
Stability of Disability Among PACE Enrollees: Financial and Programmatic Implications

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This article examines the experience of the first 11 Program of All-inclusive Care for the Elderly (PACE) programs. It investigates changes in functional status of participants in relation to length of enrollment in the program and individual risk characteristics. Our findings indicate that mature programs experience stable disability mix over time, supporting the rationale for the current PACE payment method. However, significant differences exist between programs, suggesting that payment rates could be more program specific. Analysis of the effect of patient characteristics at admission on the likelihood of improvement in functional status identified areas for quality improvement. The implications of this study have increasing importance in light of the expected expansion of PACE to approximately 100 sites by the year 2000.

INTRODUCTION

Interest in managed long-term care (LTC) programs for older, frail persons is increasing. Such programs often base their operational protocols and ratesetting methodologies on the assumption that disability is a permanent condition among their enrollees. This means that the monthly premium paid to the program

does not increase as an enrollee's level of disability increases, thus providing incentives to prevent further disability. It also does not decrease as disability declines, thus avoiding disincentives to improve enrollees' conditions. Recent empirical evidence, however, raises concerns about the appropriateness of this assumption. During the last decade a number of studies have found that a substantial amount of improvement in functional status occurs within several months of the onset of disability. The proportion of individuals who continue to suffer from functional limitations over long periods of time is well below 50 percent. (Branch and Ku, 1989; Greenlick et al., 1988; Lewis et al., 1985; Manton, 1988; Rogers, Rogers, and Belanger, 1989; Hallfors et al., 1994; Gruenberg and Kaganova, 1997). These studies suggest that, in a large number of cases, functional dependence is reversible even at high levels of disability. Indirectly, they cast doubt on the cost effectiveness of capitated, managed care programs for the elderly that do not require health status reassessments and subsequent rate readjustments (Hallfors et al., 1994). Accordingly, such programs would be expected to experience financial gains as participants' conditions improve and the cost of caring for them declines.

Most recently, PACE, a national demonstration capitated program, has been singled out for such criticism because its Medicare and Medicaid rate structures assume that disability is a permanent condition (Wiener and Skaggs, 1995). PACE uses a health status-based modification to

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the Medicare health maintenance organization (HMO) rate, the adjusted average per capita cost (AAPCC), creating a higher Medicare payment for its participants, all of whom are nursing home certifiable, and therefore expected to have higher expenditures than other Medicare enrollees. The modification to the AAPCC, however, is the same for all PACE participants regardless of their functional status, across all PACE sites, and is not updated over time. Similarly, the Medicaid rate, which is negotiated between each State and its PACE programs, does not allow for periodic updating of the rate to reflect changes in disability. This payment structure has raised speculations that PACE expansion might result in sites selecting their case mix so as to enroll persons who, while nursing home certifiable, are expected to have lower than the average costs. Furthermore, because both Medicaid and Medicare payment protocols are not updated for changes in their members' health status over time, they do not take into account the potential reversal of disability among new enrollees, and may potentially overstate or understate the costs of the program.

The purpose of this article is to investigate the stability of disability among PACE enrollees, across sites and over time, and to examine the financial implications. Furthermore, we evaluate the ability of personal and antecedent characteristics to influence changes in physical functioning of this population. Identification at admission of subpopulations at higher risk for functional deterioration would allow the programs to develop targeted interventions, with potential for improving quality of care and health outcomes. These issues are of particular importance at this time, because the Balanced Budget Act of 1997 calls for a rapid expansion of PACE programs throughout the country.

BACKGROUND

PACE is a demonstration project of HCFA modeled after the On Lok program in San Francisco. On Lok began to serve dually-eligible older, disabled persons in 1973. It has been capitated for Medicare and Medicaid since 1983.

Since 1990, the PACE program has been replicated in other sites. All PACE sites provide a full continuum of preventive, primary, acute, and LTC services to nursing home-eligible, older (age 55 or over) persons who choose to remain in the community. At the heart of the program is the adult day health center, where medical and social services are provided for the participants. Care is provided by a multidisciplinary team that includes clinical and social services, professionals as well as paraprofessionals. Each site operates under full financial risk and under fixed Medicaid and Medicare capitation rates. The private pay rate for individuals not eligible for Medicaid equals the Medicaid rate. The Medicaid rate is determined by each State and is based on an estimate of how much Medicaid would pay for PACE participants in alternative care settings. Medicare's rate is based on the AAPCC, which is the Medicare capitation payment to managed care organizations, multiplied by an adjustment factor of 2.39. The adjustment factor is in recognition of the higher than average cost of treating the frail, elderly participants, but it does not reflect potential case mix differences across PACE sites. PACE enrollees resemble participants of other LTC programs for the frail, nursing home certifiable elderly, either institutional or community based. A typical enrollee is an 80-year-old Medicaid-eligible widow who is almost equally likely to live at home alone as she is with others. She experiences multiple limitations in activities of daily living (ADLs) (Katz et al., 1963)—most likely

in bathing, dressing, and grooming as well as in most instrumental activities of daily living (IADLs) (Pfeiffer, Johnson, and Chiofolo, 1981). She is likely to experience vision and/or hearing impairments, incontinence, and more likely than not, is suffering some degree of cognitive impairment (Clark et al., 1996).

A recent report by HCFA and Abt Associates (1996) examined the effect of PACE on health services use and on several outcome measures. It concluded that relative to a comparison group, PACE reduces nursing home and hospital utilization, and is associated with improved health status, quality of life and satisfaction, for both participants and caregivers. The study, however, did not find any measurable improvements in physical functioning. Similarly, Gruenberg, Rumshiskaya, and Kaganova (1993), in an analysis based on the Medicare Current Beneficiary Survey, found that among PACE participants, unlike the general elderly population, disability may indeed be permanent.

Currently, there are 12 fully capitated PACE sites (including On Lok). Fourteen more sites are operating under Medicaid capitation only, and many more sites are exploring the possibility of developing PACE programs. The Balanced Budget Act of 1997, recently passed by Congress and signed by the President, moves the PACE model into the mainstream by changing the status of PACE programs from demonstrations to permanent providers. It permits the opening of 40 PACE programs in the coming year and 20 new programs each year thereafter. It also offers the opportunity to 10 for-profit organizations to become PACE providers as a demonstration, which would allow HCFA to compare their performance with that of non-profit PACE programs. The impending expansion of PACE programs heightens

the importance of resolving the concerns about the appropriateness of the assumption of constant disability and its impact on the cost of the programs to the public payers.

DATA AND METHODS

Data

The population included in this study involved all of the participants enrolled in the first 11 PACE sites, all of which were fully capitated by mid 1992. For each program, the data covered the time period from that program's inception through the end of 1994. The study population included 2,291 individuals. Table 1 shows the number of enrollees in each program.

The PACE data are collected under HCFA Contract Number 500-95-0035. It represents a comprehensive, administrative data base, which includes demographic, socioeconomic, health status and disability, and medical history on a person-specific, longitudinal basis. The information contained in this data base is based on self-reports (e.g., utilization of hospital and/or nursing home in the 12 months prior to enrollment), intake (e.g., enrollment, disenrollment and reasons for, and other demographics), continuous clinical assessments by program nurses (e.g., ability to perform ADLs, IADLs, medical conditions), and encounter data (e.g., utilization of day centers, drugs, doctor visits, nursing visits, hospital and nursing home stay).

The following principles underlie PACE data collection:

- There is a consistent set of variables collected by all sites.
- There are consistent guidelines for recording data across all sites.
- All training and retraining is done or directed by On Lok, Inc. staff.

Table 1
Descriptive Statistics, by Program

Program	Program Start Date (Beginning of Capitation)	Number of Enrollees	Average Age	Percent Female	Percent White	Average ADLs	Average IADLs	Percent With Dementia
All Plans	—	2,291	77.9	70.0	44.7	3.9	5.6	39.9
Bronx, New York	2/1/92	255	76.1	75.3	45.9	3.9	5.0	6.7
East Boston, Massachusetts	6/1/90	206	79.4	78.6	94.2	2.6	5.6	19.9
Portland, Oregon	6/1/90	254	78.1	72.0	85.8	4.0	5.7	47.6
Columbia, South Carolina	10/1/90	281	76.9	75.4	12.8	4.8	5.9	64.0
Milwaukee, Wisconsin	11/1/90	162	77.7	71.0	46.9	3.9	5.8	38.9
El Paso, Texas	2/1/92	209	76.7	65.6	3.3	4.2	5.1	39.2
Denver, Colorado	10/1/91	161	79.9	73.9	48.4	4.1	5.8	73.9
On Lok, California	11/1/83	363	80.0	65.0	12.1	3.7	5.8	38.8
Rochester, New York	5/1/92	226	77.8	67.3	88.5	3.8	5.8	48.2
Oakland, California	7/1/92	97	73.1	67.0	5.1	3.8	5.8	32.9
Sacramento, California	8/1/92	77	79.0	64.9	62.3	4.6	5.9	11.7

NOTES: ADLs is activities of daily living. IADLs is instrumental activities of daily living.
SOURCE: PACE data and authors' calculations, 1990-1994.

- Sites and HCFA are notified about the quality of the data and receive assistance in solving problems.
- Changes in the data set must be incorporated by all sites.

To increase data accuracy and inter-rater reliability, PACE has instituted a rigorous data collection process. Following training of all new nursing staff, nursing reliability assessments are done every 6 months. Each nurse views a video tape of an assessment being conducted with three actual participants, and scores their health status. The results are reviewed at On Lok, Inc. and compared against guidelines which have been developed for this specific purpose. Once a nurse scores correctly in 90 percent or more items, the reliability assessments are done annually. In cases where a nurse scores below 85 percent, more onsite training is required. All clinical reassessments start with a blank slate and all items, not just changes, are recorded.

For this study, dependency in ADLs was defined based on the nurses' assessment of a need for help with one or more of the following personal care tasks: bathing, dressing, feeding, grooming, toileting, walking, and transfer. PACE sites assess enrollees on a quarterly basis while the program is in development. Once a site is fully capitated and the interdisciplinary team has matured, the site has an option of extending the period between assessments up to 6 months. All the sites included in this study opted to continue with quarterly assessment.

PACE intake, or enrollment procedure, is intensive and usually begins with a phone call, then one or more home visits, and one or more visits to the PACE center. A call from a family member or friend is the principal referral source to PACE (25 percent), followed by referrals from social services and home health agencies (16 percent and

12 percent respectively), hospitals (10 percent), health care professionals (10 percent), and others. Approximately 25 percent of persons who, or on behalf of whom, the initial inquiry is made, and who are found eligible, ultimately enroll in PACE. This proportion has remained fairly constant for all PACE sites. Some of the principal reasons, made by the applicants themselves, for not enrolling are: does not wish to change providers, does not wish to attend the PACE center, program is too expensive (for those not yet eligible for Medicaid), etc. There are also reasons that a program may not enroll a participant, the most common being that an applicant is not nursing home certifiable or may only require rehabilitative care and is expected not to be a LTC candidate. The opposite may also be true, i.e., a person may be too frail to benefit from the program and may be better served in an institutional care setting (Clark et al., 1996). The final decision as to whether an applicant to PACE is appropriate is made by the multidisciplinary team at each site.

Analysis

The focus of this study was the change in functional status in terms of ADL dependencies, in relation to the duration of enrollment in the program. We, therefore, defined a variable indicating the state of each individual at 4 points in time: 3, 6, 12, and 18 months following admission. At the end of each time period, individuals were classified into one of five mutually exclusive states: death, disenrollment from the program, no change in functional status as measured by the number of ADL limitations, improvement or deterioration in functional status. We included disenrollment as a competing outcome because initial analyses suggested that individuals who disenrolled tended to be younger and

less debilitated at admission compared with the PACE population in general. These are likely to be individuals for whom the PACE program was not appropriate.

Since there was variability in the dates at which assessments were made, both across plans and within plans, we defined each time interval to include all assessments performed within 2 months of the specified time window. For example, assessments at 1 year included all assessments performed within 11 to 13 months after admission.

We performed two types of analyses. The first assessed the stability of disability. The second investigated the effect of specific enrollee risk factors, present at admission, on the individual probability of change in functional status.

The stability of disability was evaluated both at the plan level and at the individual level, since neither one implies the other. For example, individuals may experience changes in functional status over time. However, because individuals both enter and leave the program, the average disability for the plan as a whole may be stable. Similarly, even if individuals' functional status does not change over time, fluctuations in the disability mix of discharge and admission cohorts could lead to fluctuations in the average disability level of the plan.

To evaluate the stability of disability at the plan level, we calculated the quarterly average ADL count for each plan. This average was weighted by the length of enrollment of each individual in the program, using straight line interpolation of ADL counts for periods between successive assessments.

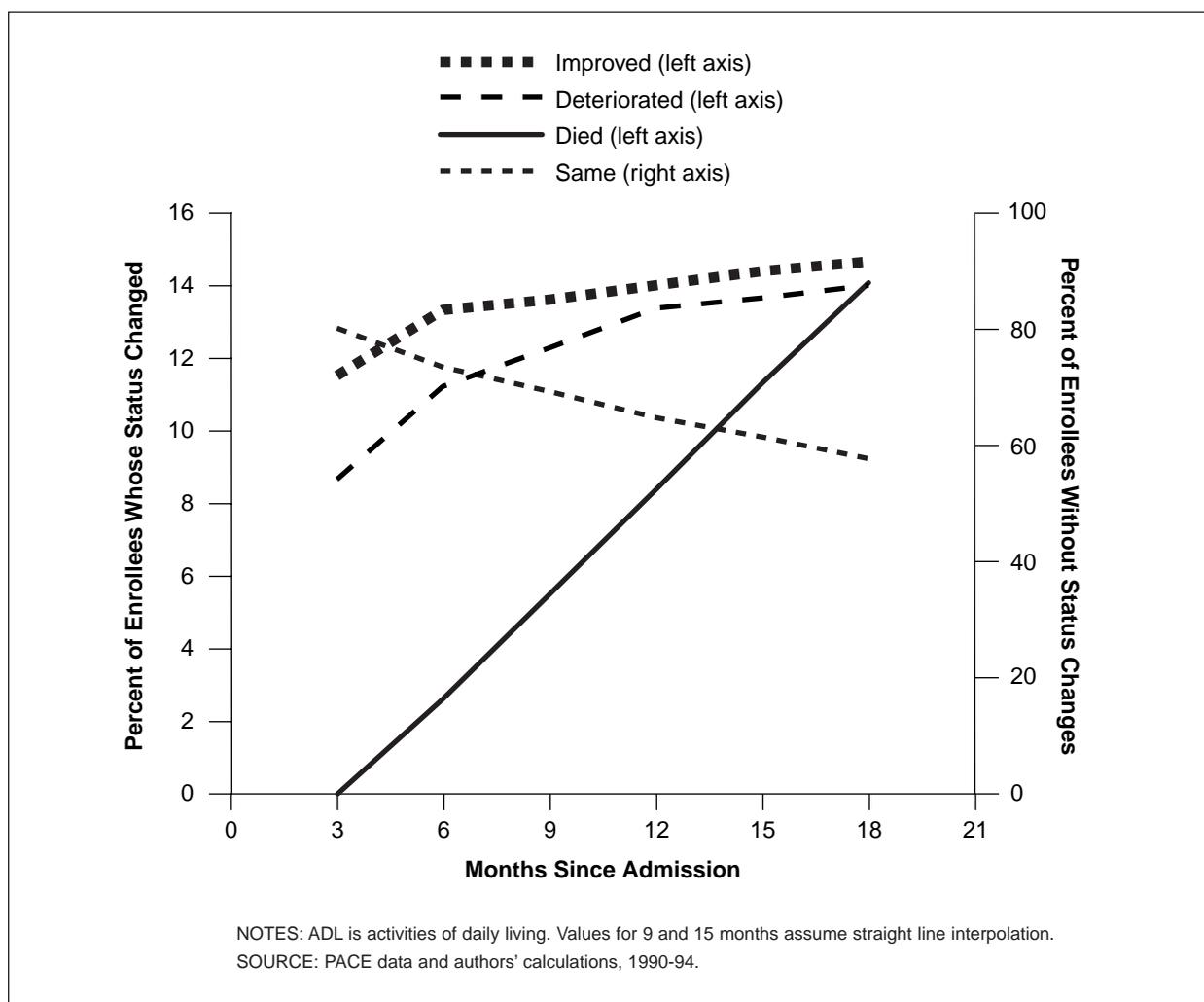
The stability of disability for individuals was evaluated through an analysis of changes in functional status and survival since admission. We calculated the probability of change in functional status as the

ratio of the number of individuals in a given state to all individuals in the admission cohort. These probabilities were calculated at the end of 3, 6, 12, and 18 months, and represent the cumulative probability at each point in time. They can also be interpreted as the percent of enrollees expected to be at a given state by the end of each period. For example, by the end of 3 months, we found that 11.6 percent of enrollees can be expected to have improved. By the end of 6 months, this increases to 13.3 percent (Figure 1). We also calculated the rate of change in functional status, as the average percent change per month (Figure 2).

To identify factors predicting change in enrollees' functional status, we modeled the probability of the five possible states as a function of all risk factors present at admission. Risk factors are listed in the Technical Note. We modeled separately changes for each of the time horizons. The analysis was done in two steps. We first estimated logistic models and tested for the assumption of no differences in slopes between states. Since this assumption was rejected in all cases, we estimated multinomial models that allow the impact of each risk factor to differ across states. Due to sample size limitations, we included in the multinomial models only independent variables which were significant at the 75 percent level (*p* values of 0.25 and below) in the logistic models.

To evaluate the incremental effect of each of the significant risk factors, we calculated the predicted probability of each state for an average enrollee. The predicted probabilities were based on the multinomial models we estimated. We calculated the predicted probabilities, once assuming that the enrollee had the risk factor, and then again assuming they did not. The incremental effect of the risk factor was then calculated as the difference in probabilities.

Figure 1
Change in ADL Status Since Admission



For example, to calculate the effect of health status on probability of death at the end of 18 months, we calculated the predicted probability from the model estimated for this time period, assuming all risk factors have the average value for our sample, except for the health status variable. This variable was included once with a value of 1, indicating good or excellent health, and once with a value of 0, indicating fair or poor health. The difference in predicted probabilities between these two calculations is the incremental effect of health status.

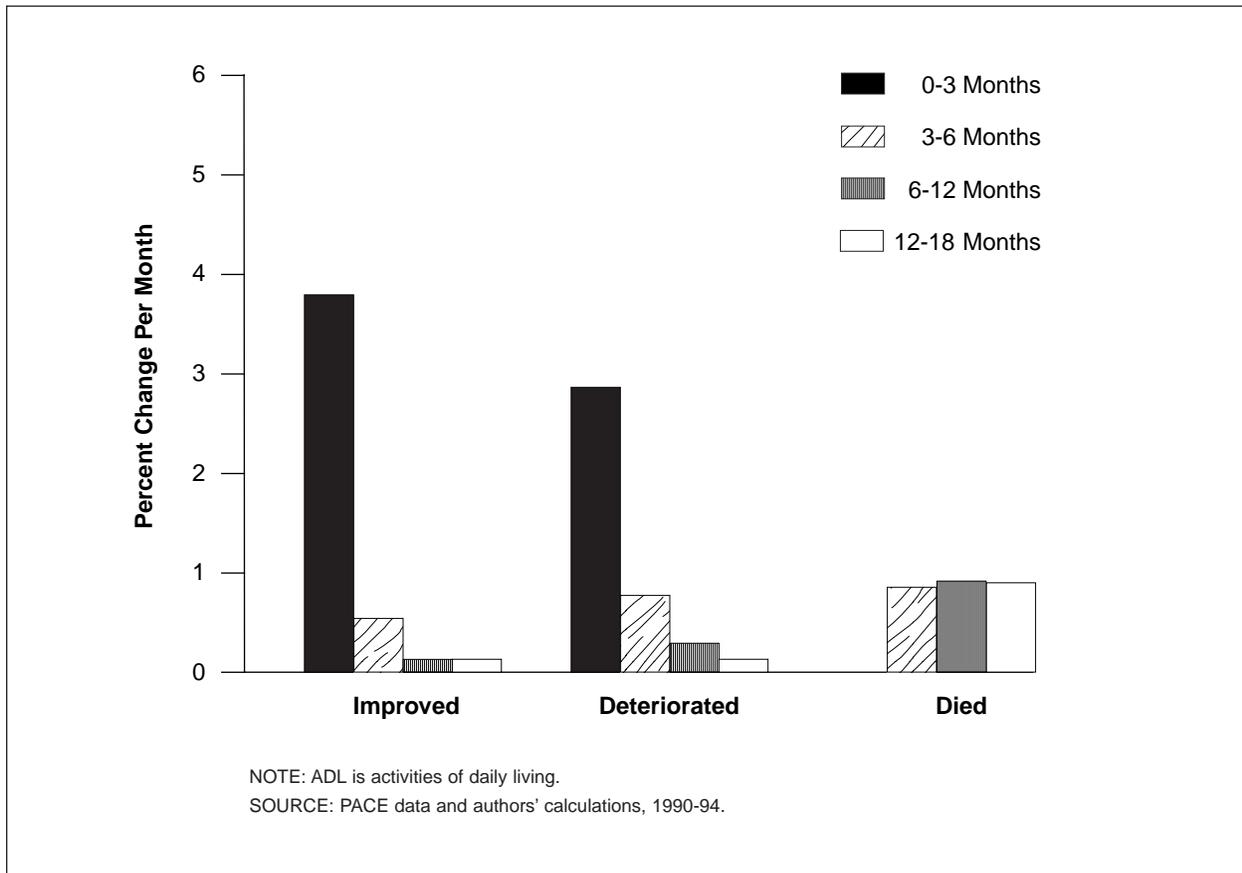
Comparisons of predicted probabilities for the average enrollee to observed aver-

age probabilities showed very good correspondence for probabilities of death, disenrollment, and improvement. The models, however, seemed to underestimate the probability of deterioration and to overestimate the probability of no change. We, therefore, chose to combine these two states into one, labeled no improvement.

RESULTS

Table 1 provides descriptive statistics about each site at the end of 1994, and the enrollees included in the analysis. On average, PACE enrollees were dependent in 3.9 out of the 7 ADLs recorded. There

Figure 2
Rate of Change in ADL Status



was substantial variability between plans in ADL dependency, ranging from 2.6 in East Boston to 4.8 in Columbia. Similarly, the distribution of patients with a diagnosis of dementia ranged from 6.7 percent of the Bronx's participants to 73.9 percent of those in the Denver program. Racial composition also varied significantly, ranging from 3.9 percent to 94.2 percent white persons, reflecting the diverse locations and populations served by each site. There was much less diversity across programs in terms of age, sex composition, and IADL dependencies. The average age of PACE participants was 77.9, 70 percent were female, and the average IADL score was 5.6.

Stability of Disability of Individuals

Figure 1 shows the changes in ADL status experienced by PACE participants at the end of each period since admission, i.e., the cumulative probability of changes. The percent of enrollees who died, improved or deteriorated are depicted against the scale to the left of the graph (percent of enrollees whose status changed). The percent of participants with no change in functional status is graphed to a different scale, depicted to the right of the graph. The most likely outcome for PACE enrollees was no change in functional status. Over 50 percent of enrollees remained at the same disability level a year

and one-half after admission to the program. About 25 percent of the population either improved or deteriorated during the same period. At all times, the percent of enrollees who improved was slightly higher than the percent who deteriorated. While no one in our sample died by the end of 3 months, by the end of 18 months about 13 percent had, a percent equal to the percent of enrollees who improved or deteriorated at that time.

During the first 3 months after enrollment, enrollees had a high probability of improving, at about 4 percent per month, and a somewhat lower probability of deteriorating, at about 3 percent per month (Figure 2). The rate of change in subsequent periods was much lower, at less than 1 percent per month for either improvement or deterioration, and it continued to decline as time from admission increased. The rate of death, on the other hand, increased after 3 months and seemed to be constant at about 1 percent, thus exceeding the rate of either improvement or deterioration.

Stability of Disability-Case Mix of Plans

Figure 3 shows the average quarterly ADL dependencies for the five programs that can be considered to have been mature at the end of 1994. These are On Lok, Portland, Boston, Columbia, and Milwaukee. The data shown begin with the first quarter of 1992, at which time all were operating for at least 1 year. On Lok has been in operation since 1983 while the other sites began during the second half of 1990. The variation in the average ADL dependencies within each program was much smaller than the variation across sites. The coefficient of variation within programs averaged about 3 percent compared with 15 percent across the programs. The large variation across sites

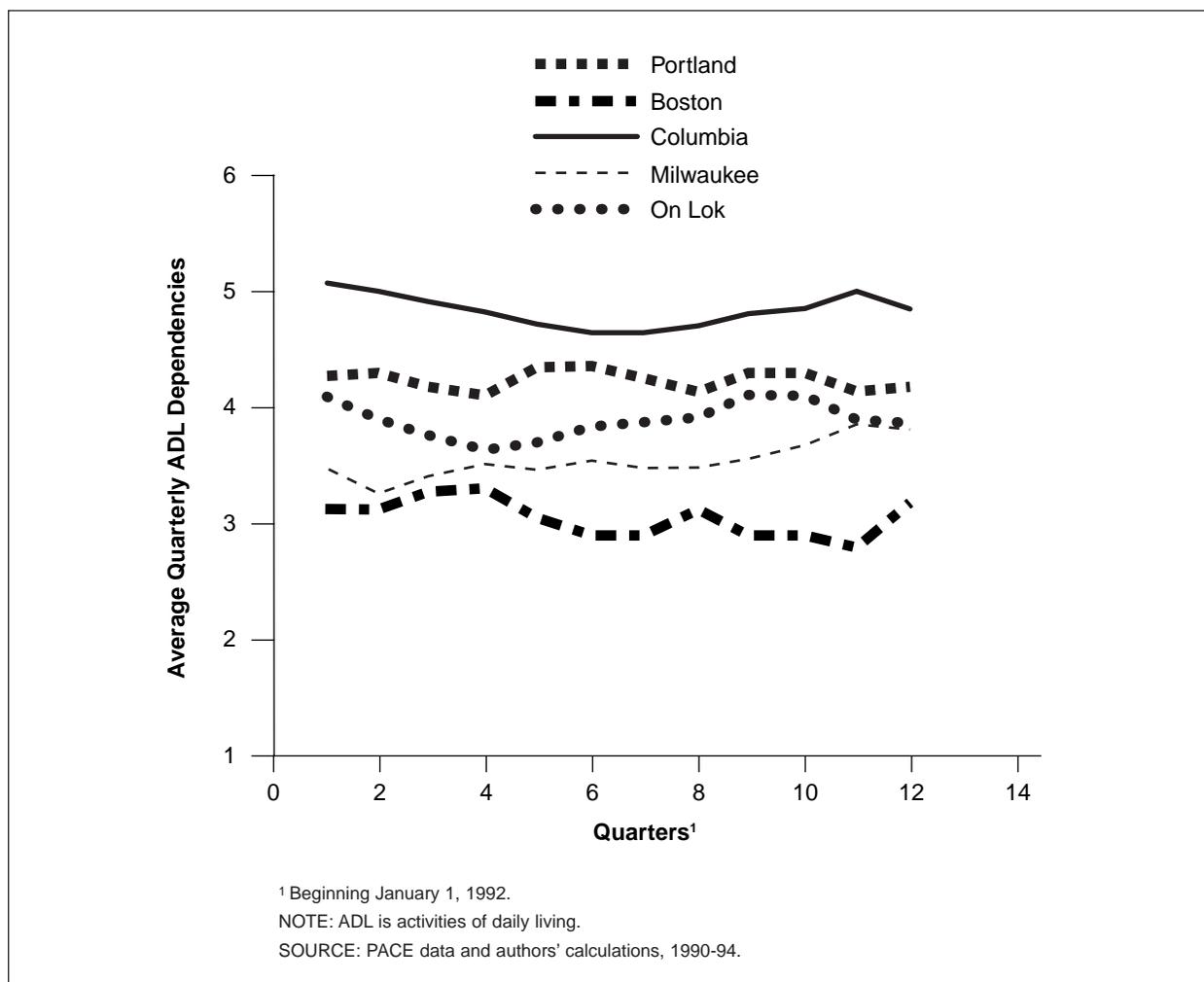
may reflect differences in State regulations determining which individuals are or are not nursing home certifiable. Similar analysis for newer programs showed much more variation in average ADL dependencies within each program (Figure 4). This variation may reflect changes in admission practices as the programs evolved, or changes in functional status of new participants, who dominate the enrolled population during the period immediately following the program start.

Effect of Individual Risk Factors on Changes in Disability Level

We examined the effect of individual risk factors on the probability of change in enrollee status at 3, 6, 12, and 18 months post admission to the program. Only a small number of variables were found to be important predictors of changes in disability. In most cases, the same variables were significant for all time horizons. Variables that were tested and did not have a statistically significant effect on changes are listed in the Technical Note. The variables that were significant predictors included self-assessed health status, living alone, having dementia, urinary incontinence, ADLs at enrollment, and being enrolled in the original On Lok program rather than at another PACE site.

Tables 2 and 3 present the incremental effect of the significant risk factors for the average PACE enrollee at 6 and 18 months post admission. The first reflects short-term changes in functional status and the second, longer term changes. The tables show the predicted probability for each state with and without the risk factor, as well as the difference in probability due to that factor. The tables also indicate which risk factors were statistically significant in predicting an outcome different from improvement.

Figure 3
Average Quarterly ADL Dependencies Mature Programs

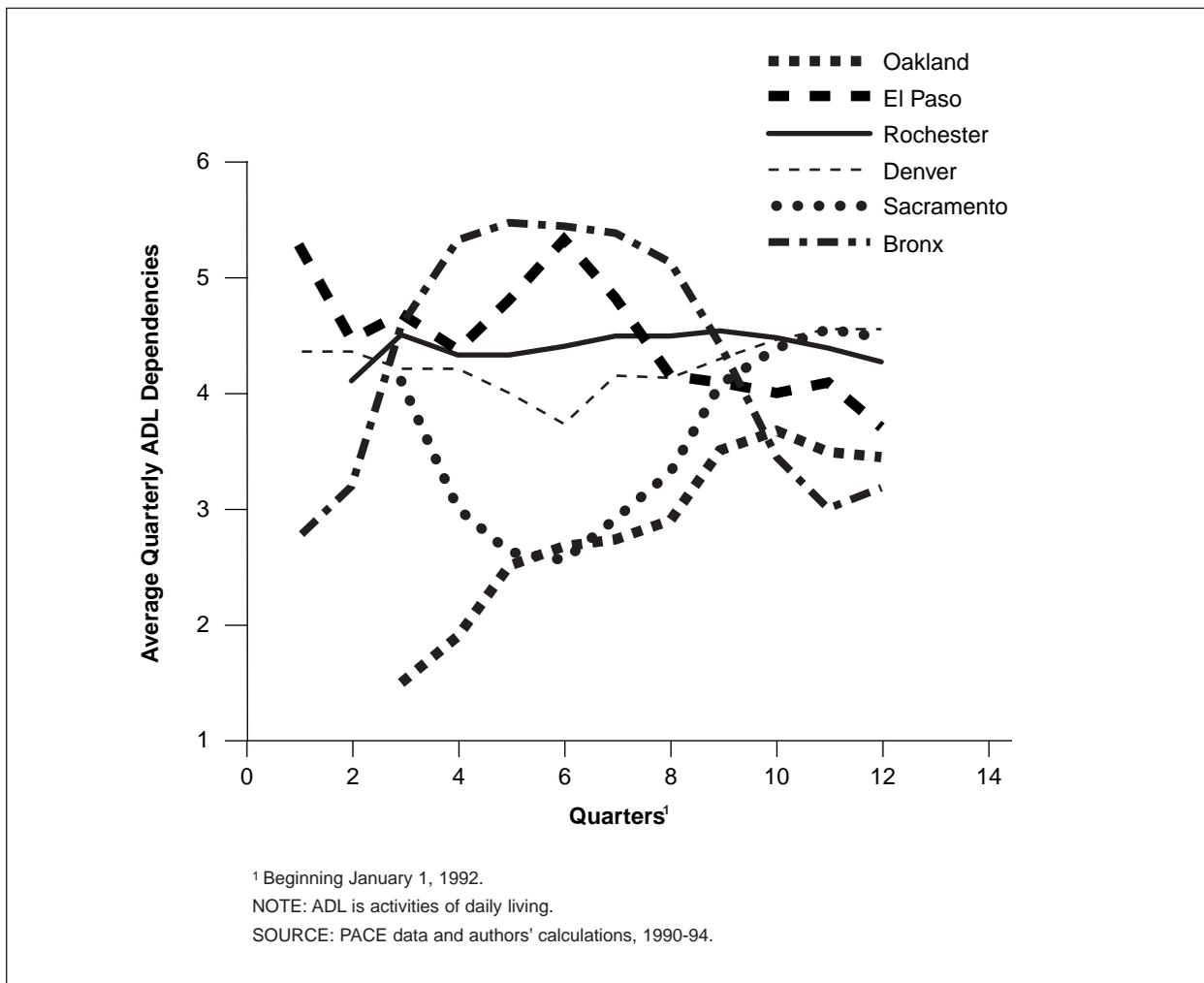


We found that self-assessed health at enrollment predicted only the probability of death. It was not a significant factor in predicting overall disability. Furthermore, except for one instance, none of the ADLs were significant risk factors for death, suggesting that survival and functional status are not strongly correlated in this population. Other risk factors predicting death were dementia (at 6 months), urinary incontinence, and living with others (at 18 months). On Lok enrollees had significantly better survival in the short term—during the first 6 months of enrollment. However, by the end of 18 months, the

probability of death did not differ significantly across sites.

Most ADLs at admission affected the likelihood of improvement in functional status, although the magnitude of the effect and the statistical significance depended on the time horizon. Enrollment with a bathing limitation had the highest impact. Everything else being equal, bathing dependency at admission increased the likelihood of improvement more than twofold at 6 months (from 6.4 percent to 14.7 percent) and almost threefold at 18 months (from 5.4 percent to 15.3 percent). On the other hand, admission

Figure 4
Average Quarterly ADL Dependencies New Programs



with a transfer dependency lowered the likelihood of improvement almost twofold at both points in time. The impact of other ADLs was much smaller, in most instances lowering the probability of improvement. The increased likelihood of improvement for individuals entering the program with a bathing ADL limitation may reflect the fact that bathing is the least severe functional limitation (Mathiowetz and Lair, 1994). It is, therefore, the most likely to be affected by the PACE program interventions.

Several other non-ADL risk factors were predictive of the probability of improvement. Urinary incontinence and dementia both lowered the probability of improve-

ment. Urinary incontinence was a strong predictor for lack of improvement both in the short- and long-term. Dementia, however, predicted primarily lack of improvement in the short-term, but had less of an impact on long-term improvement. Enrollees of the original PACE program, On Lok, were twice as likely to improve compared with individuals enrolled in other programs. This effect was stronger in the early period after enrollment.

Enrollees living alone had better outcomes compared with those living with others. They were more likely to experience functional improvement both in the short- and long-term. By 18 months, they

Table 2

Admission Risk Factors Predictive of Change in Functional Status, Death and Disenrollment by 6 Months, With Probabilities Estimated for the Average Enrollee Based on Multinomial Models

Probabilities	Disenrollment	Death	No Improvement	Improvement
			Percent	
Probability for Average Enrollee	2.0	2.2	82.9	12.9
Probability for On Lok Enrollees	0.8	1.8	72.5	24.9
Probability for Enrollees in Other Programs	2.4	2.2	84.1	11.3
Difference	1-1.6	2-0.4	1-11.6	13.6
Probability for Enrollee Living with Others	2.0	2.1	84.2	11.7
Probability for Enrollee Living Alone	2.1	2.5	79.4	16.1
Difference	-0.1	-0.4	24.8	-4.4
Probability for Enrollee With Good or Excellent Health at Admission	1.7	1.4	83.7	13.2
Probability for Enrollee With Fair or Poor Health at Admission	2.4	3.4	81.5	12.6
Difference	-0.7	2-2.0	2.2	0.6
Probability for Enrollee With Dementia at Admission	2.1	2.5	86.3	9.0
Probability for Enrollee Without Dementia at Admission	2.0	2.0	79.8	16.2
Difference	0.1	0.5	16.5	-7.2
Probability for Enrollee With Urinary Incontinence at Admission	2.1	2.0	85.6	10.2
Probability for Enrollee Without Urinary Incontinence at Admission	1.9	2.4	78.8	16.9
Difference	0.2	-0.4	16.8	-6.7
Probability for Enrollee With Bathing ADL at Admission	2.0	2.3	81.0	14.7
Probability for Enrollee Without Bathing ADL at Admission	2.1	1.7	89.8	6.4
Difference	-0.1	0.6	1-8.8	8.3
Probability for Enrollee With Dressing ADL at Admission	1.5	2.8	82.9	12.9
Probability for Enrollee Without Dressing ADL at Admission	3.7	1.3	82.3	12.7
Difference	-2.2	1.5	0.61	0.2
Probability for Enrollee With Grooming ADL at Admission	2.1	2.2	83.3	12.3
Probability for Enrollee Without Grooming ADL at Admission	1.9	2.0	81.8	14.4
Difference	0.2	0.2	21.5	-2.1
Probability for Enrollee With Toileting ADL at Admission	1.9	2.5	82.6	13.0
Probability for Enrollee Without Toileting ADL at Admission	2.2	1.9	83.4	12.5
Difference	-0.3	0.6	2-0.8	0.5
Probability for Enrollee With Transfer ADL at Admission	3.2	2.3	85.6	8.9
Probability for Enrollee Without Transfer ADL at Admission	1.4	2.0	79.7	16.8
Difference	1.81	0.3	25.9	-7.9

¹ $p < 0.01$.

² $0.01 < p < 0.05$.

NOTES: P values indicate significant differences with respect to improvement. ADL is activities of daily living.

SOURCE: PACE data and authors' calculations, 1990-1994.

Table 3

Admission Risk Factors Predictive of Change in Functional Status, Death and Disenrollment by 18 Months, With Probabilities Estimated for the Average Enrollee Based on Multinomial Models

Probabilities	Disenrollment	Death	No Improvement	Improvement
			Percent	
Probability for Average Enrollee	7.7	14.7	64.4	13.1
Probability for On Lok Enrollees	2.1	22.6	55.5	19.8
Probability for Enrollees in Other Programs	9.9	13.2	64.9	11.8
Difference	1-7.8	9.4	1-9.4	8.0
Probability for Enrollee Living with Others	7.9	15.6	65.6	10.9
Probability for Enrollee Living Alone	7.4	12.6	60.3	19.7
Difference	10.5	3.0	15.3	-8.8
Probability for Enrollee With Good or Excellent Health at Admission	7.8	10.8	68.1	13.2
Probability for Enrollee With Fair or Poor Health at Admission	7.6	19.7	60.0	12.8
Difference	0.2	2-8.9	8.1	0.4
Probability for Enrollee With Dementia at Admission	8.1	15.0	65.3	11.7
Probability for Enrollee Without Dementia at Admission	7.6	14.5	64.0	13.7
Difference	0.5	0.5	11.3	-2.0
Probability for Enrollee With Urinary Incontinence at Admission	8.7	16.0	64.9	10.5
Probability for Enrollee Without Urinary Incontinence at Admission	6.8	13.4	63.2	16.6
Difference	11.9	2.6	1.71	-6.1
Probability for Enrollee With Bathing ADL at Admission	7.3	13.4	64.0	15.3
Probability for Enrollee Without Bathing ADL at Admission	10.0	22.7	62.0	5.4
Difference	-2.7	-9.3	2.02	9.9
Probability for Enrollee With Dressing ADL at Admission	6.4	15.7	65.8	12.1
Probability for Enrollee Without Dressing ADL at Admission	11.3	12.2	61.4	14.9
Difference	-4.9	3.5	4.42	-2.8
Probability for Enrollee With Grooming ADL at Admission	7.5	14.8	64.9	12.8
Probability for Enrollee Without Grooming ADL at Admission	8.3	14.6	63.2	13.8
Difference	-0.8	0.2	1.71	-1.0
Probability for Enrollee With Toileting ADL at Admission	6.4	16.1	66.7	10.8
Probability for Enrollee Without Toileting ADL at Admission	9.3	13.2	61.9	15.7
Difference	-2.9	2.9	4.81	-4.9
Probability for Enrollee With Walking ADL at Admission	8.6	14.0	63.9	13.4
Probability for Enrollee Without Walking ADL at Admission	6.8	15.4	65.1	12.6
Difference	1.8	-1.4	1-1.2	0.8
Probability for Enrollee With Feeding ADL at Admission	10.0	17.8	61.2	11.1
Probability for Enrollee Without Feeding ADL at Admission	7.1	13.7	65.5	13.7
Difference	2.9	4.1	2-4.3	-2.6

¹ p<0.01.

² 0.01<p<0.05.

NOTES: P values indicate significant differences with respect to improvement. ADL is activities of daily living.

SOURCE: PACE data and authors' calculations, 1990-1994.

were almost twice as likely to improve as individuals living with others (with a probability of 19.7 percent compared with 10.9 percent).

DISCUSSION

The PACE programs are designed to care for nursing home certifiable elderly individuals who, absent the program, may require nursing home placement. This population is very disabled at admission, with close to four ADL dependencies and over five IADL dependencies on average. While there are many studies that examined the progress of disability among the general elderly population, there are only two that evaluated changes in disability for the PACE population (Abt Associates, 1996, Gruenberg, Rumshiskaya, and Kagenova, 1993). Both were based on a sample of enrollees and did not evaluate average plan disability changes. The study we present here was based on data for all PACE enrollees. It examined the stability of disability both at the plan level and the individual level, and identified risk factors at admission which predict changes in enrollee status.

Study Limitations

This study included data for all PACE enrollees available at the time, namely data from the inception of each program to the end of 1994. Because some of the sites began operating under capitation and full financial risk as late as the second half of 1992, our ability to observe outcomes over long time horizons was limited. This study, therefore, cannot speak to outcomes of enrollees beyond 18 months post admission. This is an important issue because, at 18 months from admission, the vast majority of individuals (85 percent) were still enrolled. Our finding of relatively stable

disability after the first 3 months would suggest continued stability over longer time horizons, but future research is needed to confirm that. Another limitation of this study is that most of the data capture the experience of the programs during their early phases. It may, therefore, reflect growing pains, which are likely to disappear as the programs mature. Studies of more recent data would allow us to investigate the performance of mature programs and to determine if there is a learning curve which new sites follow.

Implications for PACE Program Payment Methods

Our analysis suggests that, while enrollees experienced significant changes in their ADLs within a short time of admission, functional status seemed to stabilize fairly quickly. After the first 6 months of enrollment, the likelihood of either improvement or deterioration in functional status was very small, much less than the probability of death. Furthermore, the probabilities of improvement and deterioration were very similar in magnitude. This would suggest that, if plans have consistent admission practices, they are likely to experience a fairly constant disability mix. Indeed, we found that average disability within plans was quite stable for mature plans. Younger plans, on the other hand, did not experience similar stability. This may reflect a learning curve the plans go through, both in terms of treatment of enrollees as well as in terms of consistency of admission practices, when plans are learning to identify the type of patients they believe to be the most suited for their particular program. This instability in the young plans may also be an artifact of building up the program enrollment in its early days. During this period, the majority of enrollees are new admissions. Since

the period immediately following admission is the period during which most of the change in functional status occurs, the majority of the enrollees in these young programs will be undergoing changes. This will be reflected in a much more volatile disability mix compared with mature programs, in which a much smaller percent of enrollees are new admissions.

The stability in average disability levels for mature programs suggests that the current PACE reimbursement method, which pays a fixed rate for each enrollee and is not adjusted for changes in the functional status of the individual over time, is appropriate. Assuming that capitation rates have been set at the appropriate levels, there is little if anything to be gained from periodic adjustment of the capitation payments within each program. Furthermore, a constant payment rate offers an incentive to improve participants' functional status. A payment rate that is not adjusted downwards when the program is successful in achieving improvement in functional status, rewards programs by allowing them to keep the savings resulting from their success.

The difference in disability levels among sites, however, as well as the large variation in percent of enrollees with dementia, both of which are important determinants of program costs (Williams, et al, 1994; Liu, Wall, and Wisoeker, 1997), indicate that costs across plans may be quite variable. While this may be due to differences in States' definitions of nursing home certification, it does suggest that some programs may be experiencing more financial gains relative to others, and that payers may benefit from more finely tuning the reimbursement formula. The current payment formula does not account for such differences. Further study to evaluate case-mix differences and their implications for program costs and the PACE reimbursement methodology is indicated. Furthermore,

we evaluated only changes in functional status. PACE programs may experience more volatility in other dimensions of health status, which may not affect disability but may have an impact on costs. Our conclusions are, therefore, limited to the impact of ADLs on costs. Further research is required to assess this issue.

Unique Characteristics of PACE Enrollees and Importance of Selection Bias

The stability in disability we found among this population is in contrast to other studies that find a stronger tendency towards improvement. Branch et al. (1984) and Manton (1988) found that a significant proportion of individuals regain functional independence. Mathiowetz and Lair (1994) analyzed the national Medical Expenditures Survey and found similarly that between 31-66 percent of the elderly reported improvement in functional status over a 1-year period. Hallfors et al. (1994) found that over 50 percent of nursing home certifiable social/HMO enrollees were no longer nursing home certifiable by the end of 1 year. Our results are more similar to those of Boaz (1994) who found that, among the long-term disabled, improvement is rare. The selection criteria for acceptance to the PACE program would suggest that this population is much more similar to the population studied by Boaz than to those included in other studies. The lower probability of improvement in the PACE population may also reflect the fact that it tends to be older than the general elderly population included in most other studies. Manton, Stallard, and Liu (1993) show that improvement is less likely for impaired individuals aged 85 compared with those who are 65 years old.

We also found that enrollees living alone had better outcomes compared with indi-

viduals living with at least one other person. Individuals living alone were more likely to improve at both 6 and 18 months and less likely to die at 18 months. This is contrary to findings by Mathiowetz and Lair (1994) that single individuals were less likely to improve in functional status and more likely to deteriorate compared with individuals who were married. These findings might reflect a selection bias among PACE enrollees. These individuals, all of whom had many functional limitations and could qualify for nursing home placement, chose to remain in the community and enter the PACE program instead. Such individuals, particularly those living alone and who therefore cannot count on help at home, are likely to be more motivated to keep their independence. It is also likely that the need to fend for themselves leads to more physical activity which in turn increases the likelihood of functional improvement. We also found no statistical relationship between self-assessed health at admission and the probability of change in functional status, unlike findings by Mor et al. (1994) and Mathiowetz and Liar (1994).

The divergence between our findings and previous studies suggests that the PACE population is different in fundamental ways from the general elderly population. It is also likely to be different from nursing home populations, because PACE enrollees have self-selected into this program and are likely, therefore, to have different preferences and motivations. Our findings emphasize the danger in generalizing findings from one population to another, in particular when the population of interest tends to be in the extreme of the spectrum of disease and disability, as the PACE population is, and when self selection might be an important factor.

Programmatic Implication: Opportunities for Improvement

We found that most of the changes in functional status occur within a short time of enrollment. After that, the likelihood of functional change is very small and is dominated by the probability of death. The early occurrence of change may reflect the instability of enrollees at admission. In particular, individuals who are admitted from the hospital or who have been through an acute episode are likely to exhibit significant change within a short timeframe. Further study into the causes of both improvement and deterioration immediately following admission is required. Understanding these causes might help identify opportunities for improving care.

Potential areas for improvement may be related to patients admitted with dementia and/or urinary incontinence. These patients were the least likely to show improvement with current practice styles at PACE programs. In terms of ADL dependencies at admission, enrollees entering with a bathing dependency do seem to improve the most, both at 6 and 18 months. However, those with transfer dependencies are the least likely to improve by 6 months and could present an opportunity for new interventions that might lead to improvements.

We also found that individuals enrolled in the On Lok Senior Health Services, the original PACE program, had better outcomes compared with individuals enrolled in other plans. On Lok enrollees were less likely to disenroll or die and more likely to improve, both in the short term and the long term. This finding may be due to unmeasured case-mix differences and/or differences in the effectiveness of the pro-

gram. Given the large and rather comprehensive set of risk factors we had available for the initial analysis, we believe that the better outcomes observed among On Lok enrollees may reflect, at least partially, differences in the effectiveness of the program rather than case mix. There is empirical evidence suggesting that practice makes perfect. Hughes, Hunt, and Luft (1987) found that hospitals and surgeons with higher volumes had better outcomes for 10 procedures they studied. Luft, Bunker, and Enthoven (1979); Luft (1980); and Hannan (1989) found similarly that hospitals with larger volumes had better risk-adjusted mortality rates compared with hospitals with less volume.

Extrapolating to the PACE program, it is possible that new PACE sites follow a learning curve, gaining knowledge “by doing,” knowledge that cannot be easily transferred to replication sites. The On Lok pro-

gram, which began in 1973 and became fully capitated in 1983, has many more years of experience compared with the next oldest programs, East Boston and Portland, which began operations in June 1990. The longer experience of the On Lok program may be a contributing factor to its better outcomes. As other sites mature and more longitudinal data become available, this hypothesis could be tested. Its confirmation would suggest that, as part of the process of licensing and implementing new PACE replication sites, key personnel may benefit from training onsite at the original On Lok program. It should be noted, however, that, due to lack of power, we could not test the effect of each of the other plans separately. It is possible that other programs, possibly the more mature plans, do achieve outcomes similar to the On Lok program. This should also be tested with larger data sets and longer time series.

TECHNICAL NOTE

Individual Risk Factors Included in the Analysis

Individual Characteristics That Were Not Predictive of Change in Functional Status

Age (Less than 75, 75-85, 85 or over)
 Sex
 Race (White, Non-white)
 Education (8 or Fewer Years, 8-12, 12 or Over)
 IADL Dependencies (Count)
 Diabetes
 Arthritis
 Hypertension
 Cardiac Disease
 Number of Medications
 Number of Hospitalizations 12 Months Prior to Enrollment
 Number of Nursing Home Days During the Last 12 Months Prior to Enrollment

Individual Characteristics That Were Predictive of Change in Functional Status

Enrollment in On Lok
 Living Alone
 Good or Excellent Health
 Dementia
 Urinary Incontinence
 ADL Limitations at Admission

- Bathing
- Dressing
- Grooming
- Toileting
- Transfer
- Walking
- Feeding

NOTES: ADL is activities of daily living. IADL is instrumental activities of daily living.

SOURCE: PACE data and authors' calculations, 1990-94.

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