatment in the MCO group) and a dummy variable indicating the person was in the NCC group and received the intervention. The relationship of the intervention to the NCC group costs was therefore captured by the estimated coefficient on this interaction. This approach is akin to the difference-in-difference econometric estimation procedure (Wooldridge, 2003) and is often employed in health services research (McConnon et al., 2007; Wharam et al., 2007).

To determine the cost of the NCC intervention, nurse care coordinator time and travel costs were recorded on daily activity logs. Time was recorded in the categories of direct and indirect time related to individual clients. In addition, time was recorded according to payer source, so that time spent in the care coordination intervention that was not billable could be identified for cost purposes. Because time was recorded in this method, we were able to separate nurse care coordinator time and travel expenses that were additive to the MCO and Medicare Home Health programs.

RESULTS

The mean age of study participants was 73.3 and the majority were female (74%). There were no significant differences in age and gender between the two groups, nor were the average per-month cost per participant in the 6-month period before NCC intervention significantly different between groups.

Medicare and Medicaid Costs

In the 6-month period prior to the NCC intervention, the mean monthly Medicare costs for the two groups were nearly identical, but the Medicaid costs for the MCO group were significantly higher (Table 1). Twelve months post-NCC intervention there was no significant difference in the mean monthly costs for Medicare or Medicaid between groups. In Table 2, results are reported using regression analysis controlling for high

Table 1. Mean Medicaid and Medicare Costs Per Month, Comparisons Between NCC and MCO Groups

	Medicaid Costs	Medicare Costs	Total Costs
Six months prior to intervention			
NCC	349.78	1506.94	1856.72
MCO	545.19	1497.45	2042.64
Difference in NCC costs and MCO costs	-195.40	9.49	-185.91
<i>t</i> -Test NCC and MCO differ (<i>p</i> -value)	<i>t</i> = 2.15 (<i>p</i> = .03)	<i>t</i> = .023 (<i>p</i> = .98)	<i>t</i> = .44 (<i>p</i> = .66)
Year after intervention			
NCC	595.16	915.31	1510.47
MCO	604.36	1289.31	1893.66
Difference in NCC costs and MCO costs	-9.20	-373.99	-383.19
<i>t</i> -Test (NCC and MCO differ (<i>p</i> -value)	<i>t</i> = .09 (<i>p</i> = .93)	<i>t</i> = 1.59 (<i>p</i> = .11)	<i>t</i> = 1.34 (<i>p</i> = .18)

n = 57 for NCC and *n* = 80 for MCO.

NCC, nurse care coordination; MCO, Missouri Care Options.

Table 2. Regression Estimation of Impact of Intervention on Medicaid and Medicare Costs Per Month (12 Months Post), Including a Dummy Variable Indicating High Inpatient Costs in the 6 Months Prior to Intervention

	Relative Change in NCC Group Per Month Costs (vs. MCO) Post-Intervention	<i>t</i> -Statistic of Estimate	<i>p</i> -Value	<i>R</i> ² of Regression
Total Medicare and Medicaid costs	-482.85	-1.41	.16	.78
Total Medicaid costs	202.96	2.26	.03	.80
Total Medicare costs	-685.81	-2.07	.04	.76
Medicare cost subcategories:				
Inpatient	-611.60	-2.38	.02	.72
Outpatient	-77.18	-2.57	.01	.93
SNF	-8.99	-.15	.88	.49
DME	-1.00	-.05	.96	.80
Physician	-47.46	-1.13	.26	.81
Home health	60.42	1.68	.10	.76

Each row is from a separate regression, with the dependent variable being per-month costs from each category ($n=57$ for NCC and $n=80$ for MCO).

NCC, nurse care coordination; MCO, Missouri Care Options; SNF, Skilled Nursing Facility; DME, durable medical equipment.

utilization in the period 6 months before intervention. In the NCC group, the regression results show that total Medicare and Medicaid average per month costs were decreased by \$483 in the 12 months after the NCC intervention relative to the MCO; however, the amount is not statistically significant (Table 2). But, examination of Medicare and Medicaid costs separately in the NCC group shows that Medicare costs fell \$686 ($p=.04$) while Medicaid costs increased by \$203 ($p=.03$). In addition, examination of the Medicare cost subcategories revealed that average inpatient and outpatient costs per month were significantly lower at \$612 ($p=.02$) and \$77 ($p=.01$), respectively; however, home health cost did not differ \$60 ($p=.10$).

Cost of Aging in Place Intervention

Costs of the NCC intervention were comprised of the dollar value of nurse time, including visit time, travel time, and other time linked to the NCC participant. The mean number of nurse care coordinator visits per month for NCC Medicaid clients was 2.19 and the mean cost per month for nurse care coordinator time plus mileage cost was \$133.60. This cost was additive to the care delivered in either HCBS or Medicare Home Health services. However, when considering the reduction in total costs per month, adding

the monthly cost of NCC still provides a savings of about \$350 per month.

DISCUSSION

The purpose of this study was to study the relationship between NCC and the costs to Medicare and Medicaid in a community-based long-term care program called MCO. Furthermore, nurse care coordinators followed participants across all care settings, and managed participants regardless of payer source. A single provider, Senior Care was used for both MCO and Medicare Home Health services.

When total costs of the Medicare and Medicaid programs were compared, the NCC group yielded greater cost savings than the MCO group. These results are similar to the PACE program, in that Medicare costs were lower and Medicaid costs were higher; however, Medicaid spending increased by 86% in the PACE program evaluation while only increasing 58% in the NCC evaluation (White et al., 2000). In the Minnesota Senior Health Options Program both Medicare and Medicaid costs were higher when compared to the fee for service nursing home and community-based groups (Kane & Homyak, 2002).

One key difference in the AIP program, when compared to PACE and the Minnesota Senior Health Options programs, is that AIP was based on

a home care delivery model with NCC as the link between the home based Medicare and Medicaid services. For frail older adults who may be disabled, a simple trip to a physician office, adult health service, or outpatient care can be exhausting. Emergency department care and hospital admissions are known to be detrimental to the health and well being of chronically ill older adults (Covinsky et al., 2003). The NCC intervention was focused on provision of care in the participant's home, so that unnecessary trips to outpatient and inpatient care were reduced and/or prevented. In addition, delivery of services in participants' homes provided a much broader perspective of the challenges and interventions needed to support older adults in the management of their chronic illness.

When the NCC group was compared to the MCO group the major cost reductions were to the Medicare program; inpatient and outpatient Medicare costs were significantly lower in the NCC group. One explanation for this could be that in the NCC group, outpatient services such as physical therapy were offered via the Medicare Home Health benefit shifting the cost from Medicare outpatient costs to the Medicare Home Health benefit. It appears that the addition of NCC to the MCO program reduced total cost. In fact, the relative change in total Medicare cost was lower in all areas except home health and durable medical equipment.

Poor coordination of care has recently been identified as the heart of the problem in care delivery to chronically ill people (Dentzer, 2009). A major component of NCC was assisting, and/or supporting, NCC participants with the implementation of their medical plan of care with multiple health care providers. The results of this study demonstrate that NCC is associated with reduced costs across both Medicare and Medicaid programs. Although Medicaid costs were higher in the NCC group, the cost savings in the Medicare program more than covered the higher Medicaid costs and the \$134 per month cost of the NCC intervention. This study highlights the need to reexamine how the Medicare and Medicaid programs finance health care. Current care for older adults is often more focused on what is reimbursed rather than based on the individual's health care needs. More flexible reimbursement systems would allow more creative care models.

LIMITATIONS

Results of this study provide support for a different option of community-based long-term care. There

were several limitations in the evaluation of the NCC intervention. The study sample size was small and from one geographic area. This was a retrospective cohort design, and the comparison group was not randomly assigned; however, the MCO group assignment was rotated among several agencies. Also previous high inpatient use was used as a covariate to help control for differences in case mix. The NCC intervention required the creation of a new home care organization. It was a major challenge to create an efficient care delivery system over a short period. Finally, the evaluation period for this study was limited to 12 months. A longer evaluation period with a larger sample size is recommended.

CONCLUSION

As the population of chronically ill and/or older persons in need of comprehensive, coordinated health services continues to increase, we must find ways to help these individuals receive services in a way that optimizes their personal choices. In addition, the belief that health care services provided in the home are cost prohibitive must be reexamined. One guiding principle in creating new models of care is to provide the most continuity with the least amount of burden to the recipient of care. Programs such as the NCC program follow this principle and need further investment if we are to create cost effective programs that meet the needs of a growing chronically ill older adult population.

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