

**Evaluation of the  
Program of All-  
Inclusive Care for  
the Elderly (PACE)  
Demonstration**

**The Impact of PACE  
on Participant  
Outcomes**

**FINAL**

HCFA Contract #500-96-0003/TO4

Pinka Chatterji, PhD  
Nancy R. Burstein, PhD  
David Kidder, PhD  
Alan White, PhD

July 1998

*Prepared for*  
Nancy Miller, PhD  
Health Care Financing Administration  
Office of Strategic Planning  
Mail Stop C-3-21-06  
7500 Security Boulevard  
Baltimore, MD 21244-1850

*Prepared by*  
Abt Associates Inc.  
55 Wheeler Street  
Cambridge, MA 02138

# Table of Contents

1.	Introduction .....	2
2.	The Goals and Objectives of Home and Community-Based Programs for the Elderly .....	3
3.	The Characteristic Features of PACE .....	4
4.	The Effectiveness of PACE Alternatives .....	6
5.	Hypothesized Effects of PACE .....	9
6.	Analysis Samples .....	11
7.	Methodology: Estimation of PACE Impacts .....	17
8.	Interpretation of Estimates: Selection, Attrition, and Response Rates .....	19
9.	Service Utilization .....	22
10.	Participant’s Health Status, Quality of Life, Satisfaction, and Functional Status .....	32
11.	Participant Mortality .....	43
12.	Days in the Community .....	44
13.	Variation in PACE Impacts by Level of ADL Dependence .....	45
14.	Summary and Conclusions .....	47
	References .....	51
	Appendices .....	53

# 1. Introduction

The Program of All-Inclusive Care for the Elderly (PACE) is a demonstration project of the Health Care Financing Administration (HCFA), modeled on the On Lok program in San Francisco. PACE has attracted widespread attention from states, managed care organizations (MCOs), provider groups and others in search of cost-effective options for meeting the needs of frail, elderly Medicaid beneficiaries who are nursing home eligible.

The salient features of PACE are:

- Sites serve a clientele of nursing home-eligible impaired and frail elderly individuals.
- Sites provide comprehensive medical and social services under management of an interdisciplinary team (IDT) that includes clinical and social services professionals.
- The adult day health center (ADHC) provides a social center for participants, most of whom live in the community, and a central location for medical and social services delivery.
- Each site operates at full financial risk for dually eligible participants, under fixed Medicaid and Medicare capitation rates.<sup>1</sup>

Although On Lok opened in 1971 and has served dually-eligible participants under capitation since 1983, the PACE “replicates” of On Lok were not authorized until the Omnibus Budget Reconciliation Act of 1986 (OBRA 1986). HCFA funded an evaluation of PACE in 1991, and, in 1997, PACE was established as a permanent provider under Medicare as part of the Congress’s Balanced Budget Act. As of June 30, 1997, PACE demonstration enrollment had reached a total of 3,524 persons in eleven sites across the country. [White (1998)]

This paper reports findings about the impact of PACE on health services utilization and several measures of outcomes, including health and functional status, quality of life, and satisfaction with services. Data come from a survey of PACE applicants that was conducted between January 1995 and August 1997.<sup>2</sup> In a previous impact study, participant outcomes were analyzed six months and 12 months after the initial baseline survey, but only limited sample sizes were available for the estimation of 12 month impacts.<sup>3</sup> This updated report takes advantage of the larger sample sizes now available by estimating the effects of PACE on outcomes measured 6, 12, 18, and 24 months after the baseline survey. Sample sizes for the 24 month analysis are quite small; the results from this portion of the analysis therefore should be interpreted with caution.

---

1 PACE sites also serve non-dually eligible individuals if they pay a premium or co-pay.

2 Baseline interviews ended on February 28, 1997. Follow-up interviews officially closed on August 29, 1997 but a close-out period for interviews was allowed until September 30, 1997.

3 Burstein et. al. (1996)

This paper does not address PACE impacts on Medicare costs, Medicaid costs or costs incurred by PACE participants and their families.<sup>4</sup> The final report of the PACE evaluation will include analyses of both Medicare and Medicaid expenditures and self-reported out-of-pocket spending.

The findings reported in this paper suggest the following:

- PACE enrollees had much lower rates of nursing home utilization and in-patient hospitalization than comparison group members. This difference between PACE enrollees and comparison group members was still evident 2 years after enrollment in PACE, but the magnitude of the impact did appear to diminish over time.
- PACE enrollees had higher utilization of ambulatory services than comparison group members. Again, this impact was long-lasting but grew somewhat smaller as the length of time in PACE increased.
- PACE enrollees reported better health status and quality of life relative to comparison group members. This effect was most dramatic six months after the baseline survey. In some cases, PACE enrollees also experienced less deterioration in physical function relative to the comparison group. Like the self-reported measures of health status and quality of life, this effect was most evident during the first six months of enrollment.
- Holding other factors constant, participation in PACE was associated with a lower mortality rate.
- The benefits of PACE appeared to be magnified for those participants with high levels of physical impairment. PACE enrollees with high numbers of Activities of Daily Living (ADL) limitations experienced the most marked decreases in hospital utilization, decreases in nursing home days and improvements in self-reported quality of life.

## **2. The Goals and Objectives of Home and Community-Based Programs for the Elderly**

PACE shares many of the goals and characteristics of the earlier home and community-based services (HCBS) programs, while managing a mix of medical and social services under the incentives of capitation. PACE can therefore be viewed both as a unique approach to caring for frail elders and as a variant of earlier and concurrent initiatives.

Beginning with the first state HCBS programs in the 1970's (for example, New York's Nursing Home Without Walls Program) and the National Channeling Demonstration, federal and state governments have promoted efforts to de-institutionalize and rationalize the delivery of health care to Medicare and

---

4 White (1998) compares the costs of the Medicare portion of the PACE capitation rate to what costs would have been had PACE enrollees remained in the FFS system. At the time this paper was written, Medicaid claims data were not sufficiently complete to support an assessment of the Medicaid portion of PACE's capitation rate.

Medicaid beneficiaries. Under federal Medicaid waivers, state governments experimented with fee-for-service HCBS programs for frail elderly and disabled beneficiaries during the 1970's. HCBS waivers were part of broader state cost-containment strategies that included caps on payments to nursing home providers, certificate of need (CON) reviews of new requests for nursing home beds, and, in some states, active efforts to reduce the number of Medicaid beds. Through careful targeting of at-risk individuals in the enrollment process, and through the provision of comprehensive formal support services, HCBS programs were expected to contain public expenditures by keeping elders in the community and out of costly nursing homes for as long as possible.<sup>5</sup>

The overriding policy objective of all of these initiatives has been to reduce government health care expenditure and improve enrollee health and functional outcomes. These types of HCBS programs, however, did not demonstrate significant cost savings, even though their effects on patient outcomes were often significant (see literature review in Section 4). With this model, cost savings can accrue only if reductions in hospital and nursing home expenditures exceed increased spending on HCBS and other services. The government as the payer remains at full risk under this model of HCBS.

Within the past five years, states and the federal government began turning to capitated managed care to contain government health care expenditures through contracts with MCOs and the Medicare TEFRA Risk HMO program. More targeted programs such as the Social HMO (S/HMO) I (First Generation) Program, the Arizona Long-Term Care System (ALTCS), the Community Nursing Organizations (CNO) Demonstration, and experiments that “bundle” hospital and post-hospital care payments, purported to encourage more efficient management across a continuum of acute and long term care services.

Interest in and acceptance of alternative approaches grew as new payment methods (prospective payment, capitated payment) were tested and refined. Capitated managed care agreements delegate both the financial risks and decisions about the appropriate mix of services to conventional MCOs and to more targeted programs like PACE. If capitation reduces hospital and nursing home utilization, or use of any particular expensive service, it will be because the programs themselves, not the government, see these changes as both appropriate and cost-effective.

### **3. The Characteristic Features of PACE**

The PACE “effect,” if it exists, is the product of PACE’s care management and delivery system and the fiscal discipline of capitated payment. Although most participants live in the community, PACE must manage services across a continuum of institutional and non-institutional settings to achieve cost-effective results. This broad scope of management responsibility requires constant coordination among diverse clinical and social service disciplines, and continuous monitoring of participants’ conditions, requirements normally best attained in institutional settings. The adult day health center provides the locus for these activities without, it is assumed, the substantial overhead costs of an inpatient hospital or nursing home.

---

<sup>5</sup> Weissert et al. (1988) describe a waiver program that was apparently successful in containing costs by encouraging nursing home use as a subacute option to inpatient hospital utilization. More recently, Hughes et. al. (1997), in a meta analysis of studies on the impact of home care on hospital days, find that home care has a small to moderate, negative effect on hospital days. [Hughes et. al. (1997), 428]

Although actual practice varies among PACE sites, a defining characteristic of the On Lok model has been the requirement that all participants regularly attend an **adult day health care** center, where most ambulatory services are delivered.<sup>6</sup> Day care programs, operating as stand-alone units or in association with medical and social service organizations (including “day hospitals” run from outpatient facilities), have become established parts of the continuum of care in several communities. Von Behren reports growth of ADHCs in the U.S. from 300 in 1978 to 2000 in 1989. Of the 27 HCBS programs reviewed by Weissert and his colleagues, 13 included adult day care among the waived services offered to elderly participants. In a fee-for-service system, however, day care always has been an option for participants and caregivers rather than a requirement of program participation.

All PACE sites **manage care through interdisciplinary teams**. HCBS programs for the elderly tend to follow the National Channeling Demonstration model, with an assigned manager for each participant. Care managers in the S/HMO programs manage access to long term care services, and ALTCS contracts the care management function, most frequently to county governments. In PACE, care managers are not identified as such — the team is the care manager. PACE appears to be the only working model of team care management for integrated services for the frail elderly. The composition of these teams varies among sites, as do the frequency with which teams meet and the group dynamics of team meetings.

PACE is the only operational program **targeted to frail and impaired elders** in which sites are at **full financial risk**. Medicaid Section 1915(c) HCBS programs are treated (and financed) as extensions of state Medicaid coverage and paid fee-for-service. Payments to both S/HMO and ALTCS providers are based on capitated rates. S/HMO sites serve elders with and without impairments, while ALTCS serves Medicaid-eligible elders and persons with physical or developmental disabilities.

PACE sites **coordinate and provide medical and social services** (and, in many sites, housing) for participants. Although other programs provide these services as well, most tend to define the continuum somewhat more narrowly. S/HMO covers acute and long term care services, but care managers largely confine their activities to long term care. State HCBS programs and the CNO demonstration sites coordinate services, but narrowly within home and community settings. ALTCS care managers do coordinate services across acute and long-term settings.

After a start-up period of risk sharing between PACE sites, their respective state Medicaid agencies, and Medicare, all PACE sites have accepted full financial risk for the care of their dually eligible participants. States pay Medicaid’s share of **capitated rates** based on an estimate of how much Medicaid would pay for PACE participants in alternative settings. The assumptions and methods used to set PACE and other capitated program rates vary.<sup>7</sup> Medicare pays each PACE site a rate per participant month for its share of Medicare-covered services, based on 95 percent of the local Adjusted Average Per Capital Cost (AAPCC) inflated by an adjustment factor of 2.39 that recognizes the higher expected costs of treating frail elderly participants. [White (1998)] All sites use the same frailty adjustment, and the rate is not

---

6 <sup>3</sup> The definition of “regular” attendance varies substantially among those PACE sites that still adhere to this principle. Many sites reported modifying the requirements to accommodate site-specific circumstances and enrollment as early as 1993. See Coulam et al (1993).

7 For example, Oregon defines PACE as a substitute for assisted living and sets the Portland PACE rate to reflect these costs. Reflecting a more common perception, South Carolina and New York view the Columbia and Rochester PACE sites as alternatives to nursing home care, and negotiate rates based on county nursing home costs. Other sites (East Boston, Milwaukee, Denver ) are paid blended rates that reflect the costs of nursing home and “other” care. (Zimmerman et. al. (1997))

altered based on individual participants' severity of illness or service use. States contribute Medicaid's portion of the capitated rates based on an estimate of how much Medicaid would pay for PACE participants in alternative care arrangements. [White (1998)] These rates generally range between 85-95 percent of the estimated payments for skilled care and/or home and community based service options.

Other demonstrations and programs use different methods. First generation S/HMOs, for example, were paid 100 percent of the AAPCC for Medicare's share of the rate and site-specific Medicaid rates set by each state; beneficiaries shared costs, and long term care service payments were capped. ALTCS contractors receive Medicaid capitation payments negotiated in a competitive bidding process, adjusted for expected Medicare payments (contractors are expected to bill Medicare directly for covered services used by dual eligibles).

Before the Balanced Budget Amendment of 1997, Medicare TEFRA HMOs were paid 95 percent of the AAPCC, and some had beneficiary cost sharing. The Balanced Budget Amendment of 1997 established the Medicare+Choice Program which will encompass a wider range of health plan options than were available previously. The Medicare+Choice Plans will no longer be tied to the AAPCC. Few states that have negotiated Medicaid contracts with MCOs have made special provisions for elderly beneficiaries. Most have mandated enrollment in managed care first for Medicaid beneficiaries least at risk for high-cost medical needs (AFDC and income-eligible women and children), while retaining standard Medicaid or HCBS coverage for aged and disabled dual eligibles.

## 4. The Effectiveness of PACE Alternatives

Two teams of researchers have reviewed the evidence on the impact of HCBS and capitated managed care programs on outcomes and costs. Weissert and his colleagues (1988) reviewed assessments of 27 HCBS programs, in operation from the 1960s to the 1980s. All functioned within a fee-for-service payment system. Roughly half provided a broad range of home services, including adult day care. Most purported to target elders at risk of nursing home admission.<sup>8</sup> In a more recent review, Wiener and Skaggs (1995) summarized what was then known about the effectiveness of programs that manage a continuum of acute and long-term care services. With the exception of Medicare experiments in bundling acute and post-acute services, the programs Wiener and Skaggs review are capitated: S/HMOs (first generation),<sup>9</sup> On Lok/PACE (early reports and articles), Medicare TEFRA<sup>10</sup> HMOs, and the Arizona Long-Term Care System (ALTCS). The following discussion draws heavily on these two sources.

---

8 The ACCESS project provides an exception. ACCESS concentrated on "reducing the hospital stays of high-cost chronic-care patients ...", largely by encouraging *increased* use of nursing homes as a less expensive subacute alternative. They were evidently successful, although estimates of about \$3,000 annual savings per capita were not statistically significant at a five-percent level. (Weissert et al., 1988)

9 OBRA 1991 mandates a second generation of S/HMOs, to be implemented in six sites: Columbia, South Carolina; Coral Gables, Florida; Grand Junction, Colorado; Las Vegas, Nevada; Martinez, California; Worcester, Massachusetts.

10 Tax Equity and Fiscal Responsibility Act of 1982 which authorized the Medicare Risk HMO program.

Evidence on the success of programs in **targeting frail and impaired elders** has been mixed.<sup>11</sup> Weissert and his colleagues use frequency and intensity of nursing home use among control group members to measure targeting effectiveness. Only four of the 27 programs reviewed drew from populations with 30 percent or more nursing home residents; the median percentage was 18 percent. Alternatively, if risk of hospitalization is used to measure targeting, the HCBS programs reviewed by Weissert appear to be more effective. Annual rates of hospital use among control group members exceeded 30 percent in over half of the studies.

Under capitation, programs may have financial incentives to market selectively to less impaired elders. Wiener and Skaggs report on early studies of S/HMO I (Manton et al., 1994; Newcomer et al., 1995) and On Lok (1993) that suggest tendencies toward favorable selection. Nevertheless, the evidence on favorable selection in PACE represents relatively early experience with capitation for most of the sites.

Program effects on **service utilization** (for example, reduction in the prevalence of nursing home use, reductions in annual nursing home days) were large and significant in three of the four “effective” HCBS programs reviewed by Weissert et al. The single exception was ACCESS, in which frail elders were steered into nursing homes in order to reduce hospital utilization.<sup>12</sup> Program impacts on hospitalization were less impressive. Most treatment-control differences were smaller than 5 percentage points, and the four statistically significant estimates provided mixed signals (two showed reductions, two showed increases in hospital use). Effects on hospital days were similarly mixed and inconclusive.

Most capitated programs that serve elders have reduced hospital utilization but have not consistently managed to reduce the use of nursing homes and other long-term care services. Wiener and Skaggs, citing Brown et al. 1993, note that TEFRA HMOs have been able to reduce the intensity of acute utilization (numbers of hospital days, physician visits) without reducing the frequency of service (indeed, HMO elders are more likely to have at least one physician visit than their fee-for-service counterparts). Elderly HMO and fee-for-service beneficiaries were equally likely to use home health services, but the former received about half the number of visits of the latter. HMO enrollees seemed more likely to enter a skilled nursing facility, but nursing facility days did not differ between HMO and fee-for-service beneficiaries.

First generation S/HMOs achieved similar results in reducing hospital utilization by shortening stays relative to fee-for-service alternatives. Comparisons to TEFRA HMOs do not show a clear S/HMO effect. S/HMOs also appear to have reduced overall long-term care service use (both home health and nursing home), although experience differed widely among the sites. Early PACE experience seems to have been similar, though evidence for effects is largely anecdotal, and the sites varied dramatically in average lengths of inpatient stays (from 12.9 days in the Bronx, New York site to 2.9 days in Columbia,

---

11 Use of term “targeting” implies that programs fail or succeed depending on actions they undertake (marketing, outreach) to attract impaired elders. Success in this regard, however, is also a function of self-selection, based on enrollment decisions of patients and their families which may be favorable or unfavorable with respect to health risks. Since program enrollment is voluntary, less impaired elders (or elders with more committed informal caregivers) may be disproportionately attracted to HCBS program).

12 Weissert and his colleagues note the importance of state nursing home policies in shaping the effectiveness of HCBS diversion and conversion strategies. (Weissert et al., page 330) If there are bed shortages, perhaps due to aggressive state CON programs, nursing home admissions may be limited to the most impaired and frail elderly candidates. In this environment, HCBS may be unsuccessful in finding severely impaired individuals. This view depends on the somewhat questionable assumption that nursing homes admit the most difficult cases just when beds are in short supply.



South Carolina, according to Wiener and Skaggs, p. 31). The rate of institutionalization among PACE enrollees averaged 5 percent (of member days) in 1993, with wide inter-site variation (from 1.8 to 9.9 percent). ALTCS acute and long-term care utilization data have not been separately analyzed.

In general, neither HCBS nor capitated managed care for the elderly have demonstrably achieved **cost savings**. Weissert et al. found that only four of the 19 HCBS programs subjected to cost analysis saved above \$1,000 annually (in 1988 dollars). Twelve were evidently more expensive than fee-for-service alternatives, with a median loss of about \$2,400. In a recent study of TEFRA HMOs, Brown and his colleagues reported that Medicare spent more on its HMO enrollees than it would have if the enrollees had been receiving fee-for-service care, due to favorable selection. With the exception of White (1998), no controlled analyses of cost savings have been conducted in first generation S/HMOs, On Lok/PACE or ALTCS.

Overall, HCBS programs have had few positive effects on participant **health status and well-being**, at least in the aggregate. Weissert et al. found no consistent evidence for improvements in **physical function** due to community care. Interestingly, however, they did detect a pattern of positive effects for HCBS elderly enrollees who were relatively young, minimally disabled, and socially supported. They suggest that truly impaired enrollees may do less well in community settings.<sup>13</sup> HCBS programs seemed to produce more **satisfaction** than alternatives. Few studies of **survival** have produced statistically significant results, although those that were statistically significant tended to reflect favorably on HCBS. Estimated effects of HCBS on **mental function** were generally not significant. Again, as with survival, the statistically significant estimates (2 of 25) were positive.

Wiener and Skaggs report fragmentary and inconclusive evidence for effects of capitated programs on elders' health and well-being. A study recently completed on TEFRA HMOs by Brown and his colleagues focused on tracer conditions (joint pain, chest pain, urinary incontinence) and showed no significant difference in outcomes between HMO and fee-for-service beneficiaries. Other studies have supported this finding for other chronic conditions.

Wiener and Skaggs also noted that elderly enrollees in capitated programs seem generally satisfied with the quality of services received, though some evidence reveals concerns with specific aspects of care and differences in attitudes linked to levels of impairment. Brown et al. (1993) and Newcomer, Weinstock and Harrington (1989) reported that 90 percent or more HMO and S/HMO enrollees respectively were satisfied with their care. However, when queried about specific dimensions of care, HMO enrollees were less likely than non-enrollees to rate their care as excellent. Some studies suggest that more impaired HMO enrollees are relatively less satisfied than less impaired enrollees. Early analysis of enrollee satisfaction in the S/HMO program, however, found that ratings expressed by impaired enrollees were, according to Wiener and Skaggs "comparable to unimpaired enrollees and ... usually the same or higher than the ratings of persons in the fee-for-service comparison groups".

This body of research suggests that, thus far, HCBS and capitated managed care programs have seldom saved money on the care of impaired and frail elders. Despite evidence that some interventions reduce nursing home or hospital utilization, few have avoided more than offsetting cost increases due to added

---

13 Weissert et al note, however, that "[these] subgroup findings are tentative ... due to small sample sizes and some conflicting results".

layers of care management and enriched packages of home and community care services. Evidence for positive effects on health status and well-being are generally inconclusive. Although program participants tend to be satisfied with their care, the same can be said for beneficiaries who receive services in the traditional fee-for-service system.

## 5. Hypothesized Effects of PACE

Exhibit 1 summarizes the two paths by which PACE is hypothesized to affect participant outcomes. The population targeted by PACE consists largely of poor and minority individuals with limited access to health services, whose treatment plans may suffer from gaps and unintended interactions. Through care planning and integrated service delivery, PACE is expected to lead directly to better health and functional status outcomes than would otherwise have been experienced. As a consequence, improvements in participant satisfaction, and decreases in hospital stays, nursing home stays, and mortality, may be expected as well.

The second causal path is through participants' attendance at the adult day care center. The total amount of supportive care provided is expected to increase, leading to further beneficial effects on participants' health and functional status, and on the less immediate outcomes.<sup>14</sup> In addition, there may be a substitution effect on informal care, in that friends and family may be able to cut down on the support that they provide, to their own benefit.

To some extent, each PACE site has its own unique approach to providing and managing care. Nevertheless, all of the PACE sites share the common goal of maintaining and improving health by offering preventive services and a continuum of care. It is reasonable to suggest, therefore, that PACE has some general impacts on service utilization, health outcomes, and quality of life.<sup>15</sup> The hypothesized impacts of PACE are summarized below.

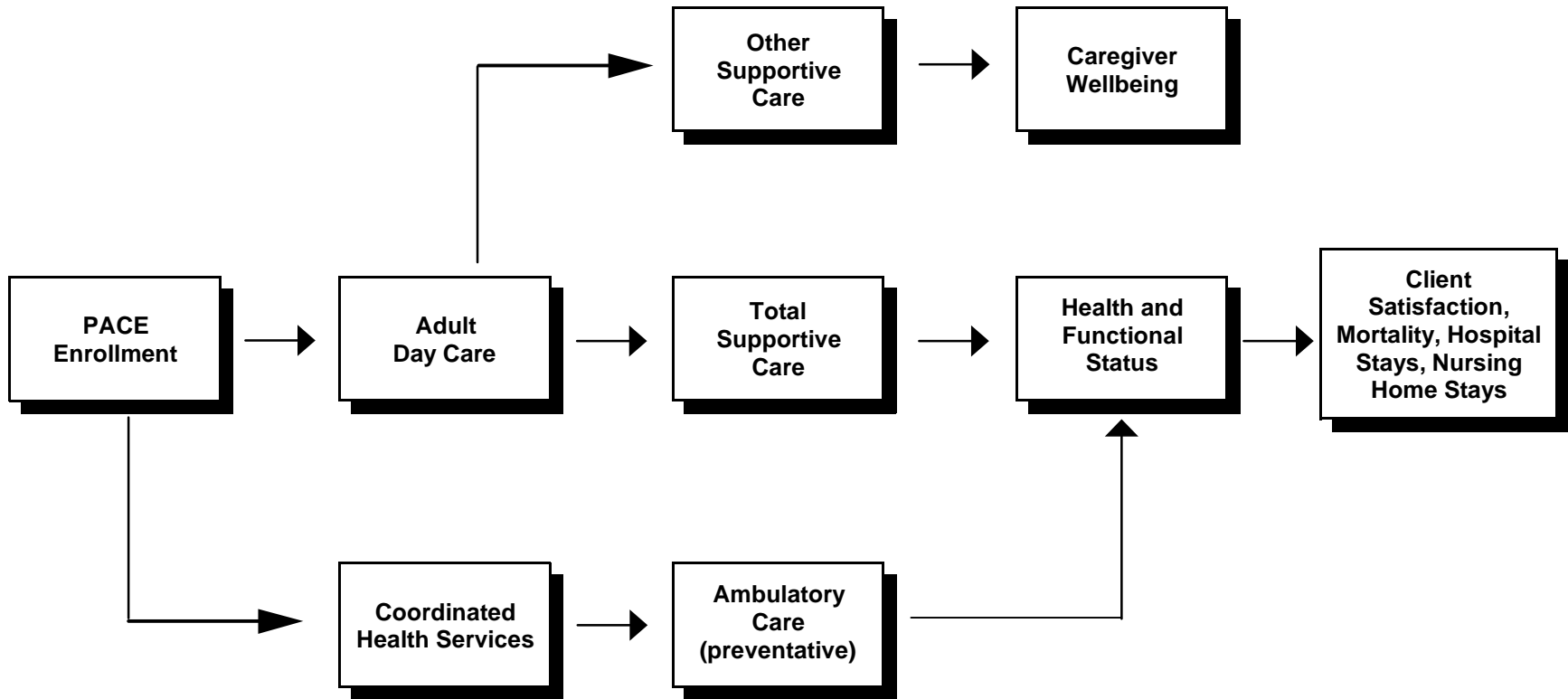
- PACE sites offer a range of medical, social and other services at the adult day care center. Initially, because of the focus on prevention, PACE enrollees may experience an increase in formal and informal care services utilization if these services are intended to prevent future health problems. Over time, however, it is expected that the PACE will, at least to some extent, act as a substitute for other supportive services such as nurse visits to the home and assistance from family and friends. PACE enrollees therefore are hypothesized to use *fewer* formal and informal support services than comparison group members.
- PACE enrollees are expected to benefit from the integrated package of health services and interdisciplinary team approach. Because many ambulatory, preventive services are provided at the adult day care center, PACE enrollees are hypothesized to have *higher*

---

14 It would be interesting to look at the impact of adult day care attendance on outcomes. It is possible that increased frequency of attendance leads to improved outcomes up to a particular threshold of attendance. This issue is beyond the scope of the paper, but it is important to address this topic in future research. An analysis of variance indicated that the set of site dummy indicators explained about 11% of the variation in adult day care attendance.

15 The possibility of site specific treatment effects is addressed in Appendix D.

# Exhibit 1



rates of ambulatory service utilization than comparison group members. In addition to preventive care, PACE sites also may offer some pre- and/or post-subacute care and intensive rehabilitation. It is likely that the combination of services offered reduces the need for hospitalization and nursing home placement, or shortens lengths of stay in inpatient or institutionalized settings. PACE enrollees, then, are expected to have *lower* rates of hospital and nursing home admission, and a *lower* number of days spent in a hospital or nursing home compared to PACE decliners.

- It is likely that PACE enrollee quality of life and satisfaction with care arrangements will be *enhanced* by the integration of care, preventive services and social activities at the adult day care center. Furthermore, if PACE enrollees benefit from the range of services offered, including access to assistive devices, they may have *better* functional status than comparison group members.
- It is difficult to predict how long the impacts of PACE, if they exist, will persist. If the sites can implement long-lasting changes in the way care is provided, the magnitude of the PACE effects may be fairly stable over time. On the other hand, PACE may be effective in changing short-term outcomes, but ineffective in maintaining these improvements over a long period of time.
- Furthermore, if PACE enrollees have access to more preventive health services, and if they enjoy better health status and better quality of life, the program may be associated with a decrease in mortality. Nevertheless, because the study population consists of frail elders, it is unlikely that PACE will be able to effect a large decrease in mortality. Instead, if an impact is measurable, it is probably small in magnitude.

## 6. Analysis Samples

The samples used in this analysis are drawn from applicants to the PACE program. PACE applicants are referred to the program by providers, referral agencies, social service agencies, caregivers, and family and friends, the latter of whom, along with word of mouth, have become very important sources of referrals. [Zimmerman et. al. (1996)] After the PACE site receives a referral, staff contact the potential participant and conduct an in-home assessment to verify eligibility and interest. The applicant is then asked to participate in the survey process, and, if consent is obtained, the baseline interview is conducted in the home; about two-thirds of sample members consented. This process of referral, home visit, and a request for consent was similar across the sites.

This impacts evaluation uses a treatment/comparison group study design. The *treatment group* consists of individuals in 11 sites who: (1) expressed an interest in PACE; (2) had a home visit between January, 1995 and February, 1997; (3) decided to enroll in PACE; and (4) were accepted into the PACE program prior to collection of follow-up data.<sup>16</sup> The *comparison group* consists of individuals who likewise

---

<sup>16</sup> In the analysis of all four follow-up interviews, the participant must have enrolled in PACE before the interview occurred in order to be included in the treatment group. An individual who enrolled between follow-up interviews would be deemed a comparison group member for the initial follow-up period and a treatment group member for the next follow-up period. For the analysis of mortality, all individuals

expressed an interest in PACE and had a home visit between January 1995 and February, 1997. Unlike treatment group members, however, comparison group members ultimately decided not enroll in PACE, at least up to the time of collection of follow-up data.<sup>17</sup> Throughout the paper, treatment group members are also called PACE enrollees, and comparison group members also are referred to as PACE decliners.

The samples used in this analysis exclude the following: (1) participants who refused to participate in the baseline survey or who had missing survey consent information (N = 1135); (2) participants with missing information on the home visit date (N = 392); (3) participants with missing information on the enrollment decision (N = 109)<sup>18</sup>; and (4) participants with missing information on the outcome of interest (N varies by outcome). A small number of participants had concluded prior enrollment spells in PACE within 12 months of the current enrollment decision. These participants were assigned to the PACE enrollee and comparison groups normally, ignoring the prior enrollment spell.<sup>19</sup> Similarly, participants whose enrollment decisions apparently preceded the home visit date were assigned to the enrollee and comparison groups normally.<sup>20</sup>

The treatment group also includes participants who enrolled in PACE and then later disenrolled; in a few cases, participants who did so went on to enroll in PACE for a second time. Consequently, enrollees spent varying amounts of time in PACE, ranging from less than a month to more than two years. Although the length of time spent in PACE may be an important determinant of the outcomes of interest, it also may be correlated with unobserved factors that affect the outcomes of interest. Data limitations preclude the possibility of using statistical methods to remedy this problem.<sup>21</sup> For this reason, the analysis does not consider the length of time spent in PACE; instead, the analysis simply compares those who enrolled in PACE to those who did not enroll.

This study uses five analysis samples: (1) survey outcomes measured 6 months after the baseline survey (N = 1098); (2) survey outcomes measured 12 months after the baseline survey (N = 783); (3) survey outcomes measured 18 months after the baseline survey (N = 529); (4) survey outcomes measured 24 months after the baseline survey (N = 296); and (5) mortality during time period between the home visit date and June 30, 1997 (N = 1255). Each analysis sample includes baseline survey data which was used to create covariates in the regression analysis described in the next section.

---

who enrolled in PACE prior to June 30, 1997 were deemed treatment group members.

17 Participants who decided at the time of home visit that they definitely would not enroll in PACE (or are deemed not eligible by PACE staff) are excluded from the comparison group.

18 These participants were not surveyed.

19 The small number of participants with prior enrollment spells precluded the use of a prior enrollment dummy variable in the regression analysis. For example, in the 6 month analysis sample, only 6 individuals had a prior enrollment spell in the 12 months before the current enrollment decision.

20 In these cases, the enrollment decision date usually preceded the home visit date by a short period of time, suggesting that one of the dates reported was inaccurate.

21 The length of time spent in PACE may be correlated with an unobserved attribute (i.e. attitude) that also affects the outcomes of interest. If appropriate identifying variables were available (i.e. exogenous variables that affect the length of time spent in PACE but that do not affect the outcomes of interest), instrumental variables methods could be used to address this problem.

To utilize all information relevant to the analysis and to maximize the sample size, this analysis includes survey information provided by proxies. Proxies responded to survey questions for living participants who were impaired, and close-out surveys with proxies were conducted for deceased participants whose deaths occurred between surveys. The use of proxy information was essential in this study because a large portion (29-42%) of PACE participants could not be directly interviewed, mainly because many participants were impaired. In general, a proxy was sought for a living participant in the following cases: (1) the participant responded incorrectly to five or more items on the Short Portable Mental Status Questionnaire; (2) the participant showed signs of dementia; or (3) the participant was unavailable for an extended period of time (e.g. long hospital stay). The surveyor to some extent could also make decisions about proxy interviews based on his/her own judgement. Because the close-out survey did not include questions about the participant's health status, quality of life, or satisfaction with care, for analyses of these outcomes, deceased people with close-out survey information were assigned the lowest possible value for these measures.<sup>22</sup>

Outcome measures were constructed to capture various dimensions of participant well-being including the following: (1) receipt of supportive services; (2) medical utilization; (3) mortality; (4) functional status; and (5) satisfaction and quality of life. The definitions of these measures are presented in subsequent sections of this report. Cases for which survey outcomes data were available always had baseline data, because follow-up surveys were only conducted with those sample members for whom a baseline interview had been completed.

Mortality data, however, was collected not from the surveys but rather from the HCFA Medicare enrollment files which include date of death. Like the other samples used in this report, the sample used in the mortality analysis excluded participants for whom baseline survey data were not available so as to be able to take account of initial differences between the treatment and comparison groups in factors that might affect survival.<sup>24</sup>

The PACE enrollee and comparison groups are drawn from the same population, in the sense that there is no characteristic (other than the enrollment decision itself) that is found only in one group or the other. Nonetheless, the groups differ in the *distributions* of a number of key characteristics for which data were collected in the baseline interview. For example, while each group contains some individuals whose self- or proxy-reported health status at the time of the home visit was excellent, very good, good, fair, or poor, those who enrolled were somewhat more likely to report fair or poor health than those who did not enroll (Exhibit 2). Failure to take such initial differences into account could lead to biased assessments of the impacts of the PACE intervention.

A comparative analysis of the baseline characteristics of PACE enrollees and comparison group members is the subject of another evaluation report (see Irvin, Massey, and Dorsey, (1998)). For purposes of interpreting the current analyses, however, group means of some key characteristics are displayed in Exhibit 2. Among the striking differences between the two groups, we note that PACE enrollees, relative to comparison group members, were significantly *less* likely to be a high school graduate, a home owner, living with a spouse or sibling (and no one younger), and in good to excellent health. They were

---

22 See Burstein et. al. (1987) for another application of this method.

24 Of those participants with EDB information available, 47 percent also had baseline survey information available.

significantly *more* likely to be female, widowed, in receipt of formal (paid) supportive care, and attending a senior day center. It should be emphasized that these group means pertain to the six-month outcomes analysis sample analyzed in this report (i.e. those participants for whom first follow-up as well as baseline data are available). The analysis in Irvin *et al.* (1998) is based on a larger sample of applicants (i.e. all applicants with baseline survey data available).

---

**Exhibit 2: Baseline Characteristics of PACE Enrollees and Comparison Group Members in First Follow-Up Analysis Sample**

---

	PACE enrollees	Comparison group
<b>Demographics</b>		
Female**	72.4%	64.9%
Black	35.2%	31.9%
Hispanic	21.7%	20.8%
Aged 85 or over	23.7%	22.9%
Widowed**	59.4%	51.6%
Less than 12 years of education**	72.4%	65.5%
Home owner***	23.2%	31.6%
Live alone*	29.0%	34.3%
Live with spouse or sibling only**	13.7%	20.6%
Medicaid enrollee	79.6%	77.9%
<b>Current Supportive Care Arrangements</b>		
Any home visits from a nurse, past six months	58.2%	41.8%
Mean number of home visits from a nurse, past six months**	8.1	12.1
Any formal care**	48.9%	41.9%
Five or more formal care visits per week	28.6%	26.4%
Any informal care	88.7%	86.7%
Attend a senior day center***	18.3%	6.5%
<b>Medical care utilization</b>		
Have a usual source of medical care	78.9%	79.6%
Any ambulatory care visits, past six months	85.9%	87.0%
Mean number of ambulatory care visits, past six months*	4.1	4.9

	<b>PACE enrollees</b>	<b>Comparison group</b>
Any hospital stays, past six months	44.7%	48.0%
Mean number of hospital days, past six months***	6.9	10.1
Any nursing home stays, past six months	15.4%	14.9%
Mean number of nursing home days, past six months	9.0	8.8
<b>Health, Functional Abilities, and Quality of Life</b>		
In good, very good, or excellent health*	39.5%	45.1%
Mean number of ADL limitations (0-7)*	2.85	2.58
Mean number of IADL limitations (0-7)	5.95	5.48
Cognitively impaired**	27.8%	31.2%
Satisfied with life**	61.6%	54.9%
Satisfied with health care arrangements	55.8%	52.0%

**Source:** Abt Associates Inc. Survey of PACE Applicants. Includes only those with data from both the baseline and first follow-up surveys.

- \*\*\* Difference is statistically significant at the 1% level
- \*\* Difference is statistically significant at the 5% level
- \* Difference is statistically significant at the 10% level

On the following page, Exhibit 3 displays the number of PACE enrollees and the number of comparison group members in each analysis sample. In the 24 month sample, the number of comparison group respondents is quite small. For this reason, the results of the 24 month analysis should be interpreted cautiously throughout the report.



---

**Exhibit 3: PACE Impact Analysis Samples**


---

<b>Sample</b>	<b>Sample Size</b>	<b>PACE Enrollees Group</b>	<b>Comparison Group</b>	<b>Proxy and Close-Out Surveys</b>	<b>Sample includes:</b>
six month follow-up sample	1098	790 72%	308 28%	464 42%	living participants and proxies for living participants with baseline and first follow-up survey information; participants who died within six months of home visit, who have baseline survey information, and who have proxy information from first follow-up survey
12 month follow-up sample	783	556 71%	227 29%	306 (39%)	living participants and proxies for living participants with baseline and second follow-up survey information; participants who died between six and 12 months of home visit, who have baseline survey information and who have proxy information from second follow-up survey
18 month follow-up sample	529	378 72%	151 29%	194 (37%)	living participants and proxies for living participants with baseline and third follow-up survey information; participants who died between 12 and 18 months of home visit ,who have baseline survey information, and who have proxy information from third follow-up survey
24 month follow-up sample	296	210 71%	86 29%	86 (29%)	living participants and proxies for living participants with baseline and fourth follow-up survey information; participants who died between 18 and 24 months of home visit, who have baseline survey information, and who have proxy information from fourth follow-up survey
mortality analysis	1255	881 71%	374 29%		participants with baseline survey information, date of death taken from Medicare Enrollment Database

---

*Source: Abt Associates Survey of PACE Applicants, HCFA*

---

## 7. Methodology: Estimation of PACE Impacts

The PACE study design, from an analytical perspective, is not as rigorous as a randomized, controlled trial, in which frail, elders would have been randomly assigned to PACE and to a control group. A randomized controlled trial was considered for the study, but, eventually, HCFA, the evaluator, and the sites made a joint decision not to pursue this approach. Randomization was rejected for a variety of reasons, including concerns about potentially denying needed health services, identifying appropriate comparison groups for each PACE catchment area, and enrollment rates that were lower than originally projected. Ultimately, it was decided that a suitable comparison group would be individuals who, like all applicants, showed an interest in PACE and went through initial application procedures but then decided not to enroll.

The main disadvantage of this approach is that it is possible that members of the PACE comparison group decided not to enroll for reasons that are related to the outcomes of interest in this study. For example, comparison group members may have elected not to enroll in PACE because of poor health, or because of a lack of interest in the activities offered at the adult day care center at baseline. In this case, a simple comparison of follow-up outcomes between treatment and comparison groups would be misleading. To account for this possibility, this analysis used multivariate regressions that controlled for a range of baseline characteristics, including a baseline measure of the dependent variable. The inclusion of these baseline characteristics in all of the models essentially controls for observable factors that may influence both the decision to enroll in PACE and the outcomes that are potentially affected by PACE. This method cannot, however, control for unobserved factors that affect PACE enrollment and outcomes.

An alternative approach would have been to use the instrumental variables method. This method involves replacing the potentially endogenous variable (which, in this case, is PACE enrollment) with a proxy that is highly correlated with PACE enrollment yet is not correlated with the unobservable factors that affect the outcomes of interest. The instrumental variables method requires that at least one variable be found that is a predictor of PACE enrollment, is *not* a predictor of the outcomes of interest, and is *not* correlated with unobservable factors that affect the outcomes of interest.

Although potentially suitable instruments were considered (such as home ownership and previous attachment to providers), it was decided that reasonable identifying instruments were not available for this study, mainly because it was difficult to find predictors of PACE enrollment which were not also potentially predictors of outcomes. For example, home ownership is likely to be correlated with unobserved socioeconomic factors that affect health outcomes. Implementing the instrumental variables method with weak instruments (i.e. instruments that are poor predictors of PACE enrollment, or instruments that are correlated with factors that affect the outcomes) can lead to biased and inconsistent estimates, as well as invalid specification tests. For this reason, this analysis does not take an instrumental variables approach to addressing the possible endogeneity of PACE enrollment.

The general approach for estimating the impact of PACE on each outcome was to estimate a regression equation of the form:

$$y_i = b_0 + b_1 \times PACE_i + \sum_{j=1}^{10} b_{2j} \times SITE_{ij} + b_3 \times y_{0i} + b_4 \times X_i + u_i \quad (1)$$

where  $y_i$  = value of the outcome measure for participant  $i$ ;  
 $PACE_i$  = 1 if participant  $i$  was enrolled in PACE between the time of the initial home visit and when the outcome was measured, 0 else;  
 $SITE_{ij}$  = 1 if participant  $i$  is from Site  $j$ , 0 else (the On Lok site is excluded);  
 $y_{0i}$  = baseline value of the outcome measure for participant  $i$ ;  
 $X_i$  = a vector of baseline characteristics for participant  $i$ ; and  
 $u_i$  = the regression residual.

The  $\mathbf{b}$ 's are parameters to be estimated;  $\mathbf{b}_1$  is the estimated impact of PACE.

Although it would have been desirable to estimate a richer model which could distinguish among the impacts of PACE in the various sites, the size of the analysis samples precluded this approach. In three sites, there were fewer than 10 comparison group members with baseline information and a six-month follow-up interview (see Appendix D).

Alternative functional forms of equation (1) were used for outcomes that were discrete variables and for the analysis of mortality. Logistic regression was used for dichotomous outcomes. Logistic coefficients were translated to impacts at the sample mean by multiplying by  $\frac{p}{1-p}$ , where  $p$  is the fraction of the sample that are PACE participants. Mortality was analyzed using a multivariate survival model that takes account of the right censoring of the data.

A set of covariates was chosen with the intent to describe the baseline situation of the sample as completely and compactly as possible. In addition to the PACE indicator and the site indicators, the following baseline measures of participant characteristics were included as right-hand side variables in all models:

- C Demographics at the time of sample entry
  - female
  - African-American
  - Hispanic
  - age 85 or over
  - widowed
  - less than 12 years of education
  - homeowner
  - enrolled in Medicaid
  - living alone
  - living with a spouse or sibling only
  
- C Care arrangements at the time of sample entry
  - number of home visits from a nurse (RN or LPN), past six months
  - any formal care
  - five or more formal care visits per week
  - any informal care
  - attend a senior day center
  
- C Utilization in six months prior to home visit

- number of ambulatory visits
  - number of hospital days
  - number of nursing home days
  - Medicare reimbursements six months prior to the home visit (measured as distribution quartiles)
  - any participation in a risk-based group health plan six months prior to the home visit<sup>24</sup>
- C Health and functional abilities at the time of sample entry
- current self-reported health status (1-5)
  - number of ADL limitations
  - number of IADL limitations

One outcome which was included in the analysis was treated differently. This outcome was *caregiver satisfaction*, which was measured only in those cases in which the caregiver rather than the participant was interviewed. This outcome was of interest because of the potential of the PACE program to relieve the burden on participants' families and friends. The multivariate model for caregiver satisfaction in the follow-up period included the caregiver's level of satisfaction at baseline and the handful of characteristics that were known for the caregiver: sex and relationship to the participant—not the baseline characteristics of the participant.

## 8. Interpretation of Estimates: Selection, Attrition and Response Rates

In the exhibits that follow, only the PACE impacts are shown. Because of the systematic selection of participants into PACE, the other coefficients in the model should not be interpreted as effects of those variables on the outcome. For example, PACE enrollees were less likely than comparison group members to report being in good to excellent health at baseline. The coefficient on the baseline measurement of good to excellent health is therefore the sum of two effects:

- C the *direct* effect of baseline good to excellent health on good/very good/excellent health six months later; and
- C the *indirect* effect of baseline good to excellent health on good/very good/excellent health through increased PACE participation.

Because our estimated regression models are "reduced form"—that is, they do not attempt to distinguish between direct and indirect effects—the coefficients, other than those on PACE participation itself, cannot be interpreted in a causal fashion, even in principle.

---

<sup>24</sup> Alternatively, those who participated in a risk-based health plan six months prior to the home visit (about 7% of each sample) could have been excluded from the analysis samples. The 6 and 12 month models were re-estimated excluding those with risk based health plan experience six months prior to the home visit. The results were similar to the results with these participants included in the sample.

The regression-adjusted PACE and comparison group means and proportions that are presented throughout the paper represent the values of these outcomes holding constant the baseline characteristics. Thus, the treatment and comparison group adjusted means for each outcome, when weighted by the fractions of the sample that are in the two groups, average out to the total sample mean. The difference between the two group means is equal to the estimated PACE impact.

Throughout this report the PACE regression coefficient is referred to as the "estimated impact of PACE". Lacking a true experimental design, one cannot be certain that this coefficient is the effect of PACE *per se*, rather than a reflection of unmeasured differences between PACE participants and decliners—a "selection effect". It may be, for example, that PACE enrollees are disproportionately those individuals who would have had good outcomes even in the absence of the PACE program. As discussed earlier, the models' covariates include a broad array of baseline measures of functional status, prior utilization, and self-reported well-being. The analysis therefore seems to be at least somewhat protected against substantial differences between the treatment and comparison group in characteristics that could affect outcomes.

One of the goals of this paper is to assess the persistence of the estimated PACE impact over time. Each model was estimated using outcomes data from follow-up surveys that were administered 6, 12, 18 and 24 months after the baseline survey. Although sample sizes were small at the time of the 24 month survey, this method allows one to assess the magnitude of the PACE impact at different points in time. In the following sections, trends over time in the regression adjusted PACE impact are presented both graphically and in tables.

This method, however, is limited to some extent by mortality and other attrition issues. If a PACE enrollee or a comparison group member died before a follow-up survey, an attempt was made to administer a close-out survey to a proxy. In cases where a close-out survey was available, deceased PACE enrollees and comparison group members were included in the analysis sample for the next follow-up interview. Subsequent survey samples, however, would not include the deceased individual's outcomes. For example, if a participant died between the 6 and 12 month follow-up interviews, s/he would be included in the 12 month outcome sample but not in the 18 or 24 month samples. In some cases, when close-out interviews were not possible, no survey information was available after the death of a participant. Furthermore, some PACE enrollees and comparison group members who did not die were still lost to follow-up for a variety of other reasons. (See Appendix A for a breakdown of reasons for attrition.)

It is possible that this attrition, whether it is due to mortality or to other reasons, is non-random. For example, if PACE reduces the likelihood of death for the frailest elders, the PACE sample eventually may include a higher proportion of very frail elders relative to the comparison group, where very frail elders were more likely to die. It is possible that this change in the composition of the sample could affect outcomes, causing a spurious decline in the magnitude of the PACE impact over time. Nevertheless, a sensitivity analysis, presented in Appendix C, suggests that the estimated PACE impacts are robust to varying methods of accounting for mortality in the analysis.

It is important to note that although this analysis is based on survey responses from all PACE sites, the survey response rate varied widely by site. Exhibit 4 below displays the response rates by site for the entire sample of PACE applicants.

**Exhibit 4**  
**Survey Response Rates by Site**

	# of Applicants (% of Total)	# of Survey Respondents (% of Total)	Response Rate	Enrollment Rate	
				Respondents	Non- Respondents
<b>Site 1</b>	300 (10.0%)	42 (3.1%)	14.0%	78.6%	74.8%
<b>Site 2</b>	194 (6.4%)	94 (7.0%)	48.5%	73.4%	57.0%
<b>Site 3</b>	367 (12.2%)	57 (4.3%)	15.5%	71.9%	64.2%
<b>Site 4</b>	383 (12.7%)	349 (26.1%)	91.1%	73.1%	41.2%
<b>Site 5</b>	303 (10.0%)	196 (14.7%)	64.7%	56.6%	47.7%
<b>Site 6</b>	272 (9.0%)	104 (7.8%)	38.2%	53.8%	45.8%
<b>Site 7</b>	150 (5.0%)	75 (5.6%)	50.0%	74.7%	84.0%
<b>Site 8</b>	394 (13.1%)	39 (2.9%)	10.0%	69.2%	64.2%
<b>Site 9</b>	236 (7.8%)	80 (6.0%)	33.9%	66.3%	46.8%
<b>Site 10</b>	286 (9.5%)	241 (18.0%)	84.3%	66.8%	48.9%
<b>Site 11</b>	124 (4.1%)	59 (4.4%)	47.6%	79.7%	64.6%
<b>Total</b>	3,009 (100.0%)	1,336 (100.0%)	44.4%	68.0%	60.9%

PACE applicants who refused to respond to the survey could not be included in the impacts analysis because the analysis is based on survey responses.

The varying response rate by site affects the interpretation of the results. It is important to note that the results described in this paper are based on survey responders only, and the survey responders mainly come from Columbia, El Paso, and Milwaukee. It is not necessarily true, therefore, that the impacts estimated here reflect the impacts experienced by the entire group of PACE enrollees, which includes survey responders and non-responders. The 6 and 12 month analyses described in the following sections

was repeated, limiting the sample to survey responses from these three sites. The results from this analysis, presented in Appendix E, were very similar to those obtained using the entire sample.

## 9. Service Utilization

### Supportive Services

The population that is targeted by PACE receives a variety of supportive services to assist them with their ADL and IADL dependencies. Most receive informal (unpaid) care from friends and relatives; many receive formal (paid) care in their homes as well. In addition, registered or licensed practical nurses may visit the home to administer medications or to provide other services. Comparison group members as well as PACE enrollees may attend an adult day center.

The outcome measures in this domain that were analyzed included:

- C any attendance of an adult day center;
- C frequency of attendance of an adult day center (times per week);
- C any home visits from a nurse (RN or LPN);
- C number of visits from a nurse in the last six months;
- C receipt of any informal care;
- C receipt of any formal care; and
- C receipt of formal care at least five times per week.

No attempt was made to measure the intensity of informal care because it is often provided around the clock by household members as it is needed.

While some comparison group members attended *adult day centers* regularly, PACE participants were far more likely to do so in every time period, even after controlling for their previous attendance at senior centers (Exhibit 5). PACE enrollees had a .710 to .863 probability of attending adult day care compared to a .000 to .136 probability for comparison group members. Similarly, the mean frequency of attendance, including individuals who did not attend, was increased by a statistically significant 2.1 to 2.4 days per week. This result confirms that this component of the PACE intervention was successfully implemented, and that attendance at the PACE day center was not merely substituting for community services.

Furthermore, PACE enrollees' frequent adult day care attendance persisted for up to two years after the baseline survey.

**Exhibit 5: PACE Impact Analyses - Supportive Services**

Outcome	Months 1-6 (first follow-up)				Months 7-12 (second follow-up)			
	PACE mean	Comp mean	Impact (Std Error)	% Impact	PACE mean	Comp mean	Impact (Std error)	% Impact
<b>1. Day health center</b>								
Any day health center <sup>b</sup>	0.928	0.065	0.863*** (0.049)	1329.48%	0.864	0.136	.728*** (0.053)	536.02%
Day health center days per week <sup>a</sup>	2.929	0.526	2.403*** (0.104)	457.18%	2.805	0.579	2.226*** (0.139)	384.45%
<b>2. Nurse visits to home</b>								
Any nurse visits to home <sup>b</sup>	0.235	0.358	-0.123*** (0.037)	-34.23%	0.223	0.380	-0.157*** (0.045)	-41.44%
Number of nurse visits to home in past six months <sup>a</sup>	3.576	7.479	-3.903*** (1.454)	-52.19%	3.118	7.722	-4.604** (1.973)	-59.62%
<b>3. Informal support services</b>								
Any informal support (i.e., from family of friends) <sup>b</sup>	0.848	0.899	-0.051 (0.053)	-5.69%	0.877	0.826	0.051 (0.065)	6.16%
<b>4. Formal support services</b>								
Any formal support <sup>b</sup>	0.503	0.505	-0.002 (0.033)	-.350%	0.560	0.612	-0.052 (0.039)	-8.50%
More than 5 formal care visits per week <sup>b</sup>	0.295	0.308	-0.013 (0.036)	-4.20%	0.323	0.306	0.017 (0.044)	5.54%

**Source:** Abt Associates Inc. Survey of PACE Applicants

**Notes:** <sup>a</sup> Model based on ordinary least squares regression

<sup>b</sup> Model based on logistic regression

\*\*\* Statistically significant at the 1% level  
 \*\* Statistically significant at the 5% level  
 \* Statistically significant at the 10% level



**Exhibit 5: PACE Impact Analyses - Supportive Services cont'd**

Outcome	Months 13-18 (third follow-up)				Months 19-24 (fourth follow-up)			
	PACE mean	Comp mean	Impact (Std Error)	% Impact	PACE mean	Comp mean	Impact (Std error)	% Impact
<b>1. Day health center</b>								
Any day health center <sup>b</sup>	0.818	0.108	0.710*** (0.069)	659.43%	0.908	0.00	.962*** (0.131)	N/A
Day health center days per week <sup>a</sup>	2.503	0.414	2.089*** (0.171)	504.42%	2.492	0.273	2.219*** (0.242)	813.42%
<b>2. Nurse visits to home</b>								
Any nurse visits to home <sup>b</sup>	0.241	0.392	-0.151*** (0.058)	-38.49%	0.239	0.293	-0.054** (0.098)	-18.56%
Number of nurse visits to home in past six months <sup>a</sup>	3.852	10.571	-6.719** (2.726)	-63.56%	2.839	5.308	-2.470 (3.094)	-46.53%
<b>3. Informal support services</b>								
Any informal support (i.e., from family of friends) <sup>b</sup>	0.844	0.896	-0.052 (0.085)	-5.79%	0.829	0.896	-0.067 (0.180)	-7.50%
<b>4. Formal support services</b>								
Any formal support <sup>b</sup>	0.594	0.657	-.0633 (0.050)	-9.64%	0.656	0.723	-.0664 (0.076)	-9.19%
More than 5 formal care visits per week <sup>b</sup>	0.300	0.284	0.016 (0.060)	5.57%	0.337	0.368	-.0306 (0.085)	-8.33%

**Source:** Abt Associates Inc. Survey of PACE Applicants

\*\*\* Statistically significant at the 1% level

\*\* Statistically significant at the 5% level

\* Statistically significant at the 10% level

**Notes:** <sup>a</sup> Model based on ordinary least squares regression

<sup>b</sup> Model based on logistic regression

Attendance at PACE day centers may have reduced the need for *nurses* to visit participants in their homes. PACE participants were 19 to 41 percentage points less likely than comparison group members to receive any home visits by a nurse. This difference was statistically significant at the one percent level in every time period. PACE enrollees received 4 to 7 fewer nurse visits in the home relative to comparison group members; this impact was statistically significant for the first three time periods. As displayed below in Exhibit 5, the difference between the treatment and comparison groups in the number of home visits by a nurse decreased initially and then increased slightly over time.

It was hypothesized earlier that PACE may have a negative effect on the amount of informal care provided by family and friends. In three of the four time periods assessed, the proportion of participants receiving any *informal care* was lower in the PACE enrollee group relative to the comparison group. None of these differences were statistically significant, suggesting that participation in PACE did not have an important impact on informal care utilization.

These data provide no compelling evidence that PACE adult day center care served as a partial substitute for formal homemaker/home health aide care that the participant received in the home. In the first follow-up survey, the likelihood and intensity of *formal support services* utilization were very similar in the PACE enrollee and comparison groups. In later surveys, the probability of receiving formal was higher in the comparison group than in the PACE enrollee group, but the difference between groups in the probability of receiving formal care was never statistically significant. Furthermore, the intensity of formal care utilization never differed significantly between the PACE enrollee and comparison groups. Instead, the reduction in nurses' home visits that persisted for at least 18 months after the baseline survey suggests that the center care focused on participants' medical needs.

## Medical Services

To measure the impact of PACE on participants' utilization of hospital, nursing home, and ambulatory care services, the following outcome measures were analyzed:

- any inpatient hospital admission
- number of inpatient hospital days
- any nursing home admission
- number of nights spent in a nursing home
- any ambulatory care (i.e. visits with doctor, therapist, or other medical professional)
- number of ambulatory care visits

## Hospital Utilization

Enrollment in PACE was associated with a large decrease in the rate of hospital admissions and the number of inpatient hospital days (Exhibit 8), particularly in the first twelve months following the baseline survey. At the time of the first follow-up survey, PACE enrollees were 50 percent less likely than comparison group members to have had one or more hospital admissions. This difference had fallen to 40 percent by the time of the second follow-up survey. Both differences in admission rates were statistically significant at the one percent level.

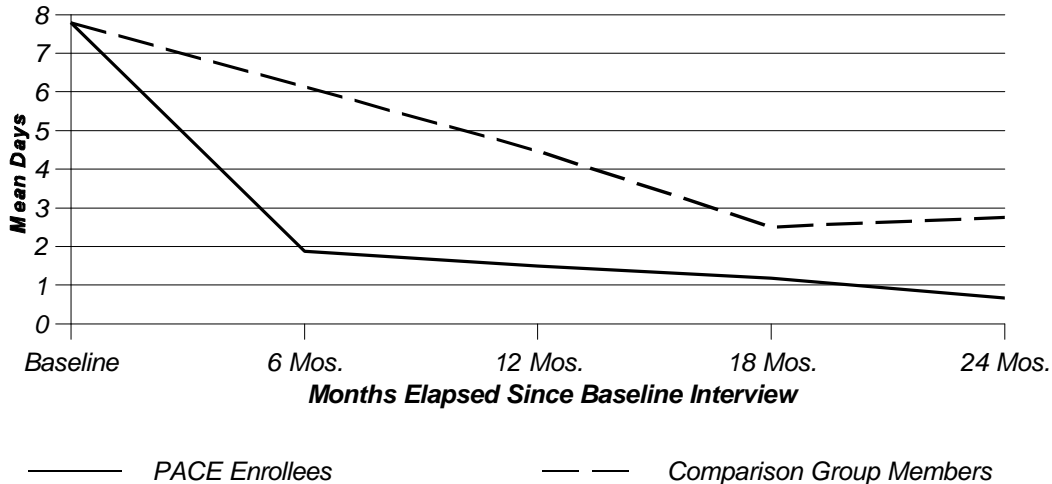
The mean number of hospital days also differed significantly between the treatment and comparison groups during the first six months after the baseline survey; PACE enrollees spent an average of 1.9 nights in a hospital, compared to 6.1 nights for PACE decliners. By the second follow-up survey, this impact had diminished somewhat because of a decrease in the comparison group’s hospital utilization. At month 12, PACE enrollees spent almost 3 fewer nights in the hospital than comparison group members. Again, these large impacts were statistically significant at the one percent level.

In later time periods, those enrolled in PACE continued to have lower hospital admission rates and shorter inpatient hospital stays relative to comparison group members. Nonetheless, compared to the first 12 months of survey results, the differences between the two groups in inpatient hospital stays became less striking 18 and 24 months after the baseline survey. For the 13-18 month period following the baseline survey, PACE enrollees were only 11 percent less likely than comparison group members to have had any inpatient hospital stays; during this period, the difference in the average number of hospital days between the two groups had declined to about 1 day. These differences were still statistically significant at the five percent level.

By the fourth follow-up survey, however, the magnitude and statistical significance of the PACE impact on the probability of hospitalization had declined further. The impact of PACE on the number of hospital days, however, was largest in percentage terms at the time of the 24 month follow-up survey. Nevertheless, the small sample size available for the fourth follow-up survey limits the relevance of these results. As displayed in Exhibit 6, there is suggestive evidence that the initial strong impact of PACE enrollment on inpatient hospital stays tended to decline after enrollees had spent about a year in the program.

**Exhibit 6: Mean # Hospital Days In 6 Months Before Interview**

*Note: All values are regression adjusted*



The consistent and large impact of PACE on hospital admissions and hospital days in the first 12 months of enrollment suggests that sites have been successful in reducing utilization of acute care services. These results are consistent with other studies that have compared hospital utilization between PACE enrollees and the Medicare population as a whole. Wiener and Skaggs (1995) report evidence that the PACE sites have been able to control utilization of acute care services. These findings also are consistent with White (1998), who found that Medicare costs for PACE enrollees were substantially lower than they would have been had the enrollees remained in the fee-for-service system. The reduction in hospital days may be the result of the success of the medical and social services provided at PACE sites in improving the health and functional status of PACE enrollees, the incentives for cost containment given by the capitated payment system, and/or PACE's focus on monitoring and early intervention.

It is not clear, however, why the differences in hospitalization rates between the two groups became less important over time. It appears that while PACE enrollees' hospital utilization declined slowly over the four follow-up surveys, hospital utilization in the comparison group decreased more dramatically, at least as long as 18 months following baseline survey. Exhibit 6 suggests that PACE effected a large initial decrease in hospital utilization, and then maintained this reduction over the life of the study. In the comparison group, where this large initial reduction did not occur, there was more room for reductions and regressions later on in the survey process.<sup>25</sup>

## Nursing Home Utilization

PACE targets a frail, nursing home eligible population. One of the main goals of the program is to provide enrollees with the support they need to avoid nursing home placement. [White (1998)] The data suggests that the PACE sites were successful in reaching this goal.

PACE enrollees were much less likely than comparison group members to have a nursing home admission, and also had far fewer nursing home days (Exhibit 8). In months 1-6, 30 percent of comparison group members had one or more admission to a nursing home, compared to about 10 percent for those in PACE. On average, PACE enrollees spent only 6.5 nights in a nursing home during the first six months, while comparison group members spent 22.7 nights in a nursing home during the first six months.

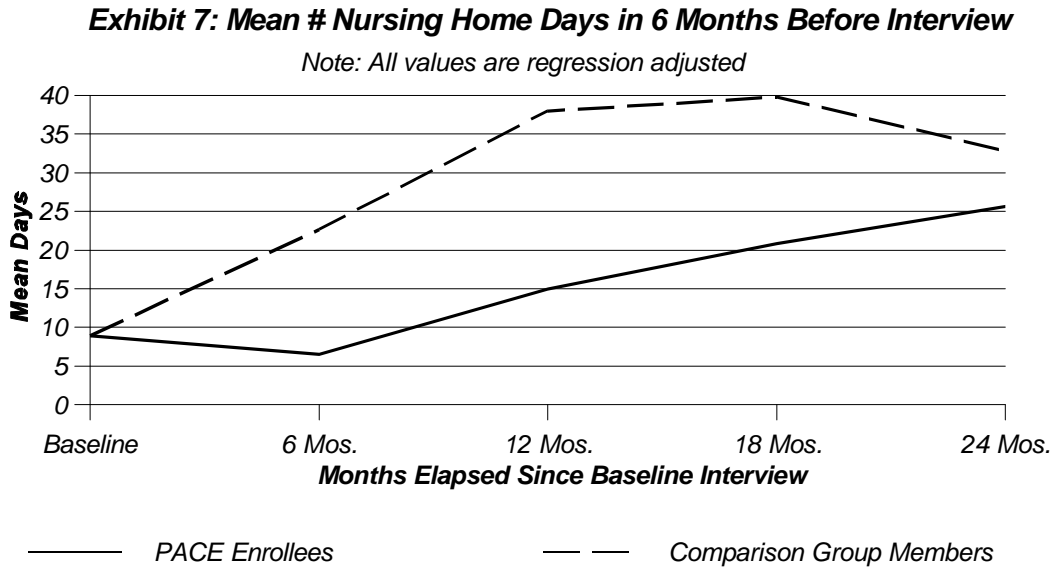
These differences persisted over the following 6 months; at the time of the second follow-up survey, PACE enrollees were about 52 percent less likely than comparison group members to have any nursing home stays. Twelve months after the baseline survey, PACE enrollees spent an average of 15 days in a nursing home while the comparison group spent an average of 38 days in a nursing home. All of these striking differences between the PACE enrollee and comparison groups in nursing home utilization were statistically significant at the one percent level.

In the 18 and 24 month surveys, however, the magnitude of the differences between PACE enrollees and comparison group members declined. During months 13-18, PACE was associated with a large, statistically significant impact on the number of nursing home days. Nonetheless, there was no longer a statistically significant difference between the two groups in the probability of any nursing home admission. At the time of the final, 24 month follow-up survey, the difference between PACE enrollees

---

25 The possible role of non-random attrition is addressed in Appendix B.

and comparison group members in nursing home admissions and nursing home days was not statistically significant. Exhibit 7 below displays the trend in the number of nursing home days for PACE enrollees and comparison group members.



These results suggest that the medical and social services provided to enrollees have allowed many of them to remain in the community and avoid nursing home placement. This effect was quite large in magnitude, especially during the first year after enrollment. Preventing nursing home placement was a primary objective of PACE, and it appears that the sites have been quite successful in reaching this goal.

**Exhibit 8: PACE Impact Analyses: Utilization of Hospital, Nursing Home, and Ambulatory Care**

Outcome	Months 1-6 (first follow-up)				Months 7-12 (second follow-up)			
	PACE mean	Comp mean	Impact (Std Error)	% Impact	PACE mean	Comp mean	Impact (Std error)	% Impact
<b>1. Hospitalization: Inpatient stays</b>								
Any inpatient hospitalization	0.202	0.406	-0.204*** (0.034)	-50.18%	0.207	0.343	-0.136*** (0.042)	-39.60%
Number of inpatient hospital nights <sup>a</sup>	1.890	6.142	-4.252*** (0.902)	-69.23%	1.513	4.485	-2.972*** (0.676)	-66.27%
<b>2. Nursing home stays</b>								
Any nursing home admission <sup>b</sup>	0.098	0.303	-0.205*** (0.042)	-67.59%	0.160	0.335	-0.176*** (0.045)	-52.38%
Number of nursing home nights <sup>a</sup>	6.527	22.662	-16.135** (2.489)	-71.20%	15.034	38.036	-23.002*** (4.600)	-60.48%
<b>3. Ambulatory care</b>								
Any ambulatory care <sup>b</sup>	0.927	0.740	0.187*** (0.045)	25.24%	0.904	0.834	0.070 (0.061)	8.41%
Number of ambulatory visits <sup>a</sup>	10.775	3.464	7.311*** (1.252)	125.16%	9.801	5.392	4.409*** (1.410)	81.76%

**Source:** Abt Associates Inc. Survey of PACE applicants  
**Notes:** <sup>a</sup> Model based on ordinary least squares regression  
<sup>b</sup> Model based on logistic regression

\*\*\* Statistically significant at the 1% level  
\*\* Statistically significant at the 5% level  
\* Statistically significant at the 10% level

**Exhibit 8: PACE Impact Analyses: Utilization of Hospital, Nursing Home, and Ambulatory Care**

Outcome	Months 13-18 (first follow-up)				Months 19-24 (second follow-up)			
	PACE mean	Comp mean	Impact (Std Error)	% Impact	PACE mean	Comp mean	Impact (Std error)	% Impact
<b>1. Hospitalization: Inpatient stays</b>								
Any inpatient hospitalization <sup>b</sup>	0.180	0.203	-0.023*** (0.060)	-11.27%	0.143	0.150	-0.007 (0.102)	-4.49%
Number of inpatient hospital nights <sup>a</sup>	1.189	2.513	-1.324** (0.575)	-52.68%	0.679	2.770	-2.090* (1.156)	-75.46%
<b>2. Nursing home stays</b>								
Any nursing home admission <sup>b</sup>	0.210	0.274	-0.064 (0.572)	-23.42%	0.239	0.145	0.094 (0.091)	65.20%
Number of nursing home nights <sup>a</sup>	20.839	39.808	-18.97*** (6.435)	-47.65%	25.713	32.926	-7.212 (10.306)	-21.91%
<b>3. Ambulatory care</b>								
Any ambulatory care <sup>b</sup>	0.914	0.860	0.054 (0.094)	6.27%	N/A	N/A	N/A	N/A
Number of ambulatory visits <sup>a</sup>	10.587	5.263	5.324*** (1.998)	101.17%	10.436	4.879	5.557** (2.201)	113.91%

**Source:** Abt Associates Inc. Survey of PACE applicants  
**Notes:** <sup>a</sup> Model based on ordinary least squares regression  
<sup>b</sup> Model based on logistic regression

\*\*\* Statistically significant at the 1% level  
\*\* Statistically significant at the 5% level  
\* Statistically significant at the 10% level

## Utilization of Ambulatory Services

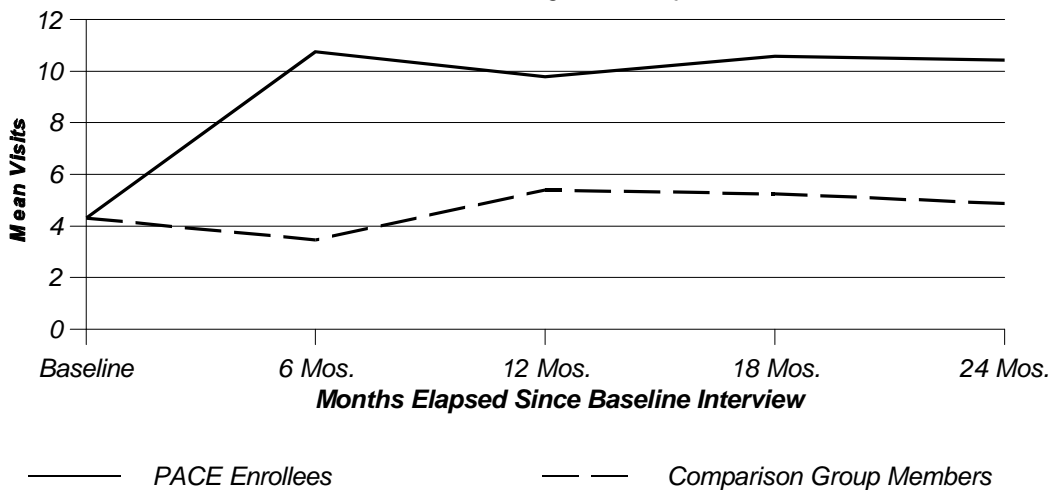
The PACE sites strive to maintain and improve health by offering a range of preventative, acute and long-term care services. Most of these services are provided in an adult day health center by a interdisciplinary team of physicians, nurse practitioners, social workers and other professionals. Ambulatory encounters are an important component of PACE’s integrated package of health care services.

It is not surprising, then, that PACE enrollees made more intensive use of ambulatory services than comparison group members. During the first six months, 93 percent of those in PACE reported one or more encounters with a physician, therapist or other medical professional, compared to 74 percent of PACE decliners. This difference was statistically significant at the one percent level. In the following time periods, PACE enrollees continued to have a higher probability of one or more ambulatory visits than comparison group members, but the difference was not statistically significant.

Those in PACE also reported having significantly more ambulatory encounters with health professionals than comparison group members. PACE enrollees had an average of about 10-11 ambulatory visits for all four follow-up surveys. This was about twice the number of ambulatory visits reported by comparison group members during every time period. These differences between PACE enrollee and comparison group members were statistically significant at least at the five percent level in every period.

**Exhibit 9: Mean # Ambulatory Visits in 6 Months Before Interview**

*Note: All values are regression adjusted*



The difference between PACE enrollees and comparison group members in the number of ambulatory encounters can be attributed at least in part to PACE’s approach to providing care. Ambulatory encounters are used to maintain and improve health, and to avoid more costly forms of care. But PACE also disproportionately attracts applicants who are minorities, poorly educated, and indigent — PACE enrollees’ persistently high level of ambulatory visits also may result from their previous lack of access to medical care.



## 10. Participant's Health Status, Quality of Life, Satisfaction, and Functional Status

PACE is intended to stabilize or improve the health status, physical functioning, and overall quality of participants' lives. By placing a strong emphasis on providing preventative services, providers attempt to reduce participants' functional decline. Through coordination of health services, PACE might lead to improved health status, a corresponding improvement in participants' quality of life, and perhaps greater satisfaction with overall care arrangements.

Previous results showed that PACE participants received significantly more ambulatory services than comparison group members. Given the large negative impact of PACE on utilization of hospital and nursing home services, however, PACE could be associated with decreases in health and functional status, if participants are not receiving necessary acute or long-term care services. Under capitation, sites have a financial incentive to avoid utilization of expensive forms of care. Limiting access to needed services could have adverse implications for participants' health status, also reducing their quality of life. Alternatively, PACE sites could develop flexible, creative health care plans that emphasize prevention and rehabilitation.

The baseline and four follow-up interviews of PACE applicants collected detailed information on applicants' perceived health status, quality of life, physical and cognitive limitations, and satisfaction with care arrangements. For interviews completed with a proxy respondent, information on the proxy's satisfaction was also gathered. To measure the impact of PACE on perceived health status and quality of life, the following outcome measures were analyzed:

- Whether the applicant indicated that (s)he was in good or excellent health
- Whether the applicant expected his/her health to be good or excellent one year from now
- Whether the applicant reported that his/her life was satisfying
- Whether the applicant reported having choice in how (s)he spends his/her time
- Whether the applicant reported having confidence in his/her ability to deal with problems
- Whether the applicant attended social, religious, or recreational programs at least once a week

As in the analyses discussed so far, all models included the value of the dependent value reported at baseline among the covariates.

For interviews completed with a caregiver rather than the applicant, we also analyzed whether the caregiver reported his/her own life as being satisfying. Proxy respondents for both the baseline and follow-up surveys were available for 464 of the 1098 interviews completed as part of the first follow-up, 306 of the 783 second follow-up interviews, 194 of the 529 third follow-up interviews, and 86 of the

296 fourth follow-up interviews<sup>26</sup>. We used these proxy responses to analyze the impact of PACE on caregiver satisfaction.

At the time of each scheduled follow-up interview, six to eight percent of participants were deceased. Data for these individuals were based on a close-out interview conducted with a knowledgeable proxy. The close-out interview did not include questions about health status, quality of life, or satisfaction with care. For our analyses of these outcomes, we have assigned decedents the lowest possible value for these measures. This method maximizes the available sample for the analysis.

**Health status.** At the time of first follow-up period, PACE was associated with a significantly higher probability of being in good or excellent health, adjusting for the influence of health status at baseline (Exhibit 13). At month 6, 43 percent of PACE participants reported that their health was good or excellent, compared to 37 percent of comparison group members. PACE participants also had higher expectations about their future health status compared to PACE decliners. Fifty-two percent expected to be in good or excellent health one year from the survey date, compared to 44 percent of PACE decliners. Both of these impacts were statistically significant at the five percent level.

Over the next three follow-up interviews, PACE enrollees continued to report better current health and more optimistic predictions about future health relative to comparison group members. The differences between PACE enrollees and PACE decliners, however, generally became statistically insignificant after the first follow-up survey. At month 12, 43 percent of those in PACE reported that their health was good or excellent, compared to 40 percent of decliners. By month 18, 43 percent PACE enrollees still reported that their health was good or excellent, but this figure in the comparison group had dropped to 34 percent. After the first follow-up period, the differences between PACE enrollees and decliners in expected future health were never statistically significant.

These results suggest that the coordinated approach to addressing the health needs of PACE participants, and the emphasis on preventative and rehabilitative care that are central to the PACE philosophy have resulted in an at least a short-term improvement in health status for PACE participants relative to comparison group members.

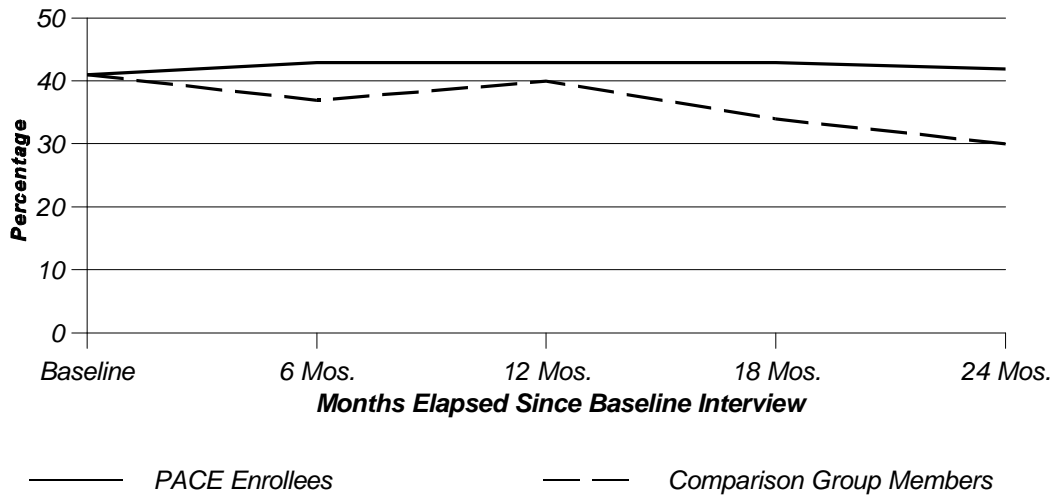
Interestingly, as displayed below in Exhibit 10, the percentage of PACE enrollees reporting good or excellent health was very stable over time. The percentage of comparison group members reporting good or excellent health, however, increased slightly at the time of the second follow-up survey and then decreased over the next two follow-up surveys.

---

26 In the analysis of all of the outcomes, proxies responded to questions about participant outcomes when the participant was unable to respond for him/herself. Proxy responses may be subject to greater systematic measurement error compared to participants' own responses. The 6 and 12 month models in this report were re-estimated with a proxy responder dummy variable included as a covariate. The estimated coefficient on the proxy responder covariate usually was not statistically significant, and it was inconsistent in sign across the models. The estimated PACE impact in these models was very similar to the estimated PACE impact in models that did not include the proxy responder dummy variable. These findings suggest that having a proxy respond instead of the participant did not have a systematic relationship with the outcomes of interest.

**Exhibit 10: % Reporting Good to Excellent Health in 6 Months Before Interview**

Note: All values are regression-adjusted



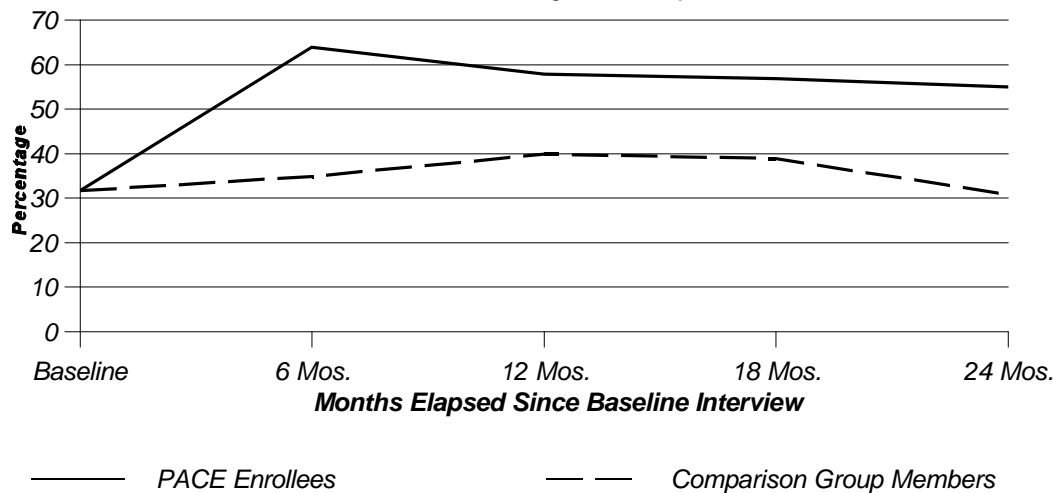
**Quality of life.** PACE enrollees seemed to enjoy a higher quality of life than comparison group members, as assessed by the quality of life measures available in the survey. At month 6, 72 percent of PACE participants reported that their lives were at least “pretty satisfying,” compared to 55 percent of decliners. The impact of PACE on satisfaction with life persisted into the second follow-up period; at month 12, 71 percent of PACE enrollees were satisfied with life compared to 60 percent of PACE decliners. The differences in the 6 and 12 month follow-up surveys both were statistically significant at the one percent level. At the time of the 18 and 24 month surveys, PACE enrollees still had higher levels of satisfaction with life compared to PACE decliners, but the differences between the two groups were no longer statistically significant.

At month 6, those in PACE also were significantly more likely than comparison group members to report having at least some choice in how they spend their time and at least some confidence in their ability to deal with life’s problems. In later follow-up surveys, however, there were no longer significant differences between PACE enrollees and comparison group members in these two aspects of quality of life.

As expected, given PACE’s emphasis on activities at the day health center, PACE enrollees were much more likely than decliners to regularly participate in social, religious, or recreational programs. This impact persisted for at least two years after the baseline survey. At the time of the first survey, 64 percent of PACE participants reported attending social events at least once a week, compared to less than 35 percent of comparison group members. By the final survey, which was conducted 24 months after the baseline survey, PACE enrollees were still 75 percent more likely than decliners to attend social activities at least once a week. The regression-adjusted means (displayed in Exhibit 11 and reported in Exhibit 13) are based on a model that included baseline attendance at social programs as an independent variable. The large impact of PACE on social program participation therefore does not simply reflect the fact that those who enroll in PACE are more likely to have an interest in participating in social activities (based on their willingness to attend the day health center regularly) compared to decliners.

### Exhibit 11: % Reporting Weekly Socialization in 6 Months Before Interview

Note: All values are regression-adjusted



**Caregiver quality of life.** Through its integration of services and use of an adult day health center, PACE may increase the quality of life for participants’ caregivers. The caregiver satisfaction model was limited to participants with complete information for at least two proxy surveys (a baseline survey and one follow-up survey). Consequently, compared to the other models presented in this report, much smaller sample sizes were available for this model (N=91 at month 6, N=67 at month 12). Insufficient sample size precluded an analysis of caregiver satisfaction at the time of the third and fourth follow-up surveys.

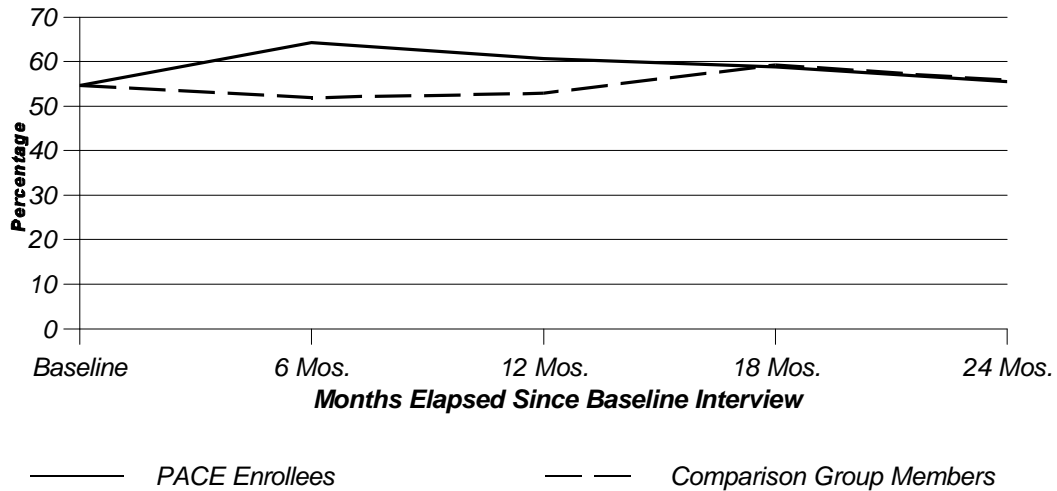
At month 6 and at month 12, there were no statistically significant differences between the treatment and comparison groups in the percentage of caregivers of PACE participants who reported that their lives were at least “pretty satisfying”. These findings indicate that PACE did not have measurable impact on participants’ caregivers’ satisfaction with life; small sample sizes, however, may have affected these results.

**Satisfaction with care arrangements.** At the time of the first follow-up survey, PACE enrollees were 24 percent more likely than PACE decliners to report being “very satisfied” with their overall care arrangements. Adjusting for satisfaction at baseline, at month 6, 64 percent of PACE participants were very satisfied, compared to 52 percent of decliners (see Exhibit 12). This difference was statistically significant at the one percent level. Very few (about 6 percent in the first follow-up survey) in either group reported being dissatisfied with overall arrangements made to care for them.

Similarly, in month 12, PACE enrollees continued to be significantly more likely than PACE decliners to report being completely satisfied with arrangements made to care for them. In the next two follow-up surveys, there was no statistically significant difference between the PACE and comparison groups in this outcome.

**Exhibit 12: % Satisfied with Care Arrangements in 6 Months Before Interview**

Note: All values are regression-adjusted



**Functional status.** The baseline and follow-up interviews of PACE applicants included a series of questions about applicants’ physical functioning, including activities of daily living (ADL) and instrumental activities of daily living (IADL) limitations. The following outcome measures were used to measure the impacts of PACE on participants’ functional status:

- Whether the applicant had a behavioral problem
- Whether the applicant had a visual or hearing disability
- Whether the applicant uses an assistive device (i.e., wheelchair, walker, back or leg brace, trapeze, or lift)
- Whether the applicant was cognitively impaired
- The number of ADL limitations reported by the applicant
- The number of IADL limitations reported by the applicant
- Whether the applicant has bowel or bladder incontinence

ADL limitations represent activities for which the individual usually requires direct help from another person. IADL limitations reflect areas where the individual would not be able to perform the activity without help, even if necessary. In this analysis, no distinction is made between general and marked dependency.<sup>27</sup>

27 Irvin et. al. (1998), in an analysis of PACE enrollment, distinguish between general dependency and marked dependency.

**Exhibit 13: PACE Impact Analyses: Health Status, Quality of Life, and Satisfaction with Care**

Outcome	Months 13-18 (third follow-up)				Months 19-24 (fourth follow-up)			
	PACE mean	Comp mean	Impact (Std Error)	% Impact	PACE mean	Comp mean	Impact (Std error)	% Impact
<b>1. Health Status</b>								
Good or excellent health	0.432	0.339	0.093* (0.055)	27.26%	0.423	0.298	0.125 (0.090)	41.88%
Expect good or excellent health one year from now	0.471	0.398	0.073 (0.054)	18.37%	0.496	0.413	0.083 (0.087)	20.16%
<b>2. Quality of life</b>								
Life pretty/completely satisfying	0.638	0.614	0.024 (0.049)	3.97%	0.664	0.554	0.110 (0.076)	19.87%
Some/ Great deal of choice in how spend time	0.595	0.546	0.050 (0.050)	9.08%	0.657	0.558	0.099 (0.074)	17.73%
Some/ Great deal of confidence of ability to deal with problems	0.587	0.513	0.075 (0.051)	14.57%	0.574	0.595	-0.022 (0.074)	-3.65%
Attends social/ religious/ recreational programs at least once per week	0.574	0.394	0.180*** (0.050)	45.77%	0.545	0.311	0.234*** (0.077)	75.46%
Caregiver finds life pretty/completely satisfying	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>3. Satisfaction with Care</b>								
Very satisfied with overall care arrangements	0.589	0.593	-0.004 (0.048)	-.680%	0.555	0.558	-0.003 (0.073)	-.500%

Source: Abt Associates Inc. Survey of PACE applicants

Notes: All models based on logistic regression

\*\*\* Statistically significant at the 1% level \*\*Statistically significant at the 5% level \* Statistically significant at the 10% level

For interviews completed with a proxy respondent, behavioral problem status was based on a series of questions about whether the applicant sometimes wandered, was verbally disruptive, was physically aggressive, had regressive behavior, or had hallucinations. Applicants reported as sometimes doing one or more of these types of behavior defined as having behavioral problems. These questions were not asked for interviews completed directly with the applicant. Behavioral status for non-proxy interviews was determined based on a series of interviewer observations. If the interviewer reported any behavior that seemed inappropriate or showed hostility towards the interviewer, then the applicant was assumed to have behavioral problems. About one-third of the sample was identified as having behavioral problems based on this methodology.

Cognitive impairment was determined based on the Pfeiffer Short Portable Mental Status Questionnaire (MSQ) administered before beginning the interview. The interviewer scored responses to the ten questions included in the MSQ to determine whether the applicant was capable of continuing with the interviewer or whether a proxy respondent should be sought. Applicants who missed at least half of the MSQ questions, or who were not administered the test because they were aphasic were assumed to be cognitively impaired, as were those reported by their proxy as having Alzheimer's Disease. Overall, about 30 percent of the first follow-up survey sample was cognitively impaired.

Information on functional status was not included in the close-out interview attempted for applicants that died prior to a scheduled follow-up interview. For our analyses of functional status outcomes, we assigned decedents the minimum physical functioning score. In the previous impact analysis, estimated PACE impacts were not sensitive to whether or not information on decedents was included in the analyses. [Burststein et. al. (1996)]

At the time of the first follow-up survey, there were many statistically significant differences between the PACE enrollees and PACE decliners in measures of functional status. Compared to PACE decliners, PACE enrollees were 7 percent less likely to have a visual or hearing disability, were 19 percent less likely to have frequent bowel or bladder incontinence, and had about .3 fewer limitations in the Activities of Daily Living (Exhibit 14). These effects, however, generally did not persist after the six month survey. At the time of the next three surveys, there were no longer statistically significant differences between treatment and comparison groups in visual/hearing disability and incontinence. PACE enrollees had 15 percent fewer ADL limitations than PACE decliners at the time of the fourth follow-up survey; this difference was statistically significant at the .10 level. Otherwise, the treatment/comparison difference in ADL limitations was not statistically significant after the first follow-up survey.

PACE enrollees were more likely than comparison group members to use an assistive device (e.g. hearing aid, walker) (Exhibit 15). This difference was statistically significant 6 and 12 months after the baseline survey. As discussed previously in the context of ambulatory care visits, PACE applicants tended to be from quite disadvantaged backgrounds. It is likely that prior to their enrollment in PACE, these elders lacked access to many of the assistive devices they needed. Through PACE's coordination of enrollees' health care needs, improved access to care and perhaps the flexibility of capitation, participants may have received assistive devices that they had needed in the past. Furthermore, increased use of assistive devices could suggest an improvement in health status if severely disabled patients gain greater independence and mobility. Because the other evidence strongly suggests that PACE enrollees experienced at least small improvement in health status, it is unlikely that the increased use of assistive devices indicates a decline in PACE enrollees' health relative to the comparison group.

**Exhibit 14: PACE Impact Analyses: Functional Status**

Outcome	Months 1-6 (first follow-up)				Months 7-12 (second follow-up)			
	PACE mean	Comp mean	Impact (Std Error)	% Impact	PACE mean	Comp mean	Impact (Std error)	% Impact
Applicant has behavioral problem <sup>b</sup>	0.317	0.286	0.0313 (0.048)	10.96%	0.277	0.292	-0.015 (0.062)	-5.11%
Applicant has visual or hearing disability <sup>b</sup>	0.346	0.418	-0.072** (0.034)	-7.22%	0.375	0.385	-0.010 (0.044)	-2.68%
Applicant uses assistive device <sup>b</sup>	0.882	0.795	0.087* (0.051)	8.72%	0.944	0.766	0.178*** (0.069)	23.27%
Applicant is cognitively impaired <sup>b</sup>	0.277	0.350	-0.073 (0.053)	-20.91%	0.262	0.231	0.031 (0.078)	13.54%
Number of ADL limitations <sup>b</sup>	2.715	2.995	-0.280** (0.128)	-9.36%	2.928	3.096	0.169 (0.167)	5.45%
Number of IADL limitations (Don't do activity) <sup>a</sup>	5.733	5.675	0.058 (0.115)	1.02%	5.884	5.668	0.216 (0.143)	3.81%
Number of IADL limitations (Cannot do activity and don't) <sup>a</sup>	4.905	4.953	-0.048 (0.143)	0.96%	5.064	4.964	0.100 (0.176)	2.00%
Bowel or bladder incontinence at least once per week <sup>b</sup>	0.398	0.490	-0.092** (0.038)	-18.77%	0.458	0.482	-0.024 (0.044)	-4.96%
Ever had bowel or bladder incontinence <sup>b</sup>	0.496	0.564	-0.068 (0.036)	-6.78%	0.549	0.529	0.020 (0.044)	3.77%

**Source:** Abt Associates Inc. Survey of PACE applicants  
**Notes:** <sup>a</sup> Model based on ordinary least squares regression  
<sup>b</sup> Model based on logistic regression

\*\*\* Statistically significant at the 1% level  
\*\* Statistically significant at the 5% level  
\* Statistically significant at the 10% level



**Exhibit 14: PACE Impact Analyses: Functional Status**

Outcome	Months 13-18 (third follow-up)				Months 19-24 (fourth follow-up)			
	PACE mean	Comp mean	Impact (Std Error)	% Impact	PACE mean	Comp mean	Impact (Std error)	% Impact
Applicant has behavioral problem <sup>b</sup>	0.253	0.299	-0.046 (0.079)	-15.51%	0.205	0.127	0.078 (0.181)	61.10%
Applicant has visual or hearing disability <sup>b</sup>	0.406	0.323	0.084 (0.055)	25.98%	0.346	0.315	0.031 (0.084)	9.84%
Applicant uses assistive device <sup>b</sup>	0.928	0.827	0.101 (0.093)	12.27%	0.950	0.765	0.185 (0.156)	24.24%
Applicant is cognitively impaired <sup>b</sup>	0.258	0.311	-0.052 (0.091)	-16.84%	0.135	0.416	-0.281 (0.235)	-67.62%
Number of ADL limitations <sup>b</sup>	2.966	3.149	-0.183 (0.211)	-5.81%	2.888	3.413	-0.525* (0.312)	-15.38%
Number of IADL limitations (Don't do activity) <sup>a</sup>	5.627	5.575	0.052 (0.177)	.935%	5.500	5.508	-0.077 (0.293)	.140%
Number of IADL limitations (Could do activity, but don't) <sup>a</sup>	4.914	4.788	0.126 (0.228)	2.63%	4.950	4.602	0.348 (0.336)	7.60%
Bowel or bladder incontinence at least once per week <sup>b</sup>	0.437	0.482	-0.045 (0.055)	-9.32%	0.466	0.463	0.004 (0.083)	.810%
Ever had bowel or bladder incontinence <sup>b</sup>	0.531	0.505	0.027 (0.054)	5.25%	0.531	0.494	0.037 (0.077)	7.42%

**Source:** Abt Associates Inc. Survey of PACE applicants \*\*\*

\*\*\* Statistically significant at the 1% level

\*\* Statistically significant at the 5% level

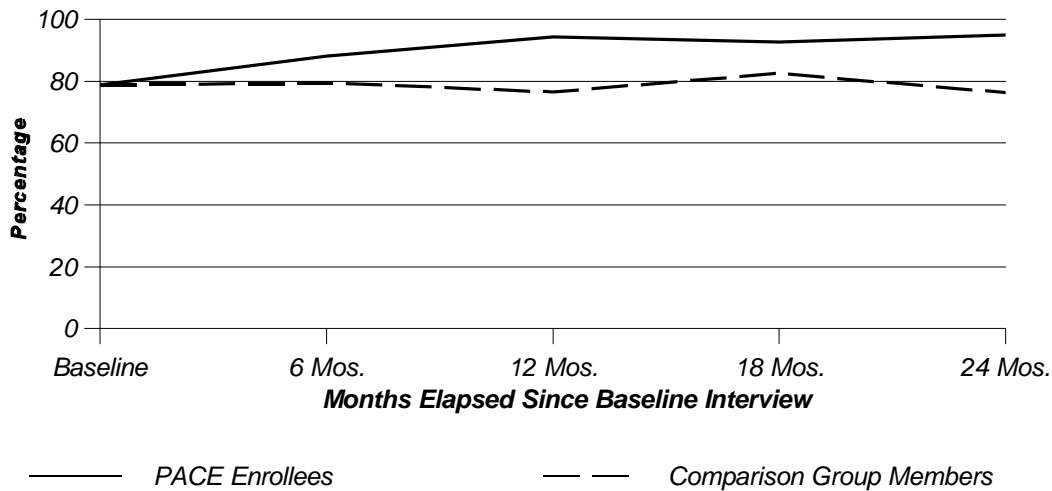
\* Statistically significant at the 10% level

**Notes:** <sup>a</sup> Model based on ordinary least squares regression

<sup>b</sup> Model based on logistic regression

### Exhibit 15: % Using Assistive Device in 6 Months Before Interview

Note: All values are regression-adjusted



## 11. Participant Mortality

To test hypotheses about PACE impacts on mortality, data from Medicare enrollment records was used.<sup>28</sup> The analysis sample included 1255 individuals for whom there was baseline data and whose HIC numbers could be matched with Medicare records.

The observation period for individuals ranged from 11 days to 2.5 years. Over the course of the observation period, 165 out of a total of 881 PACE enrollees died (19%), compared with 95 out of a total of 374 comparison individuals (25%). A multivariate survival analysis of the data yielded a positive, statistically significant impact of PACE on survival (p-value=.03). The model indicated that an individual with mean values of all independent variables would have a median life expectancy of 5.2 years if in PACE, and a median life expectancy of only 3.9 years if in the comparison group—a 33 percent difference. Alternatively, controlling for baseline characteristics, the likelihood of dying within a year of sample entry was 10 percent for PACE participants, but about 13.5 percent for control group members.

PACE appears to have substantial effects on a variety of outcomes that reflect health status and quality of life. Intuitively, it is reasonable to suggest that PACE enrollees live longer than comparison group members because their health needs are addressed more efficiently and because they enjoy an enhanced

<sup>17</sup> For both groups, mortality was measured based on time elapsed between the home visit date and the date of death, if any, recorded in the Medicare Enrollment Database (EDB) file. While more complete information might possibly have been available from PACE enrollment files, these data would have been available for treatment group members only, and therefore would have been inappropriate to use in an impact analysis. The last date of death recorded was as late as October 1997, but the analysis focussed on death status as of June 30, 1997. This method was used to ensure that the EDB file included nearly all of the deaths that had occurred. It was assumed therefore that all participants for whom no date of death was recorded were alive as of June 30, 1997.

quality of life. This finding, however, is not consistent with other literature in this area which has shown that most HCBS programs have no statistically significant effect on mortality. Furthermore, like all of the results in this paper, these findings may have been affected by selection bias (see Appendix B).

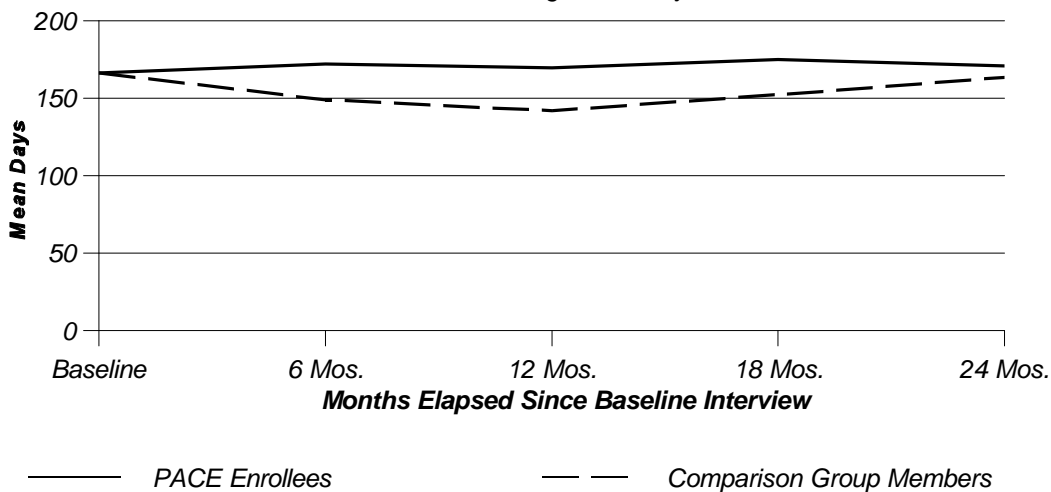
## 12. Days in the Community

The preceding sections have discussed the effects of PACE on formal and informal services utilization, quality of life, health status, satisfaction with care, functional status, and mortality. To summarize some of these impacts, a composite measure called “days in the community” was created. Days in the community is defined as the number of days in each follow-up period where the participant was alive, not in a nursing home and not in the hospital. For each six-month survey period, the maximum number of days in the community was 183.

PACE enrollees spent more days in the community than comparison group members in every time period. At the time of the first six month survey, PACE enrollees had an regression adjusted mean of 172 days in the community while, in the comparison group, this mean was 149 days. This effect persisted over the next two follow-up surveys. At month 12, PACE enrollees spent an average of 170 days in the community, and the comparison group members spent an average of 142 days in the community. By the third follow-up survey, the difference between the treatment and comparison groups had diminished somewhat, with PACE enrollees spending an average of 175 days in the community and the comparison group members spending an average of 153 days in the community (Exhibit 16). The difference between the two groups was not significant at the time of the last follow-up survey but, as in all of the analysis, small sample sizes make the 24 month survey results less reliable.

**Exhibit 16: Days in the Community in 6 Months Before Interview**

*Note: All values are regression-adjusted*



## 13. Variation in PACE Impacts by Level of ADL Dependence

To examine how PACE impacts varied among participants with different levels of baseline functional dependence, we separated enrollees into two subgroups based on their number of Activities of Daily Living (ADL) limitations (as defined previously) at sample entry. The first category included those with two or fewer limitations (low limitations). The second category included those with more than two limitations (high limitations).

To measure how the PACE impact differed between these two groups, the models described in the previous sections were applied separately to the two sub-samples. This method allows the PACE effect, as well as the effects of other independent variables, to vary by the severity of baseline ADL limitations. The analysis was limited to four key outcomes for which PACE had a large, statistically significant impact in the previous sections: number of inpatient hospital nights, number of nursing home nights, frequent socialization, and self-reported satisfaction with life. The analysis was limited to the first two six month follow-up periods.

In almost every case, the impacts of PACE were substantially larger for the subset of enrollees who had high limitations (Exhibit 17). For example, among those with high limitations, PACE enrollees spent 83 percent fewer nights in a hospital than decliners at the time of the first follow-up survey; among those with low limitations, enrollees had 69 percent fewer hospital nights than comparison group members. Twelve months after the baseline survey, the PACE impact on hospital nights was 66 percent in the low ADL sub-sample and 81 percent in the high ADL sub-sample. This difference was evidently due to PACE consistently keeping those with high ADL limitations out of the hospital. Six and 12 months after the baseline survey, comparison group members with high limitations had 1.5 to 2.8 more hospital nights than those with low limitations. Among PACE enrollees, however, there was little difference in hospital nights between the two sub-groups.

Similarly, the PACE impact on the number of nursing home nights was larger in magnitude for the high ADL sub-sample compared to the low ADL sub-sample. At month 6, those in PACE with high limitations had .4 more nursing home days than PACE enrollees with low limitations, while the high ADL/low ADL difference among comparison group members was 5.8 days. At the time of the second follow-up survey, however, this difference was more striking. Twelve months after the baseline survey, PACE enrollees with high limitations had 76 percent fewer nursing home nights than PACE decliners with high limitations. In the low ADL sub-sample, PACE enrollees had only 60 percent fewer nursing home nights relative to comparison group members.

At the time of the second follow-up survey, PACE enrollees with high limitations actually had about 3 fewer nursing home nights than PACE enrollees with low limitations. Among those in the comparison group, those with high limitations had a regression adjusted mean of 48.5 nursing home nights while those with low limitations had a regression adjusted mean of 37.7 nursing home nights. The results suggest that PACE was particularly successful in preventing nursing home placement for participants with high levels of functional dependence.

**Exhibit 17: Comparison of PACE Impacts for Those with Different Numbers of ADL Limitations**

Outcome	Two or fewer ADL limitations (N=544)				More than two ADL limitations (N=536)			
	PACE mean	Comp mean	Impact (Std Error)	% Impact	PACE mean	Comp mean	Impact (Std error)	% Impact
<b><u>First Follow-Up Survey</u></b>								
Number of inpatient hospital nights <sup>a</sup>	1.91	6.08	-4.168*** (.888)	-68.50%	1.507	8.607	-7.100*** (1.452)	-82.49%
Number of nursing home nights <sup>a</sup>	6.707	22.191	-15.484** (2.445)	-69.77%	7.171	27.964	-20.793*** (3.757)	-74.36%
Social Activities At Least Weekly <sup>b</sup>	.641	.342	.299*** (.033)	87.53%	.685	.284	.401*** (.051)	141.22%
Life pretty/completely satisfying <sup>g</sup>	0.718	0.545	0.173*** (0.032)	31.77%	0.687	0.479	0.208*** (0.046)	43.39%
<b><u>Second Follow-Up Survey</u></b>								
Number of inpatient hospital nights <sup>a</sup>	1.510	4.492	-2.98*** (.691)	-66.39%	1.133	6.093	-4.960*** (1.207)	-81.41%
Number of nursing home nights <sup>a</sup>	15.143	37.762	-22.620*** (4.495)	-59.90%	11.752	48.463	-36.711*** (7.022)	-75.75%
Social Activities At Least Weekly <sup>b</sup>	.583	.399	.184*** (.033)	46.14%	.618	.331	.287*** (0.062)	86.85%
Life pretty/completely satisfying <sup>g</sup>	0.710	0.593	0.117*** (0.040)	19.64%	0.682	0.501	0.181*** (0.061)	36.11%

A similar pattern was observed for the satisfaction outcome measure. Among PACE enrollees, those with high limitations were only about 3 percentage points less likely to find their lives satisfying compared to those with low limitations, adjusting for the baseline value of satisfaction. Comparison group members with high limitations, however, were 7 to 9 percentage points less likely to report their lives satisfying relative to comparison group members with low limitations. These differences existed both six months and twelve months after the baseline survey.

Finally, PACE had a considerably stronger impact on the frequency of socialization among those with high limitations compared to those with low limitations. At month 6, in the low ADL sub-sample, PACE enrollees were 88 percent more likely than comparison group members to socialize at least weekly. Among those with high limitations, this difference was 141 percent. As is true of the other outcomes described in this section, the difference between the PACE effect in the two sub-samples is mainly driven by relatively large differences between low ADL and high ADL participants in the comparison group.

This analysis demonstrates that the impacts of PACE were largest among enrollees with greater functional limitations, who were presumably less independent and more in need of daily or periodic assistance than other PACE participants. The larger impacts observed among those with greater functional decline may be due to the regular contact that providers at each PACE site have with their participants. Because of this regular contact, providers can detect even small changes in the needs of participants, and modify the treatment plan as appropriate. This level of care may be instrumental in helping even more functionally impaired participants stay out of hospitals and nursing homes, and may contribute to higher satisfaction with life and better perceived health status.

## 14. Summary and Conclusions

The objective of this study was to measure the impacts of PACE on a wide variety of outcomes measures including support services utilization, medical services utilization, health status, quality of life, satisfaction with care, functional status and mortality. It was hypothesized that PACE's unique approach to providing integrated care for frail elders would lead to benefits such as lower services utilization, enhanced quality of life, and improved functional status. To test these hypotheses, a treatment/comparison study design was used, with the comparison group consisting of PACE applicants who ultimately had decided not to enroll. All models controlled for a variety of confounding factors, and used baseline measures of the outcomes as covariates to reduce the potential effects of selection bias.

In most cases, the impacts estimates confirmed the hypothesized effects. PACE was found to be associated with long-lasting decreases in nurse visits to the home, inpatient hospital admissions, inpatient hospital days, and nursing home days. The program also had a persistent, positive effect on ambulatory care visits and frequent attendance at social activities. PACE was associated with short-run improvements in quality of life, satisfaction with care, and functional status. Compared to PACE decliners, PACE enrollees lived longer and spent more days in the community.

To summarize, PACE was associated with the following statistically significant impacts:

### ***Formal support services***

- A higher probability of attending a day health center and more day health center days (months 6, 12, 18 and 24)
- A lower probability of receiving any nurse visits to home (months 6, 12, 18 and 24)

### ***Utilization of medical services***

- A lower probability of having a hospital admission (months 6, 12, and 18) and fewer inpatient hospital nights (months 6, 12, 18 and 24)
- A lower probability of having a nursing home admission (months 6, 12) and fewer nursing home nights (months 6, 12, and 18)
- A higher probability of receiving ambulatory care (month 6) and more ambulatory visits (months 6, 12, 18, and 24)

### ***Mortality***

- Increased probability of survival
- Increased number of days in the community (months 6,12, and 18)<sup>29</sup>

### ***Health status, quality of life, and satisfaction***

- A higher probability of being in good or excellent health (months 6, 18)
- A higher probability of expecting to be in good or excellent health one year from the survey date (month 6)
- A higher probability of finding life to be satisfying (months 6, 12)
- A higher probability of reporting at least some choice in how one spends his/her time (month 6)
- A higher probability of reporting at least some confidence in dealing with life's problems (month 6)
- A higher probability of attending social programs at least once per week (months 6, 12, 18, and 24)
- A higher probability of being very satisfied with overall care arrangements (months 6, 12)

### ***Functional Status***

- A lower probability of having a visual or hearing disability (month 6)
- A higher probability of using an assistive device (months 6,12)
- A lower level of ADL limitations (months 6, 24)
- A lower probability of having weekly bowel/bladder incontinence (month 6)

As the summary above suggests, the differences between PACE enrollees and PACE decliners in this study were quite striking. PACE appeared to provide benefits along a number of dimensions ranging from hospital utilization to satisfaction with life. Although some of these benefits were short-lived, it is perhaps more noteworthy that several important effects were still evident two years after the baseline

---

<sup>29</sup> Days in the community each follow-up period = 183-number of hospital days-number of nursing home days-number of days deceased

survey. In particular, PACE's impact on all forms of medical services utilization persisted at least into the second year of enrollment.

The results also indicate that PACE enrollees with the most severely limiting conditions had the most to gain from the program. Both 6 and 12 months after the baseline survey, PACE enrollees with more than two ADL limitations experienced the largest reductions in nursing home and in-patient hospital utilization. These enrollees also had the best gains in satisfaction with life and socialization. Apparently, the PACE approach is particularly suited to addressing the needs of the frailest members of the nursing home eligible population.

These findings are not entirely consistent with previous research conducted in this area. Although some of the results suggest that PACE is similar to the most effective HCBS programs, PACE had some significant (albeit short-lived) impacts on some of the measures of functional status. This is not consistent with research on HCBS programs, which found no similar impact on participants' functional status. Furthermore, these findings contradict evidence reported by Weissert and his colleagues that HCBS programs were better suited to meet the needs of relatively young and healthy elderly individuals. In this study, PACE was found to be most effective in improving the outcomes of the *most severely limited elders*.

The reader should keep in mind the following important caveats:

- PACE sites vary in the characteristics that define the PACE model. For example, staffing patterns vary, and some sites have implemented more flexible policies on attendance at ADHCs. Site-specific PACE effects could not be addressed because of sample size problems. Nevertheless, as described in Appendix C, the set of site dummy indicators appeared to explain only a small portion of the variation in key outcomes.
- The small sample size for the fourth follow-up interview limits our ability to estimate the impacts of PACE after two years of enrollment.
- Most importantly, even though the models presented in this report contained a broad array of measures of functional status, prior utilization, and self-reported health status, the study still lacks a true experimental design. Consequently, one cannot state with certainty that the estimated impacts of PACE capture the effects of PACE, per se, rather than reflect unmeasured differences between PACE enrollees and decliners. The analysis presented in Appendices A and B, however, suggest that the results presented in this report are quite robust to different estimation methods and different methods of accounting for mortality.

While limitations in the study design may have affected the results to some degree, the magnitude and consistency of the estimated PACE impacts strongly indicate that the PACE approach, with its emphasis on coordination of health services and provision of preventative care, has been successful in helping participants to avoid hospitalization and nursing home placement. At the same time, the comprehensive medical and social services provided by the PACE sites have evidently resulted in improved health status and quality of life for their participants. The report as a whole suggests that PACE's unique system of integrated care provides a wide range of long-lasting benefits for its frail, elderly participants.



## References

- Allison, PD. "Change Scores as Dependent Variables in Regression Analysis." *Sociological Methodology* 1990, 93-114.
- Burstein, NR, White, AJ, and Kidder, D.. Evaluation of the Program of All-Inclusive Care for the Elderly Demonstration: The Impact of PACE on Participant Outcomes. HCFA Contract #500-91-0027, October, 1996.
- Burstein, NR. Client Mortality, Institutionalization, and Utilization of Professional Outpatient Services. Cambridge, MA: Abt Associates Inc., 1987.
- Brown R, Bergeron J, Clement D, Hill J, and S Retchin. The Medicare Risk Program for HMOs--Final Summary Report on Findings from the Evaluation. Princeton, NJ: Mathematica Policy Research, Inc., 1993.
- Coulam RF, Zimmerman YA, Branch LG, and RJ Maher. Cross-Site Analysis of the PACE Demonstration: Calendar Year 1993. HCFA Contract #500-91-0027, March 17, 1995.
- Hughes, SL, Ulasevich, A, Weaver, FM, Henderson, W, Manheim, L, Kubal, JD, and Bonarigo, F. "Impact of Home Care on Hospital Days: A Meta Analysis." *Health Services Research*, October 1997, 415-432.
- Irvin, C, Massey, S, and Dorsey, T. "Determinants of Enrollment Among Applicants to the PACE Program." Report prepared for HCFA by Abt Associates Inc, October, February 1998.
- Manton K, Newcomer R, Vertrees J, Lowrimore G, and C Harrington. A Method for Adjusting Payments to Managed Care Plans Using Multivariate Patterns of Health and Functioning: The Experience of Social/Health Maintenance Organizations. *Medical Care* 32:3, 277-297, 1994.
- Newcomer R, Harrington C, Manton KG, and M Lynch. A Response to Representatives from the Social HMOs Regarding Program Evaluation. *Gerontologist* 35:3, 292-294, 1995.
- Newcomer R, Weinstock P, and C Harrington. *Comparison of the Consumer Satisfaction of Medicare Beneficiaries in Social HMO and Fee for Service*. Minneapolis, MN: Gerontological Society of America, 1989.
- On Lok, Inc. PACE: Who is Served and What Services are Used? *PACE: Progress Report on the Replication of the On Lok Model*. San Francisco, CA: On Lok, Inc., 1993.
- On Lok, Inc. PACE: Fact Book. San Francisco, CA: On Lok, Inc., 1996.
- Von Behren R. Adult day care: a decade of growth. *Perspective on Aging* 18:14, 1989.
- Weiner JM and J Skaggs. Current approaches to integrating acute and long-term care financing and services. Washington, DC: AARP Public Policy Institute. December 1995.
- Weissert, WG, Cready CM, and JE Pawelak. The past and future of home and community-based long-term care. *The Milbank Quarterly* 66:2, 209-388, 1988.

White, AJ. "The Effect of PACE on Costs to Medicare: A Comparison of Medicare Capitation Rates to Projected Costs in the Absence of PACE." Report prepared for HCFA by Abt Associates Inc., February 1998.

Zimmerman, YA, Pemberton, DA, Dorsey, TC, Massey S and Coulam RF. "Evaluation of the Program of All-Inclusive Care for the Elderly (PACE) Demonstration." Annual Site Visit Report: Calendar Year 1995. Abt Associates Inc., Cambridge, MA, 1997.

## Appendix A: Reasons for Attrition

There were 1308 PACE applicants with baseline survey information and master file information available. Sample sizes for the four time periods studied were: (1) N = 1098, six months after baseline; (2) N = 783, 12 months after baseline; (3) N = 529, 18 months after baseline; and (4) N = 296, 24 months after baseline. Exhibit 18 below displays the reason why no client or proxy survey was available. All of the columns sum to 1308. Because PACE enrollees entered the program at different times, some of the enrollees could not complete 12, 18 and/or 24 month surveys because the survey period ended soon after they enrolled. Many of the enrollees in the “missing status” category were affected by the completion of the survey process.

---

### Exhibit 18

#### Reasons for Attrition

	6 months	12 months	18 months	24 months
Breakoff	3	0	1	1
Refusal	65	65	41	22
Died Without a Close-Out Survey	18	9	6	4
Language Barrier	2	0	2	0
Cannot Locate	30	35	42	18
Located, No Contact	24	29	17	13
Failed Q2 Screen	9	3	3	3
Client Impaired	19	29	21	18
Client Aphasic	1	0	1	0
Client Ill	2	1	0	1
Window Closed	15	13	1	3
Case Never Sent to Field	17	15	1	0
Missing Status	5	326	642	929
Other	0	0	1	0
Total Without Survey for this Month	205	525	779	1012
Total With Survey for this Month	1098	783	529	296
Total	1308	1308	1308	1308

## **Appendix B: Alternative Estimation Method**

The analyses presented above were based on a model that included as a covariate the baseline measure of the dependent variable. This technique, sometimes called the regressor variable method, was used in this study to control for prior differences between PACE enrollees and comparison group members that may be correlated with participation in PACE and the outcomes of interest. For example, it is possible that elders with an underlying, fixed characteristic such as “positive attitude” were more likely to enroll in PACE compared to elders with “negative attitudes.” Because an elder’s positive attitude potentially may have had a beneficial impact on many of the outcomes of interest (particularly self-reported quality of life), the PACE effect could be over-stated if baseline differences in attitude are ignored.

In the absence of random assignment, one can never be certain that the analysis has completely controlled for unobserved differences between the treatment and comparison groups. The regressor variable method uses the baseline measure of the outcome of interest as a proxy for these unobserved differences to minimize unobserved heterogeneity. An alternative approach would be to use as a dependent variable the difference between the current outcome and its value at baseline. Essentially, the dependent variable in this model would be the change in the outcome over time and the independent variables would be the changes in any time-varying covariates. In this analysis, all of the covariates were fixed over time with the exception of the treatment dummy variable.

This alternative approach is commonly referred to as a fixed effect model or a change score model. Under some conditions [see Allison (1990)], this method is clearly preferable to the regressor variable method, but in many cases the choice between the two models depends on features of the underlying process that are not known to the researcher. Exhibit 19 below presents PACE impacts for several key outcomes estimated using both methods.

---

**Exhibit 19****Comparison of 6 month PACE impacts estimated using the regressor variable method and the change score method**

---

	Regressor Variable Method	Change Score Method
any hospital days	-.204*** (.033)	-.122** (.059)
number of hospital days	-4.25*** (.902)	1.24 (2.11)
number nursing home days	-16.13*** (2.49)	-8.42*** (2.76)
number ambulatory visits	7.31*** (1.25)	8.24*** (1.55)
self-reported health is good or better	.068* (.035)	.158*** (.056)
self-reported future health status is good to excellent	.076** (.036)	-.058 (.154)
at least some choice in activities	.148*** (.034)	.115** (.054)
satisfied with way spending time	.171*** (.032)	.164*** (.054)
satisfied with care arrangements	.124*** (.031)	.142** (.060)
confident about problem solving	.098*** (.036)	.054 (.050)
socialize at least weekly	.290*** (.034)	.134** (.053)

---

*Source: Abt Associates Survey of PACE Applicants, HCFA*

---

Generally, the change score method yields PACE impact estimates that are smaller in magnitude and less precise than the regressor variable method estimates. Even so, the qualitative interpretation of the results does not change in most cases; PACE still has a strong, statistically significant impact on a variety of client outcomes. The sign and the statistical significance of most estimates do not change when the change score method is applied. The similarity of the estimates produced using the two different models suggests that the results are fairly robust.

## **Appendix C: Mortality Sensitivity Analysis**

Another way to test the robustness of the PACE impact estimates is to remove from the analysis any PACE enrollee or comparison group member who died within three months of the home visit (N = 23) . This method reduces the possibility that the frailest elders decided not to enroll in PACE, causing relatively healthy elders to be over-represented in the treatment group. Exhibit 20 below presents the previous results as well as results generated from a sample that excluded elders who died within three months of the home visit. This exercise was repeated with a sample that excluded all participants who died during the study. The impact estimates were very similar to the results displayed below.

---

**Exhibit 20****Comparison of 6 month PACE impacts estimated with and without elders who died within three months of the home visit**

---

	Sample includes those who died within three months	Sample excludes those who died within three months
any hospital days	-.204*** (.033)	-.183*** (.034)
number of hospital days	-4.25*** (.902)	-4.10*** (.920)
number nursing home days	-16.13*** (2.49)	-16.77*** (2.54)
number ambulatory visits	7.31*** (1.25)	7.32*** (1.27)
self-reported health is good to excellent	.068* (.035)	.053 (.036)
self-reported future health status is good to excellent	.076** (.036)	.076** (.036)
at least some choice in activities	.148*** (.034)	.131*** (.035)
satisfied with way spending time	.171*** (.032)	.157*** (.032)
satisfied with care arrangements	.124*** (.031)	.108*** (.031)
confident about problem solving	.098*** (.036)	.079** (.036)
socialize at least weekly	.290*** (.034)	.279*** (.034)

---

Note: These estimates were generated using the regressor variable method that was used throughout the main text.

Source: *Abt Associates Survey of PACE Applicants, HCFA*

---

The estimated PACE impacts are not sensitive to the exclusion of the frailest elders, who may be under-represented in the treatment group. For almost every outcome, the sign and statistical significance of the impact estimate remained the same, and the magnitude changed only slightly.

The results presented above further reinforce the preceding analysis which suggested that the estimated PACE impacts are robust. Moreover, the findings suggest that the possible non-random attrition due to mortality did not have an important influence on the estimates presented in the main body of the report.



## Appendix D: Site Specific PACE Impacts

Throughout the report, the impact of PACE has been treated as an effect that is generated by methods and goals of providing care that are common to all sites. Consequently, a single PACE impact was estimated for every outcome. In reality, each PACE site was somewhat unique in its approach to providing care. It is likely, then, that the impact of PACE varied across sites.

The number of treatment and comparison group members with complete information for the baseline and first follow-up surveys is displayed below in Exhibit 21. In some sites, such as San Francisco, Oakland, Rochester, and Sacramento, there are fewer than ten comparison group members. Because the number of participants with survey information was very small at some sites, site-specific treatment effects could not be incorporated in the impact models.

---

### Exhibit 21 PACE enrollees and Comparison Group Members by Site

---

site	number of PACE enrollees with baseline and first follow-up information	number of comparison group members with baseline and first follow-up information
San Francisco	3	21
East Boston	65	24
Portland	38	15
Columbia	253	73
Milwaukee	98	62
Denver	45	36
Bronx	34	12
Rochester	16	8
Sacramento	35	8
El Paso	155	60
Oakland	30	7

---

Source: Abt Associates Survey of PACE Applicants, HCFA

Exhibit 22 displays analysis of variance tables for several key outcomes in the first follow-up survey. These models include *only the 10 site specific dummy variables* as independent variables.

**Exhibit 22**  
**ANOVA Tables**

Source	DF	Sum of Squares	Mean Square	F Value	Pr >F	R-sqrd.
<i>Number of Hospital Days</i>						
Model	10	1857.220	185.722	1.17	.3104	.011
Error	1056	168,304.019	159.379			
Corrected Total	1066	170,161.239				
<i>Number of Nursing Home Days</i>						
Model	10	26,042.027	2604.203	2.00	.031	.018
Error	1064	1,387,239.093	1303.796			
Corrected Total	1074	1,413,281.120				
<i>Number of Nurse Visits to Home</i>						
Model	10	22,372.176	2237.218	6.31	.0001	.062
Error	959	339,902.221	354.434			
Corrected Total	969	362,274.396				
<i>Number of Ambulatory Visits</i>						
Model	10	16,035.946	1603.594	7.57	.0001	.102
Error	670	141,927.455	211.832			
Corrected Total	680	157,963.401				

Source: Abt Associates Survey of PACE Applicants, HCFA

The ANOVA tables suggest the site dummy indicators do not explain much of the variation in the number of hospital days or in the number of nursing home days. As a group, the site dummy indicators explain 6 percent of the variation in nurse visits to the home and ten percent of the variation in the number of ambulatory visits. For hospital days and nursing home days, however, the proportion of variation explained by the site indicators is much smaller.

## Appendix E: Estimation of 6 and 12 Month Impacts Using Respondents from Three Sites with Highest Response Rates

Because the response rates varied widely by site, and because only respondents who responded to the survey could be included in the analysis, the 6 and 12 month impacts analysis was repeated on a sub-sample of respondents from the three sites with the largest response rates. As seen below for selected outcomes, these results are very similar to those estimated using the whole sample. The sub-sample analysis was not conducted for the 18 and 24 month surveys because of insufficient sample size.

---

### Exhibit 23

#### Comparison of 6 month PACE impacts estimated with the full sample and with a sub-sample of respondents from El Paso, Columbia, and Milwaukee

---

	Sample includes respondents from El Paso, Columbia, and Milwaukee only	Full Analysis Sample
any hospital days	-.273*** (.044)	-.204*** (.034)
number of hospital days	-6.32*** (.999)	-4.25*** (.902)
number nursing home days	-14.30*** (3.09)	-16.14** (2.49)
number ambulatory visits	3.12** (1.37)	7.31*** (1.25)
self-reported health is good to excellent	.053 (.044)	.068 (.035)
self-reported future health status is good to excellent	.027 (.045)	.076** (.036)
at least some choice in activities	.196*** (.044)	.148*** (.034)
satisfied with way spending time	.199*** (.040)	.171*** (.032)
satisfied with care arrangements	.157*** (.039)	.124*** (.031)
confident about problem solving	.099** (.043)	.098** (.036)

---

**Exhibit 24****Comparison of 12 month PACE impacts estimated with the full sample and with a sub-sample of respondents from El Paso, Columbia, and Milwaukee**

---

	Sample includes respondents from El Paso, Columbia, and Milwaukee only	Full Analysis Sample
any hospital days	-.125** (.054)	-.136*** (.042)
number of hospital days	-3.26*** (.839)	-2.97*** (.676)
number nursing home days	-23.66*** (5.72)	-23.00*** (4.60)
number ambulatory visits	1.27 (1.33)	4.41*** (1.41)
self-reported health is good to excellent	.014 (.054)	.032 (.044)
self-reported future health status is good to excellent	-.049 (.056)	-.021** (.046)
at least some choice in activities	.120** (.051)	.075 (.134)
satisfied with way spending time	.172*** (.050)	.101** (.041)
satisfied with care arrangements	.327*** (.048)	.078** (.039)
confident about problem solving	.072 (.050)	.042 (.041)