

Impact of the REACH II and REACH VA Dementia Caregiver Interventions on Healthcare Costs

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OBJECTIVE: Examine caregiver and care recipient healthcare costs associated with caregivers' participation in Resources for Enhancing Alzheimer's Caregivers Health (REACH II or REACH VA) behavioral interventions to improve coping skills and care recipient management.

DESIGN: RCT (REACH II); propensity-score matched, retrospective cohort study (REACH VA).

SETTING: Five community sites (REACH II); 24 VA facilities (REACH VA).

PARTICIPANTS: Care recipients with Alzheimer's disease and related dementias (ADRD) and their caregivers who participated in REACH II study (analysis sample of 110 caregivers and 197 care recipients); care recipients whose caregivers participated in REACH VA and a propensity matched control group (analysis sample of 491).

MEASUREMENTS: Previously collected data plus Medicare expenditures (REACH II) and VA costs plus Medicare expenditures (REACH VA).

RESULTS: There was no increase in VA or Medicare expenditures for care recipients or their caregivers who participated in either REACH intervention. For VA care recipients, REACH was associated with significantly lower total VA costs of care (33.6%). VA caregiver cost data was not available.

CONCLUSION: In previous research, both REACH II and REACH VA have been shown to provide benefit for dementia caregivers at a cost of less than \$5/day; however, concerns about additional healthcare costs may have hindered REACH's widespread adoption. Neither REACH intervention was associated with additional healthcare costs for caregivers or patients; in fact, for VA patients,

there were significantly lower healthcare costs. The VA costs savings may be related to the addition of a structured format for addressing the caregiver's role in managing complex ADRD care to an existing, integrated care system. These findings suggest that behavioral interventions are a viable mechanism to support burdened dementia caregivers without additional healthcare costs. *J Am Geriatr Soc* 2017.

Key words: Alzheimer's disease; dementia; caregivers; healthcare utilization; expenditures; cost

Alzheimer's disease and related dementias (ADRD) are a major public health issue.¹ Currently, an estimated 5.3 million Americans have Alzheimer's disease (AD), accounting for 70% to 80% of all dementias, and incidence is rising with the nation's aging population.² Researchers forecast that patients with AD in the United States will increase to 13.2 million by 2050.³ VA ADRD patients are projected to rise by 26% between 2015 and 2033.⁴

Family caregivers are the cornerstone of care for ADRD patients, with 5.8 million family and unpaid dementia caregivers providing 532 million hours of unpaid care in 2011.⁵ Persons with ADRD constitute about 10% of community living older adults, but receive 41% of caregiving hours.⁵ In addition to the amount of family care, patients with ADRD use a disproportionate amount of healthcare resources, placing significant strain on health and long term care systems, particularly public payers such as Medicare, Medicaid, and Veterans Affairs (VA). In 2010, U.S. healthcare costs for ADRD patients were \$109 billion, exceeding costs for heart disease or cancer.⁶ In 2012, the VA spent \$3.1 billion for ADRD care.

Additional costs are incurred by dementia caregivers. Research suggests interdependence between the dyad's health and healthcare costs. Caregivers' use of healthcare services increases as their caregiving burden increases.⁷ Spouses of individuals with dementia have higher monthly

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Medicare use than spouses of non-demented individuals.⁸ In addition, spouse caregivers of individuals with dementia have greater cognitive decline compared to other spouse caregivers.⁹

Because family and unpaid caregivers provide major societal benefit at minimal cost to the healthcare system, often at considerable personal cost, there have been repeated calls for support services that enable continued provision of care in the home.^{10,11} Interventions that enhance caregiver coping skills and management of care recipient behaviors have been shown to decrease caregiver burden and improve caregiving skills and quality of life for both caregiver and patient with AD/DR.^{2,12,13} Caregiver behavioral interventions have been demonstrated efficacious in avoiding adverse physical and psychological consequences such as depression, anxiety, sleep disturbance, hospitalization and mortality, and increased risk of patient institutionalization.^{14–18}

However, it is not known if behavioral interventions for dementia caregivers increase or decrease healthcare utilization for caregivers or their care recipients. Because previous evidence suggests that caregivers' healthcare service use increases with burden,⁷ decreasing burden could be associated with lower costs. On the other hand, unintended consequences such as seeking additional care with increased recognition of caregiver or care recipient conditions that require care¹⁹ may increase healthcare costs. Few studies have examined this issue. In a study of veterans whose caregivers participated in a telephone intervention, there were significant total healthcare cost savings per patient at 6 months in the intervention arm when compared to usual care (37.4% reduction in cost, \$2,768).²⁰

To investigate the impact of caregiver interventions on costs of care for both dementia caregivers and care recipients, this study examined caregiver and care recipient healthcare utilization and costs associated with caregivers' participation in a behavioral intervention to improve coping skills and care recipient management. Demographic and outcomes data already collected through two separate national studies, Resources for Enhancing Alzheimer's Caregivers Health (REACH II) and REACH VA, were combined with Medicare claims and VA cost data to assess costs. Pre-intervention and post-intervention costs/expenditures were compared within each sample.

METHODS

This study was approved by Institutional Review Boards of the University of Tennessee Health Science Center, Memphis Veterans Affairs Medical Center (VAMC), Mount Sinai Medical Center, and Bronx VAMC. Each sample, REACH II and REACH VA, was analyzed separately.

REACH II

Intervention and Caregiver Outcomes

REACH II was a national randomized clinical trial, June 2002 to December 2004, of an intervention for family caregivers of patients with AD/DR, funded by National Institute on Aging (NIA) and National Institute of Nursing

Research (NINR).¹² Five REACH II sites contributed data for 642 African American, Hispanic, and Caucasian caregiving dyads. In the original trial, caregivers, along with associated care recipients, were randomly assigned within each racial/ethnic group to intervention (323 participants) or control (319 participants). Race/ethnicity was self-reported by the caregiver. The design and outcomes of REACH II have been described elsewhere.¹² Compared to controls, African American (spouse), Hispanic, and Caucasian intervention caregivers experienced significantly greater improvement in a multi-component quality of life variable comprised of caregiver depression, burden, self-care, and social support and care recipient problem behaviors. Prevalence of clinical depression was significantly lower for intervention group caregivers as were caregiver frustrations.^{12,21} Intervention group caregivers reported an additional hour of time per day not providing hands-on activities for their care recipients, compared to control group caregivers.²² Intervention costs were \$4.96 per caregiver per day calculated using data from the Memphis site.²²

Study Population

REACH II provided two (randomized) intervention and control groups (caregivers and care recipients).

Data

Information on Medicare spending was obtained for REACH II care recipients and caregivers who were enrolled in Medicare fee-for-service plans and supplied appropriate identification in the original study. These claims data contained detailed payments for all care covered by Medicare. Prescription medications (Part D data) were unavailable for REACH II participants because Part D was implemented after the study period.

Measures

The primary outcome was annual healthcare expenditures, with the intent to capture expenditures as broadly as possible. For REACH II participants, this was calculated as the sum of all Medicare payments.

REACH VA

Intervention and Caregiver Outcomes

The REACH II intervention has been translated in a variety of forms and settings with similar improvements in caregiver well-being.^{12,13,23–25} The REACH VA translation of REACH II into the Veterans Health Administration (VHA) for AD/DR caregivers was funded by VA Patient Care Services from September 2007 through August 2009.¹³ The REACH VA translation involved 29 sites from 24 VAMCs enrolling 127 caregivers of dementia patients (care recipients) as part of usual clinical care. REACH VA patients and their caregivers were identified from among patients enrolled in the Home Based Primary Care (HBPC) program, an interdisciplinary longitudinal home care program for individuals with complex chronic disease. Race/ethnicity was self-reported by the caregiver.

In examining the clinical effects of REACH in VA, outcomes were similar.¹³ Caregivers reported significantly decreased burden, depressive symptoms, impact of depressive symptoms on daily life, caregiving frustrations, and troubling dementia related behaviors. Costs associated with the intervention (excluding travel) were estimated to be \$2.97 per caregiver per day.¹³ REACH VA has since been modified to fewer sessions and expanded to additional diagnoses as a VHA national clinical program, not limited to HBPC.²⁶

Study Population

REACH VA provided one (non-randomized) intervention group (care recipients). A control group of veterans with AD RD whose caregivers did not receive the REACH VA intervention was constructed using propensity score methods.^{27–29} Control subjects were drawn from all veterans who met REACH VA enrollment criteria (AD RD diagnosis, received HBPC services at same VAMCs during same years as REACH VA subjects), and matched on age, race/ethnicity (white, black, Hispanic, other), marital status (married vs other), urban/rural residence, service-connected disability, and the Elixhauser Comorbidity Index³⁰ using a 1:4 matching algorithm.^{28,29} Although sample sizes were different (increased) with a greedy match, there were two reasons to use this approach. First, it is difficult to find exact matches with intervention subjects; by selecting more comparison subjects, each matched on some characteristics but not all, the comparison group is more likely to be balanced. Second, by increasing the size of the comparison group, the power to detect significant differences is increased.

Data

Healthcare cost data for REACH VA subjects and propensity matched control subjects were obtained from VA Health Economics Resource Center Average Cost Data files.^{31,32} VHA Decision Support System National Data Extracts pharmacy datasets were used to obtain inpatient and outpatient pharmacy costs. Medicare claims, including Part D data, were obtained for dually enrolled veterans.

Measures

For REACH VA participants, annual healthcare expenditures were the sum of all VA costs and Medicare expenditures. VA analyses were conducted with pharmacy data and without, for comparability to the REACH II sample. Despite this comparability, each study sample was compared only to itself, examining costs/expenditures in the pre-intervention and post-intervention periods.

Analytical Approach—REACH II and REACH VA

Baseline characteristics were compared between intervention and comparison participants for both studies using chi-squared or independent *t*-test, as appropriate. REACH II caregivers and care recipients were also compared. Although each sample was analyzed separately for costs, baseline characteristics for REACH II and REACH VA care recipients were compared. $P \leq .05$ was considered statistically significant.

Difference-in-differences (DID) analysis was used to estimate the impact of the REACH intervention on health-care expenditures for both studies. This quasi-experimental approach mimics an experimental design using observational data by studying the differential effect of treatment on a treatment group versus a control group. DID calculates the effect of the treatment on an outcome by comparing the average change over time in the outcome for the treatment group compared to the average change over time for the control group.

The intervention duration was 6 months for both studies. The pre-intervention baseline period was defined as the 12 months immediately before the REACH intervention, and the post-intervention follow-up period as the 12 months immediately following the REACH intervention. One year windows for health care expenditures are standard in economic analyses,^{33,34} because shorter periods of time are more unstable and do not reflect a true measure of use, due to seasonality (e.g., annual well visits, cold weather associated illnesses) and periodicity (e.g., readmissions related to a major illness). Using pre-intervention and post-intervention measurements, the average change in the control group was subtracted from the average change in the treatment group. By using repeated observations on the same individuals, measurement bias from unobserved differences between the groups is avoided.

Log transformed expenditures served as the dependent variable because spending was highly skewed. Although REACH II was randomized, and REACH VA controls were selected using propensity score matching methods, analyses for both studies further controlled for 5-year age intervals, race/ethnicity (white, black, Hispanic), marital status, and the Elixhauser Comorbidity Index. REACH VA analyses also controlled for urban residence and HBPC enrollment year (2009).³⁵ As all REACH II participants were recruited from urban, non-VA settings, these variables were excluded from REACH II analyses. Regression models also included random effects (appropriate for person-level data), and clustered standard errors were reported. Because the dependent variable was log transformed, coefficient estimates can be interpreted as proportional changes in cost from a one-unit change in the independent variables.

RESULTS

Figure 1 provides an overview of the final study samples. From the 642 REACH II dyads ($n = 1,284$), 408 care recipients and 201 caregivers who matched to Medicare claims data ($n = 609$) were identified. Because caregivers were, on average 18.4 years younger than care recipients, they were less likely to match to Medicare claims data. Those who died during the intervention period (no follow-up data) and those who died less than halfway through the post-intervention period ($n = 27$) were excluded from analysis, and a multiplier was generated to annualize claims data for the three individuals who died in the second half of the follow-up period. Individuals without continuous fee-for-service Medicare coverage (i.e., gaps in claims data) for at least half of the baseline and follow-up periods were excluded, and a multiplier was generated to annualize claims data for

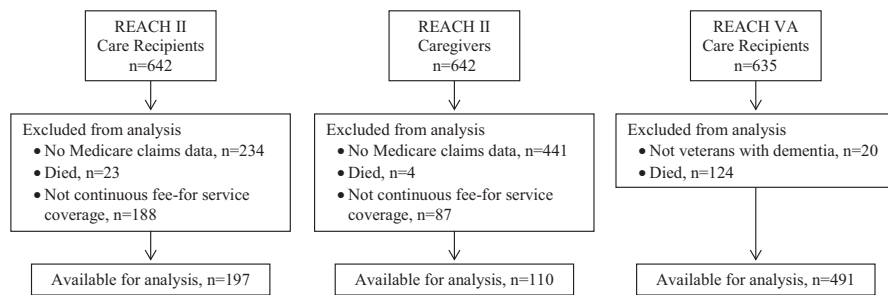


Figure 1. Study participants.

the 21 individuals with less than full year continuous coverage. The final REACH II sample consisted of 197 care recipients and 110 caregivers, each group fairly evenly divided between intervention and control.

The REACH VA sample ($n = 635$) included 127 intervention individuals and 508 control group care recipients. Four participants who were veterans caring for dementia patients and their 16 matched controls were excluded from analysis, as were 124 individuals who died during the intervention period (no follow-up data) and those who died less than halfway through the post-intervention period, leaving 491 individuals for analysis.

Demographic Characteristics

No statistically significant differences were detected between treatment and control groups for either REACH II or REACH VA samples. Compared to REACH II care recipients, REACH II caregivers were significantly more likely to be female, married, and were younger and healthier (lower Elixhauser Index, lower baseline healthcare spending) (Table 1). There were significant differences between REACH II and REACH VA care recipient samples (data not shown; all $P \leq .001$). REACH VA care recipients were more likely to be male, married, and Caucasian compared to REACH II care recipients. They were also less healthy (higher Elixhauser Index, higher baseline healthcare spending) compared to REACH II care recipients. All REACH II participants lived in urban areas, compared to 59% of REACH VA participants.

Intervention Effects

Estimated effects of the REACH intervention on healthcare expenditures for both studies are shown in Table 2. REACH II was not associated with a significant difference in Medicare expenditures in the 12 months following the intervention, compared to the 12 months prior to the intervention for either care recipients or caregivers. REACH VA was also not associated with a significant difference in Medicare + VA costs. REACH VA was associated with 33.6% lower total VA costs, comparing treatment to control, in the 12 months following the intervention compared to the 12 months prior to the intervention. With drugs included, there were 25% lower total VA costs (data not shown), which was non-significant. Average cost for the entire VA sample was \$12,910 (SD = \$26,961), a 33.6% change implying an estimated average annual saving of \$4,338.

Table 1. Demographic Characteristics and Healthcare Spending in Pre-intervention

Variable	Intervention M (SD) or n (%)	Control M (SD) or n (%)	P-value ^a
REACH II Care Recipients			
	n = 98	n = 99	
Age, y	79.7 (7.8)	78.1 (9.0)	.190
Male	39 (39.8)	40 (40.4)	.931
Married	47 (48.0)	42 (42.4)	.438
Race			
White	45 (45.9)	41 (41.4)	.526
African-American	32 (32.7)	36 (36.4)	.586
Hispanic ethnicity	21 (21.4)	22 (22.2)	.893
Elixhauser Index	1.9 (1.5)	1.8 (1.6)	.387
Total Medicare spending, US \$ ^a	9,447 (14,087)	9,217 (15,362)	.913
Caregiver Zarit score, 0–48	17.2 (8.9)	19.2 (10.1)	.158
REACH II Caregivers			
	n = 58	n = 52	
Age, y	72.1 (9.2)	72.0 (9.9)	.994
Male	15 (25.9)	11 (21.2)	.566
Married	52 (89.7)	40 (76.9)	.073
Race/Ethnicity			
White	28 (48.3)	28 (53.8)	.564
Black	21 (36.2)	16 (30.8)	.551
Hispanic	9 (15.5)	8 (15.4)	.985
Elixhauser Index	1.0 (1.7)	1.5 (1.6)	.139
Total Medicare spending, US \$ ^b	3,271 (6,308)	5,617 (7,771)	.084
Zarit score, 0–48	15.2 (9.3)	18.4 (11.0)	.101
REACH VA Care Recipients			
	n = 93	n = 398	
Age, y	80.2 (7.1)	79.8 (8.5)	.645
Male	92 (98.9)	388 (97.5)	.399
Married	85 (91.4)	353 (88.7)	.449
Race/Ethnicity			
White	64 (68.8)	275 (69.1)	.597
Black	17 (18.3)	58 (14.6)	
Hispanic	12 (12.9)	65 (16.3)	
Elixhauser Index	4.7 (2.9)	5.0 (2.7)	.412
Total VA spending, US \$ ^b	16,136 (19,333)	12,156 (28,417)	.200
Total Medicare spending, US \$ ^b	2,367 (6,646)	3,716 (9,882)	.211
Caregiver Zarit score, 0–48	17.4 (9.4)	18.1 (9.8)	.540

VA and Medicare spending excludes drug costs. SD, standard deviation; y, year.

^aP-values estimated by independent samples *t*-tests or chi-square tests, as appropriate.

^bTotal spending is for 12-month period before intervention.

Table 2. Estimated Impact of REACH Intervention on Healthcare Expenditures

Sample	Source of Claims	Difference in Differences Coefficients ^b (SE)	Observations ^a	Number of Individuals	P values
REACH VA Care recipients	VA	−0.336 (0.173)	922	482	.050
REACH VA Care recipients	VA + Medicare	−0.233 (0.149)	957	488	.119
REACH II Care Recipients	Medicare	0.247 (0.265)	385	195	.351
REACH II Caregivers	Medicare	−0.146 (0.298)	212	108	.624

^aObservations with \$0 in claims are dropped in log transformation.

^bBecause the dependent variable is log transformed, coefficients estimates are proportional changes in cost from a one-unit change in the independent variables.

DISCUSSION

This research investigated the association between caregiver participation in a behavioral intervention and healthcare costs for the caregivers and their care recipients. The study findings suggest that caregiver participation in a behavioral intervention does not increase, and, in some cases may actually reduce, costs of care. Dementia care recipients did not have increased healthcare expenditures/costs with either REACH II or REACH VA; in addition, caregiver expenditures, only measured in REACH II, did not increase. In fact, there was significantly lower (33.6%) total VA cost with REACH VA.

There are two possible explanations for the study findings. First, it is possible that the analysis was underpowered to estimate intervention effects in the REACH II sample. Alternatively, if the study findings were, in fact, robust, they provide some of the first empirical evidence that behavioral caregiver interventions may not increase healthcare costs and may be associated with cost savings. In particular, it may be that the integrated healthcare that veterans received, compared to the more fragmented fee-for-service care received by REACH II participants, was a factor in the significantly lower care recipient costs in the VA, but not the private sector. VHA places emphasis on dementia care and geriatrics, providing specialized care that may significantly exceed that generally available to Medicare recipients.³⁶ Although it is possible that some REACH II patients and caregivers included in these analyses received their primary care in geriatric or integrated care settings, all VA participants were recruited from HBPC, an interdisciplinary team designed to manage complex patients with multiple chronic conditions in the home.

Integrated and coordinated care systems are likely to support guideline-driven care across the multiple settings where complex patients seek care. Introduction of REACH VA through the VA's HBPC may have created synergies between the coordination and integration of the VA system and the REACH intervention. In the VA HBPC setting, which has been designed to support both patient and caregiver, patients newly enrolled in HBPC typically show a decrease in inpatient care and emergency department charges.³⁷ The REACH intervention may have provided another structured format for clinicians to address AD/DR care management. VA caregivers have reported that REACH helps them know what to do and empowers them to ask for help.²⁶

If REACH is cost saving within an integrated health system, the study findings argue for a focus on system

integration and quality metrics/guidelines to improve the experience of care and contain costs.³⁸ For example, adoption of the Physician Consortium for Performance Improvement® (PCPI™) consensus Dementia Performance Measurement Set³⁹ could help decrease overuse of procedures, technology, and tests that are unlikely to help AD/DR patients. These guidelines and the CMS Physician Quality Reporting System (Centers for Medicare & Medicaid Services, Baltimore, MD) would add structure to AD/DR care, while supporting caregivers. One way to meet these guidelines and improve patient/family satisfaction is through a structured intervention to help clinicians and caregivers focus on the dyad's most critical concerns, including management of patient behavioral difficulties and caregiver stress and burden. The study findings support the calls for clinician reimbursement for caregiver interventions in primary care.⁴⁰

There are limitations to this study. First, because cost and expenditure data were collected retrospectively, factors affecting these data were not considered in the original studies. The study design controlled for unmeasured variables that were consistent over time, but not for unmeasured confounders that may have changed over time. Second, because the analysis relied on the merger of retrospective data sources for outcomes, costs and expenditures, there was a reduction in sample size. Third, REACH VA did not have a randomized control group for care recipients and caregiver costs were not available. However, propensity score matching to develop the comparison group was extensive and rigorous. Fourth, it has been shown that participation in HBPC lowers VA and VA + Medicare costs for veterans. However, propensity-score matched controls were also enrolled in HBPC, with similar lengths of stay as their REACH VA counterparts, reducing bias associated with the VA environment in which REACH was introduced. Finally, *P*-values were not adjusted for multiple comparisons.^{41,42}

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