



# Five-Year Survival in a Program of All-Inclusive Care For Elderly Compared With Alternative Institutional and Home- and Community-Based Care

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**Background.** Community-based services are preferred to institutional care for people requiring long-term care (LTC). States are increasing their Medicaid waiver programs, although Program of All-Inclusive Care For Elderly (PACE)—prepaid, community-based comprehensive care—is available in 31 states. Despite emerging alternatives, little is known about their comparative effectiveness.

**Methods.** For a two-county region of South Carolina, we contrast long-term survival among entrants ( $n = 2040$ ) to an aged and disabled waiver program, PACE, and nursing homes (NHs), stratifying for risk. Participants were followed for 5 years or until death; those lost to follow-up or surviving less than 5 years as on August 8, 2005 were censored. Analyses included admission descriptive statistics and Kaplan–Meier curves. To address cohort risk imbalance, we employed an established mortality risk index, which showed external validity in waiver, PACE, and NH cohorts (log-rank tests = 105.42, 28.72, and 52.23, respectively, all  $p < .001$ ;  $c$ -statistics = .67, .58, .65,  $p < .001$ ).

**Results.** Compared with waiver ( $n = 1,018$ ) and NH ( $n = 468$ ) admissions, PACE participants ( $n = 554$ ) were older, more cognitively impaired, and had intermediate activities of daily living dependency. PACE mortality risk (72.6% high-to-intermediate) was greater than in waiver (58.8%), and similar to NH (71.6%). Median NH survival was 2.3 years. Median PACE survival was 4.2 years versus 3.5 in waiver (unstratified, log rank = .394;  $p = .53$ ), but accounting for risk, PACE's advantage is significant (log rank = 5.941 (1);  $p = .015$ ). Compared with waiver, higher risk admissions to PACE were most likely to benefit (moderate: PACE median survival = 4.7 years vs waiver 3.4; high risk: 3.0 vs 2.0).

**Conclusion.** Long-term outcomes of LTC alternatives warrant greater research and policy attention.

**Key Words:** Comparative effectiveness research—Risk stratification—Long-term care—Dual eligibles.

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COMMUNITY-BASED care is preferred to nursing home (NH) care by most older and disabled Americans, including those dually eligible (Medicare and Medicaid) certified by states as requiring long-term care (LTC). Federal and state governments are expanding access to community-based LTC because of this preference and as a result of a landmark Supreme Court ruling (Supreme Court 1999 *Olmstead v. L.C.* decision) that individuals have the right to live in community settings if possible and desired, rather than be institutionalized. Subsequent lawsuits have compelled states to expand access to community-based LTC, and provision of federal resources has assisted states in rebalancing their services from institutional to community care (1). Furthermore, different forms of community-based care have evolved in the hope that more people with different LTC needs can be served without increasing costs (2–4).

Two alternative community-based care programs are the Program of All-Inclusive Care for the Elderly (PACE), and

aged and disabled home and community-based care under 1915(c) waiver provisions. PACE is a prepaid, dually capitated, community-based model in which care for older disabled participants—certified by states as eligible for NH-level care—is integrated by interdisciplinary teams based in day centers (5,6). Under full financial risk, PACE provides all necessary acute, primary, consultative, chronic, and palliative care, as well as supportive center, home, institutional, transportation, and other services, including meals and caregiver support, to facilitate participants' remaining in the community. PACE became a Medicare provider and a state Medicaid option under the Balanced Budget Act of 1997. Programs receive capitated payments from Medicare on a diagnosis-based, frailty-adjusted formula, and from Medicaid at fixed, annually negotiated rates specific for states/localities. As of September 2009, there were 71 approved, independent PACE programs (four pending), in 31 states. In the past year, the Centers for Medicare and Medicaid Services approved

21 new plan applications and eight new State Plan amendments (raising the number of states in which PACE programs may develop to 38). The PACE census in January 2009 was 16,832.

In contrast to PACE, 48 states and the District of Columbia have more widely expanded home- and community-based care under 1915(c) Medicaid waivers (1,4,7). These programs vary across states and local areas, even among aged and disabled waivers, but the latter generally provide clients with case managers who receive per diem payments. Case managers assess client personal care needs and can authorize in-home personal care and other supportive services paid by Medicaid. The broader Medicaid home- and community-based population (ie, those receiving services through various waiver, mandatory home health, and personal care services programs) has been growing at a rate of 7% a year since 1999 (1). Nearly 600,000 Americans were enrolled under aged and disabled waivers in 2005 (8).

Although aged and disabled waiver programs are widely recognized as being limited to providing supportive care and lacking the comprehensive, integrated, and interdisciplinary team services of PACE, some decision makers view the waiver option as a lower cost alternative not only to NHs but also to PACE for older, disabled people certified by states for NH eligibility. Less recognized are differences among community programs in client level-of-care needs and risk, and outcomes, to justify program input (cost) differences. This underrecognition affects government planners and decision makers, providers, and ultimately patients and caregivers confronted with selecting among LTC options, where institutional- and community-based LTC options coexist in a state or local area.

Within the context of a program of research to compare the long-term effectiveness of care consequent to alternative LTC placements, this initial study has three objectives. First, on a quasiexperimental, intent-to-treat basis, we characterize long-term survival for three LTC admission cohorts, where follow-up has been sufficient to achieve estimates of median survival and meaningfully assess trajectories (parallel, convergent, and divergent) for the program cohorts. Second, we evaluate external validity of an established mortality risk index in the contrasted program populations. Third, we determine program effects on survival stratified a priori by level of risk.

In South Carolina (SC), Medicaid waiver and NH care is available statewide, and those programs may admit clients/residents as young as age 18. During our study, PACE was available only in a two-county catchment; here and nationally, PACE is limited to admitting only participants aged 55 years or more. Because we aimed to compare program entrants and mortality outcomes only in a population eligible for admission to any of the three main LTC options, we limit aged and disabled and NH subjects to those living in the PACE catchment, age 55 years or more. In SC as elsewhere, most PACE and Medicaid NH entrants remain until

they die. In contrast, although many aged and disabled waiver clients die after long enrollments, others may be discharged if they require higher levels of care (eg, to NH or PACE), or no longer meet NH level-of-care criteria on follow-up. Participants are assigned to program cohorts according to their initial LTC admission status, as are their subsequent vital events.

## METHODS

### *Programs*

The central South Carolina PACE—Palmetto Senior Care (PSC)—has operated as many as six day centers in Richland and Lexington counties, SC, since its establishment as an original On Lok replication site in 1988. PSC's average daily census was in the 350–400 participant range for most of the study period (1998–2005).

The aged and disabled waiver program in SC (now called Community Choices [CC]) began in 1983 after a 3-year pilot, and now is one of the several Medicaid community-based waiver programs operated by the state Community Long-Term Care agency. Like PSC, CC is available for adults qualifying for Medicaid and certified as NH eligible but who prefer to receive services in the community. Through case management and an individualized package of supportive services, CC aims to enable clients to remain at home at a cost to Medicaid that is substantially less than the cost of institutional care (9). Statewide, CC case managers (about 5% of CC expenditures) assist clients in selecting among available services: over three quarters of CC spending is for personal and attendant care and companion services, and adult day health care (included skilled nursing at the centers). Remaining service expenditures were for supplies and equipment, home delivered meals, home modifications, personal emergency response systems, and chore services (10).

According to the state, “[NHs provide] nursing, therapy, and personal care services to individuals who do not require acute hospital care, but whose mental or physical condition requires services that are above the level of room and board and can be made available through licensed, certified and contracted institutional facilities” (11). During the study period, SC maintained a stable Medicaid NH bed capacity in and around Columbia.

### *Single Point-of-Entry System*

All Medicaid recipients entering PSC, CC, or NHs must be certified as meeting criteria for a NH level of care. The state employs regional teams to conduct comprehensive preadmission assessments of LTC applicants. Through this process, the teams produce written evaluations of applicants' medical, psychosocial, functional, environmental, and support system and service needs, and determinations of medical necessity for LTC, based upon meeting specific skilled or intermediate service and/or functional support

criteria (12). These “Form 1718” assessments are standardized, provide data for initial care planning in CC and other community-based programs, and crosswalk into admission Resident Assessment Instrument (RAI) fields for those placed in NHs (13).

#### *Analytic Data Set*

We constructed a data set to represent a Medicaid LTC admission cohort entering the two community programs and institutional care. Data describing the medical, psychosocial, functional, environmental, and social supports of entrants (see Table 1 for selected variables) were derived from state Form 1718 records. Vital status at follow-up was determined for each entrant from review of repeat DataPACE 1.0 (the PACE demonstration minimum data set), and 1718 assessments for those maintaining enrollment in community programs and review of state vital statistics records.

#### *Participants, Risk Stratification, and Statistical Analysis*

Participants ( $n = 2,040$ ) were older ( $\geq 55$ ) residents of two counties in South Carolina admitted between 1998 and 2003 to CC ( $n = 1018$ ), PSC ( $n = 554$ ) and NHs ( $n = 468$ ). Participants were followed until death or 5 years postadmission. Those lost for the event or surviving with less than 5-year follow-up on August 8, 2005 were right censored. Analyses included contrasts among the three entry cohorts using descriptive statistics. Cohort survival comparisons—overall and stratified by mortality risk—were examined using Kaplan–Meier curves and tested with log-rank statistics (SAS Version 9.2; SAS Institute, Inc., Cary, NC).

Mortality risk at admission was assessed using the PACE Prognostic Index (PPI) (14). Designed to predict mortality in community-living frail elderly people, it was developed ( $n = 2,232$ ) and validated ( $n = 1,667$ ) in cohort study of 12 PACE sites (including PSC) using baseline demographic, functional, and disease risk factors derived from DataPACE. The PPI was adequately calibrated and showed good discrimination (area under the curves = 0.66 and 0.69 for development and validation cohorts). Scores ranged 0–18, with higher scores indicating greater risk. PPI risk factors (and index weights) included male sex (2 points); age 75–84 (2); age 85 years or older (3); dependence in toileting (1); dependence in dressing, partial (1), and full (3); malignant neoplasm (2); congestive heart failure (CHF) (3); chronic obstructive pulmonary disease (1); and renal failure/insufficiency (3).

For risk stratification, we used the PPI cutpoints employed by Carey and colleagues (14) to designate low (PPI: 0–3), moderate (4–5), and high-risk ( $\geq 5$ ) participants. Because the PPI was developed in a PACE population, we evaluated its external validity for 5-year mortality in each program. Calibration and discrimination were evaluated using stratified Kaplan–Meier curves with log-rank tests, as

well as SAS PROC LOGISTIC  $c$ -statistics, Hosmer–Lemeshow partitions, and tests of goodness-of-fit for survival at the end of follow-up.

#### **RESULTS**

PSC admissions compared with CC and NH entrants (Table 1) were older ( $77.2 \pm 0.42$  vs  $74.5 \pm 0.32$  and  $74.8 \pm 0.51$ ), more likely African American (70.6% vs 49.1% and 45.7%), and less educated (high school or more: 27.1% vs 33.5% and 33.1%). As a proportion of admissions, men comprised less than one quarter of the CC cohort versus over one-third among PSC and NH entrants. NH admissions were less likely to be married than CC and PSC admissions. Diagnoses of CHF and diabetes were more prevalent among CC admissions, although heart disease, renal failure/insufficiency, cancer, stroke, and dementia were more prevalent among PSC admissions. Proportions with activities of daily living dependencies and incontinence were consistently lowest in the CC cohort, highest in the NH cohort, with intermediate values among PSC entrants. PSC participants were more likely to manifest behavioral problems.

Five-year unstratified program cohort survival curves are displayed in Figure 1. The trajectories are significantly distinct over 5 years (log-rank test = 40.267 (2);  $p < .001$ ), with the exception that PSC and CC curves converge at about 4.5 years. Median survival of the NH cohort was 2.3 years. Median survival in PSC was 4.2 years versus 3.5 in CC, but the paired, unstratified trajectories are not significantly different (log rank = 0.394 (1);  $p = .53$ ).

We evaluated the external validity of the PPI as a measure of mortality risk in each program. Survival curves showed divergent trajectories over most of the 5-year period (Figure 2A–C). In logistic regression, the PPI showed adequate discrimination in CC and NH cohorts ( $c$ -statistics = .67 and .65, respectively, each  $p < .001$ ) comparable with the results of Carey and colleagues (14). The PSC risk-stratum curves (Figure 2B) show good discrimination through the fourth follow-up year, but the low- and moderate-risk curves begin to converge in the fifth year. Here, fit for the 5-year outcome was marginal (Hosmer–Lemeshow  $\chi^2 = 1.942$ ;  $p = .164$ ), as the PPI began to overpredict deaths in the moderate-risk and underpredict in low-risk strata; thus, discrimination for 5-year PSC survival was lower ( $c = .58$ ), but still significant ( $p = .002$ ).

Admission mortality risk is significantly greater in PSC than in the CC cohort, with mean values in the high- and moderate-risk range, respectively (Table 1; PPI, means  $\pm$  SEM:  $5.29 \pm 0.119$  vs  $4.29 \pm 0.074$ ;  $p < .001$ ). Nearly identical to the PSC risk index mean was the mean PPI among NH admissions ( $5.28 \pm 0.118$ ). Stratifying the program cohorts by level of risk, the proportions of moderate to high mortality risk participants among PSC (72.6%) and NH admissions (71.6%) are greater than in the CC cohort (58.8%).

Table 1. Characteristics of Persons Admitted to Community Choices (Aged and Disabled Waiver Program), Palmetto Senior Care (PACE), and Nursing Homes, Richland and Lexington Counties, South Carolina, 1998–2003

Admission Variables	Community Choices (n = 1,018)	Palmetto Senior Care (n = 554)	Nursing Homes (n = 468)	p Value
<b>Demographics</b>				
Age*	74.5 ± 0.32	77.2 ± 0.42	74.8 ± 0.51	<.001
Male* (%)	24.5	34.1	36.7	<.001
Married (%)	24.1	22.0	17.5	.018
African American (%)	49.1	70.6	45.7	<.001
Education ≥ high school (%)	33.5	27.1	33.1	.024
<b>Current diseases/conditions (%)</b>				
Heart disease	12.5	25.1	13.0	<.001
CHF*	27.1	15.5	13.5	<.001
COPD/emphysema*	25.2	11.2	16.4	<.001
Diabetes	39.2	35.7	29.5	.001
Anemia	11.4	25.8	15.2	<.001
Cancer*	7.6	12.6	8.5	.003
Renal failure/insufficiency*	6.5	22.0	7.0	<.001
Stroke	24.7	40.6	23.5	<.001
Dementia	18.0	80.9	50.2	<.001
Anxiety/depression	26.6	26.2	22.6	.248
Adequate hearing	52.8	63.4	53.4	<.001
Adequate vision	34.8	44.9	33.1	<.001
Continent of bladder	36.7	25.1	18.4	<.001
Continent of bowel	64.9	48.4	27.1	<.001
<b>Activities of daily living dependence (%)</b>				
Dressing (assistance)*	88.5	72.0	57.5	<.001
Dressing*	6.8	22.2	41.7	<.001
Bathing	11.4	23.6	48.5	<.001
Toileting*	10.2	22.4	47.0	<.001
Transferring	6.1	13.4	29.5	<.001
Eating	4.1	6.1	25.2	<.001
Locomotion	6.8	17.7	32.7	<.001
<b>Behavioral problems (%)</b>				
Wandering	5.6	31.2	21.8	<.001
Verbal abuse	4.4	22.7	11.3	<.001
Physical abuse	1.3	12.4	9.2	<.001
Socially inappropriate behavior	1.9	29.4	10.3	<.001
PPI	4.29 ± 0.074	5.29 ± 0.119	5.28 ± 0.118	<.001

Notes: CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; PACE = Program of All-Inclusive Care For Elderly; PPI = PACE Prognostic Index.

\*Risk factors included in the PPI (14).

With risk stratification taken into account, the PSC 5-year survival advantage over CC is statistically significant (log rank = 5.941 (2);  $p = .015$ ). Stratum-specific analyses sug-

gest that PSC's survival advantage relative to CC occurs among moderate- and high-risk admissions (Figure 3A–C). Median survival among moderate-risk admissions to PSC was 4.7 years compared with 3.4 years in CC (log rank = 3.08 (1);  $p = .079$ ). Among the high risk, PSC and CC median survival was 3.0 and 2.0 years, respectively (log rank = 6.53 (1);  $p = .01$ ). In all-risk strata, CC and PSC survival curves converge in the fifth year.

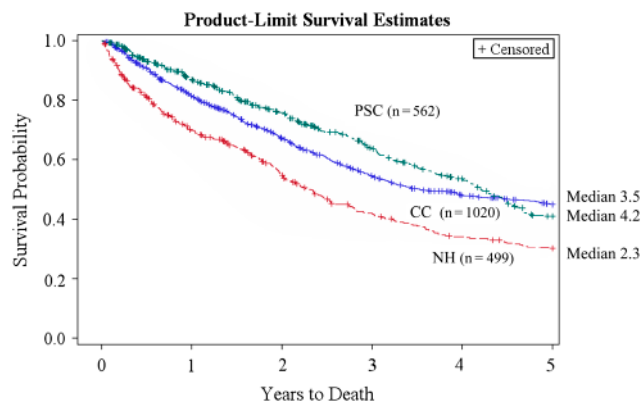


Figure 1. Overall survival (Kaplan–Meier) trajectories, by program cohort (Community Choices, Palmetto Senior Care, nursing home). Log-rank (Mantel–Cox) test = 40.27 ( $df = 2$ );  $p < .001$ .

## DISCUSSION

At admission into LTC, PSC participants were at significantly higher mortality risk than CC clients, as well as bearing a greater overall burden of cognitive impairments and disabilities in this study of Medicaid community LTC programs in central SC. Stratifying for mortality risk, PACE participants had a substantial long-term survival advantage compared with aged and disabled waiver clients into the fifth year of follow-up. That the benefit seemed most apparent in moderate- to high-risk admissions suggests the

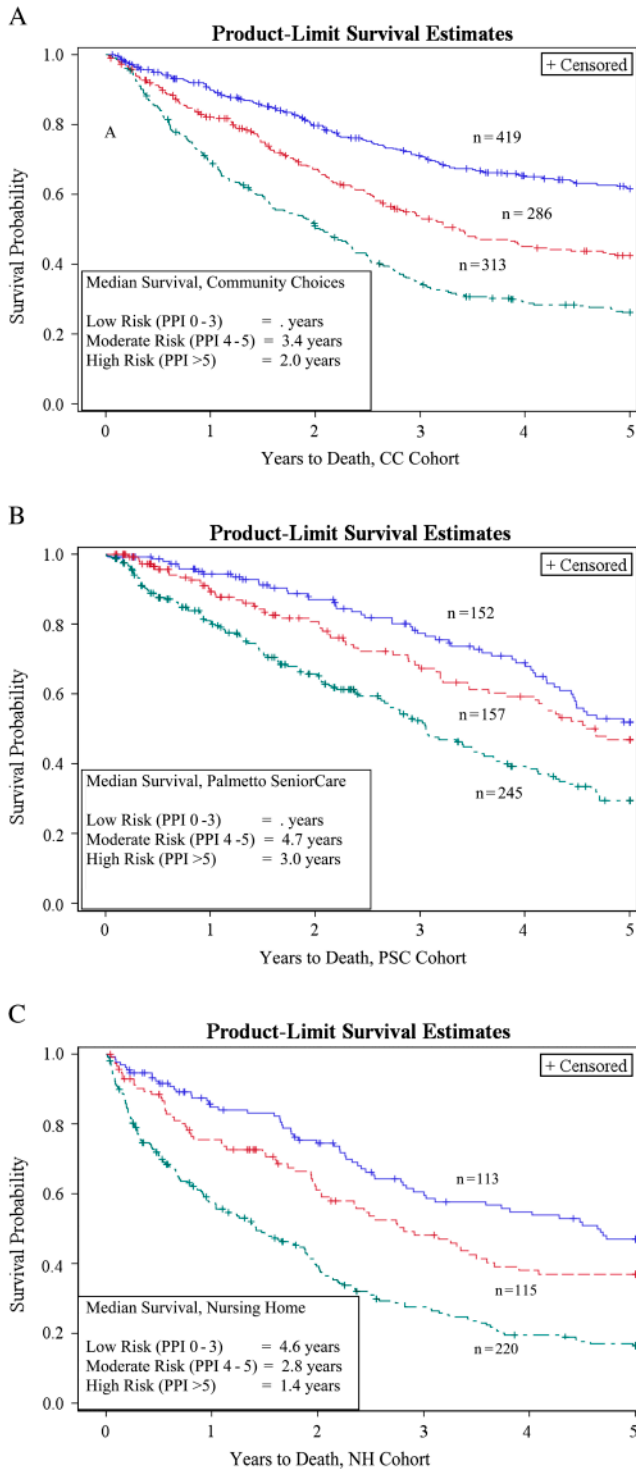


Figure 2. (A) Community Choices cohort survival, stratified by mortality risk. Log-rank test = 105.42 (2);  $p < .001$ . (B) Palmetto Senior Care cohort survival, stratified by mortality risk. Log-rank test = 28.72 (2);  $p < 0.001$ . (C) Nursing Home cohort survival, stratified by mortality risk. Log-rank test = 52.23 (2);  $p < .001$ .

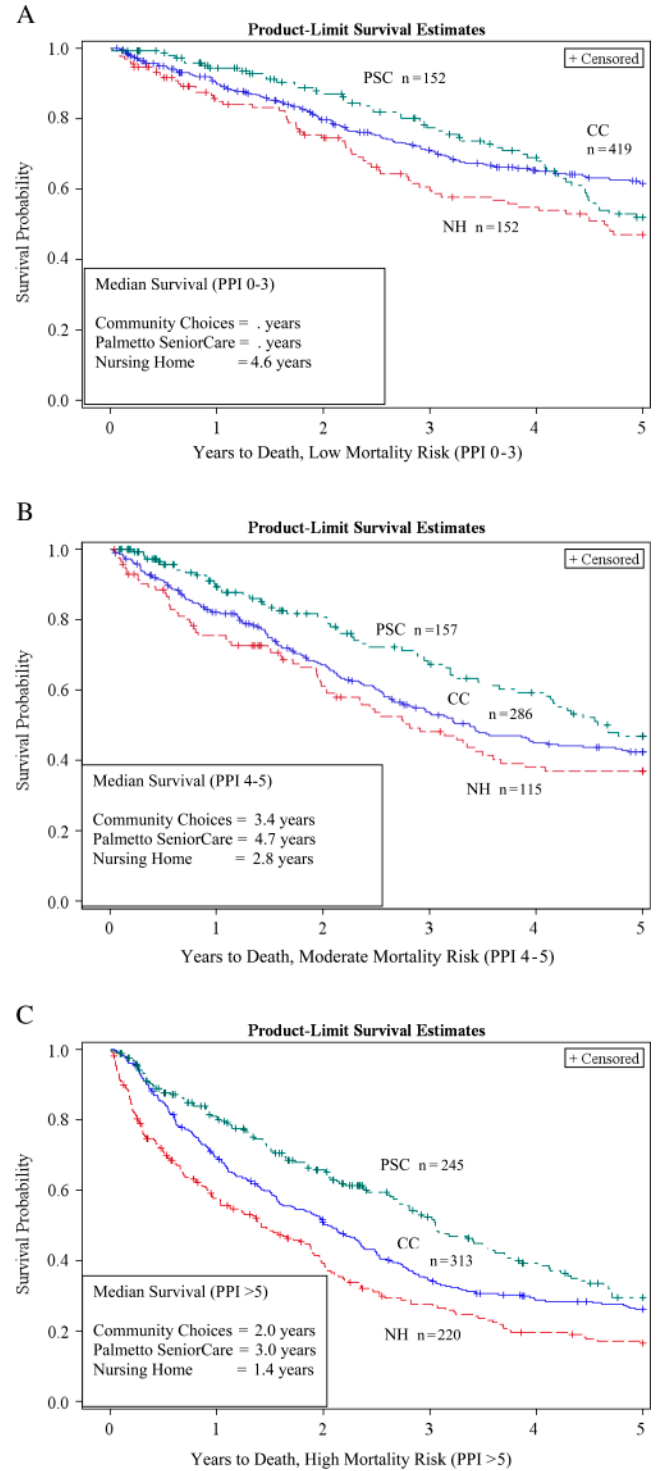


Figure 3. (A) Program cohort survival, low mortality risk (PPI 0-3). All-program log rank = 7.47 (2);  $p = .024$ ; CC versus PSC = 0.41 (1);  $p = .425$ . (B) Program cohort survival, moderate mortality risk (PPI 4-5). All-program log rank = 6.497 (2);  $p = .039$ ; CC versus PSC = 3.08 (1);  $p = .079$ . (C) Program cohort survival, high mortality risk (PPI >5). All-program log rank = 30.099 (2);  $p < .001$ ; CC versus PSC = 6.53 (1);  $p = .01$ . Notes: CC = Community Choices; PPI = Program of All-Inclusive Care For Elderly Prognostic Index; PSC = Palmetto Senior Care.

particular importance of an integrated, team-managed medical home for the older, more disabled participants more commonly admitted to PACE.

Our study has several limitations. First, it employs secondary analysis of clinicoadministrative information collected for other purposes (15). Second, baseline risk differences between program cohorts in this quasiexperimental study were manifest, raising the challenge of risk adjustment. Here, we examined the validity of the PPI in our population and performed simple risk stratification, instead of fitting (and probably overfitting) a multivariable model of program-related survival using miscellaneous admission predictors available in the analytic data set. Risk adjustment issues aside, results concerning comparative program mortality outcomes reflect specifically local conditions, and may not be observed everywhere. For example, although nationally PACE comprises comprehensive, integrated care with a strong medical management component, the quality and accessibility of primary, consultative, emergency, and acute care for waiver clients may vary considerably. The extent to which Medicaid beneficiaries in such waiver programs enroll in medical homes, special needs plans, and other programs unavailable in SC at the time of study could affect outcomes for those groups.

Moreover, we were unable to address the important issue of selection bias (16). Much of the large survival advantage of both CC and PSC over NH (Figure 3A–C) very likely reflects adverse selection to the latter, as well as probable ceiling effects of the PPI in NH admissions. Thus, we have not emphasized the survival differences observed between either of the community cohorts and the NH group in overall or stratified analyses. We must also assume there is selection between CC and PSC programs that may influence their outcomes independent of process and/or quality differences between PSC and CC care. In future research, we hope to refine our modeling of long-term outcomes by incorporating time-varying covariates as we add annual reassessment information to the data set. This will involve integration of RAI information for reassessments of NH residents presently missing. Furthermore, we plan study of the single point-of-entry process in SC, with a view to identifying instrumental variables affording us some understanding and control of selection bias.

The small literature concerned with the comparative effectiveness of alternative LTC placements usually limits follow-up to 2 years or less and suffers from other limitations (4). Few states systematically evaluate expenditures and outcomes across LTC programs over periods longer than 1 year. Thus, questions linger regarding the longer-term value of PACE relative to home- and community-based waiver or NH placements or among LTC programs generally. Our results suggest that states should make necessary investments in research and data infrastructure to evaluate

emerging LTC options, and make planning and allocation decisions based in part on evidence of value for different levels of need and risk.

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