

Hospitalizations in the Program of All-Inclusive Care for the Elderly

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OBJECTIVES: To measure the rates of hospitalization, readmission, and potentially avoidable hospitalization (PAH) in the Program of All-Inclusive Care for the Elderly (PACE).

DESIGN: Retrospective study.

SETTING: PACE.

PARTICIPANTS: PACE enrollees.

MEASUREMENTS: Hospitalization and PAH rates were measured per 1,000 person-years. Readmission was defined as any return to the hospital within 30 days of prior hospital discharge. PAHs were defined as hospitalizations for conditions that previously established criteria have identified as possibly preventable or manageable without hospitalization.

RESULTS: Rate of hospitalization was 539/1,000, vs 962/1,000 for dually eligible aged or disabled waiver (ADW) enrollees. Thirty-day readmission was 19.3%, compared with 22.9% for the national population of dually eligible older enrollees. PAH rate was 100/1,000, compared with 250/1,000 for dually eligible ADW enrollees. Considerable variation was observed between sites.

CONCLUSION: PACE enrollees experienced lower rates of hospitalization, readmission, and PAH than similar populations. Variations in hospitalization rates between PACE sites suggest opportunities for quality improvement. *J Am Geriatr Soc* 62:320–324, 2014.

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More than 9 million people in the United States qualify for Medicare and Medicaid benefits. These dual eligibles are a heterogeneous group that includes a large number of frail elderly adults, who are among the highest risk beneficiaries. Dually eligible beneficiaries consume a disproportionate share of Medicare and Medicaid spending and are of great interest to policy-makers as they seek to provide them with high-quality, cost-effective health care. Because hospitalizations are a major driver of healthcare spending, especially for dually eligible beneficiaries,¹ and many hospitalizations are potentially avoidable,² much emphasis has been placed on reducing potentially unnecessary hospitalizations in this population.

PACE is a community-based model for serving frail, high-risk elderly adults. PACE provides comprehensive medical care and long-term services and supports (LTSS) to adults, largely dually eligible beneficiaries, aged 55 and older who meet their state's nursing home (NH) eligibility criteria. Each state defines its NH certifiability criteria based on medical, cognitive, and functional status. PACE organizations provide their enrollees with highly individualized care through an interdisciplinary team approach to care planning and delivery, often involving regular attendance at a day center.^{3–5} PACE programs tend to be small; the average PACE enrollment currently is just over 300 enrollees. Five programs in large urban areas serve more than 1,000 enrollees, with the largest program enrolling nearly 3,300 as of January 2013.

PACE programs receive capitated funding from Medicare and Medicaid to cover all Medicare and Medicaid services and are responsible for the full spectrum of their enrollees' healthcare needs. As a result, the programs have the flexibility to customize services to each participant and to manage and coordinate services in ways that may

minimize the need for hospitalizations and NH admissions. PACE has incentives to integrate medical care and LTSS, and by pooling Medicare and Medicaid funding, it is able to eliminate the cost-shifting that can otherwise result from the conflicting incentives of multiple payers.⁶

There has been little systematic evidence on PACE programs' performance with regard to hospitalizations. The authors are aware of four prior studies, all of which found lower rates of hospitalization in PACE than in comparable populations, although three of these studies^{7–9} used data from the 1990s, when PACE was still a demonstration program, and few such programs were in operation. The fourth study¹⁰ was based on self-reports obtained in 2005–2006.

The current study examined patterns of hospitalization in PACE enrollees across the United States. The objectives were to assess overall hospitalization, readmission, and potentially avoidable hospitalization (PAH) rates in PACE and variations between sites and to compare unadjusted rates in PACE with other similar populations.

METHODS

Study Population

PACE enrollees, who are all NH certifiable, tend to be substantially older than the general Medicare population; 10% of Medicare fee-for-service (FFS) beneficiaries¹¹ and 33% of PACE enrollees are aged 85 and older (unpublished data). In comparison, 21% of dually eligible home- and community-based services (HCBS) aged or disabled waiver (ADW) recipients and 40% of dually eligible Medicaid NH residents (custodial care) are 85 and older.¹² Almost two-thirds of PACE enrollees have three or more limitations in activities of daily living (ADLs).^{13,14} Although this level of disability is similar to that of Medicare beneficiaries receiving long-term NH care,¹⁵ it is considerably higher than in community-based Medicare FFS beneficiaries.¹⁵

In December 2010, the National PACE Association contracted with researchers at the University of Rochester to analyze hospitalizations in PACE. Of the 69 PACE organizations then eligible for the study, three were too small to provide meaningful data, and five declined to participate, leaving 61 PACE sites (88%) for inclusion.

Data

The 61 PACE sites provided program enrollment and hospital inpatient usage data (exclusive of psychiatric, rehabilitative, and long-term hospitals) for program participants enrolled from June 1, 2008, to May 31, 2010. In 51 of the 61 participating sites, each PACE organization systematically abstracted PACE inpatient stays from the Medicare Uniform Institutional Provider Bill (UB-04), a claim form that all hospitals use to bill for services provided to Medicare beneficiaries. For the remaining 10 sites, the specific source of inpatient data could not be identified.

The raw data contained records for 18,502 hospitalizations from 25,021 people. Extensive efforts were made to clean, validate, and assure the completeness and accuracy of this database. Fewer than 2% of hospital records were excluded as potentially duplicative or erroneous.

In measuring overall hospitalization and readmission rates, the data were divided into two slightly overlapping 1-year periods (to enable a month of follow-up for Year 2 readmissions). Year 1 included hospitalizations from June 1, 2008, to May 31, 2009, and Year 2 included hospitalizations from May 1, 2009, to April 30, 2010. Data for 55 sites were available for Year 1 and for all 61 sites for Year 2. There were 8,298 hospitalizations for 19,580 people in Year 1 and 9,668 hospitalizations for 21,764 people in Year 2 (with 704 hospitalizations in the double-counted month of May 2009).

Data for June 1, 2008, to May 31, 2010, were used in analyzing PAH rates. PACE sites that did not provide the *International Classification of Diseases, Ninth Revision, Clinical Modification*, diagnostic codes corresponding to hospitalization records were excluded, limiting the PAH analysis to 53 PACE sites representing 16,996 hospitalizations for 23,241 enrollees.

Measures and Analyses

Hospitalization and Readmission Rates

For each PACE site, hospitalization rates were calculated as the number of hospital discharges divided by the number of person-years, expressed per 1,000 person-years. Only one hospitalization was counted when an individual was transferred between hospitals.

In analyzing variation between PACE sites, hospitalization rates were risk adjusted using a multivariate regression analysis. The risk factors available for this analysis were sex, age, race and ethnicity, a hierarchical condition categories score that reflects health status and medical care needs,¹⁶ and an indicator for long-term institutional status during the year (any use) or community status. Also included was presence or absence of end-stage renal disease, diabetes mellitus, cancer, congestive heart failure (CHF), renal failure, and chronic obstructive pulmonary disease (COPD). Although data were lacking on the mental health, functional, and cognitive status of PACE enrollees, this strategy allowed for case mix to be partially adjusted for between PACE sites.

Readmissions were calculated as the percentage of hospital discharges that did not end in death and were readmitted within 30 days for any diagnosis. Enrollees who died or disenrolled from PACE within 30 days after a discharge were excluded from this calculation.

Potentially Avoidable Hospitalizations

Criteria that the Research Triangle Institute (RTI) developed for a study that the Centers for Medicare and Medicaid Services (CMS)^{2,12} funded for use with NH residents and HCBS ADW enrollees were used to define PAH. Using these criteria allowed the results to be compared with those of the RTI study. The RTI criteria, developed by an expert panel, separately identify diagnoses that may be potentially preventable or manageable in NH or in community settings. The two sets of criteria are different because conditions that can be addressed in a NH may not necessarily be addressed in the community setting. To enable comparisons with the NH and waiver populations,

rates of PAH in PACE were calculated using both sets of criteria. The term “potentially avoidable” rather than “avoidable” is used because whether a hospitalization is avoidable in any specific case depends on numerous factors other than the diagnosis, for example, severity, comorbidities, and resource availability.¹⁷

For each PACE site, the rate of PAH was calculated as the number of potentially avoidable hospital discharges divided by the number of person-years, expressed per 1,000 person-years.

RESULTS

Hospitalizations and Readmissions

Overall, PACE enrollees experienced 539 discharges in Year 1 and 547 in Year 2 per 1,000 person-years. There was substantial variation in hospitalization rates between PACE sites (Table 1). Despite performing risk adjustment using the covariates described above, statistically significant and substantial variation remained.

Although rates in PACE were higher than those reported for the Medicare FFS population (352/1,000),¹⁸ they were substantially lower than in other NH-eligible populations. For example, the hospitalization rate for PACE (547/1,000) was 24% lower than the rate for dually eligible beneficiaries receiving Medicaid NH services (719/1,000) (unpublished data). Similarly, the rate for PACE was 43% lower than the rate for dually eligible beneficiaries aged 65 and older enrolled in HCBS ADW programs (962/1,000) (unpublished data).

The 30-day readmission rate in PACE was 19.3% in Year 1 (1,536/7,955) and 19.1% in Year 2 (1,777/9,299), with substantial variation between sites (Table 1). Overall, the PACE readmission rate was quite comparable with the 19.6% reported previously for the much healthier, general Medicare FFS beneficiary population.¹⁹ The PACE readmission rate was 16% lower than the readmission rate of 22.9% for the national population of dually eligible beneficiaries age 65 and older.²⁰

Potentially Avoidable Hospitalizations

Using the broader list of conditions for NH residents that the RTI expert panel identified, 5,792 of 16,996 PACE hospitalizations (34%) were classified as PAH, at the rate of 188/1,000 (Table 3). This rate was 44% lower than the corresponding rate (338/1,000) for dually eligible Medicaid NH residents. Using the shorter list developed for community-based waiver enrollees, 3,088 PACE hospitalizations (18%) were classified as PAH, at the rate of 100/1,000 (Table 2). This was 60% lower than the corresponding rate (250/1,000) for dually eligible HCBS ADW enrollees aged 65 and older.² There was substantial variation in PAH rates between PACE sites.

Rates of PAH in PACE were compared with those of dually eligible HCBS ADW populations (aged ≥ 65) and of Medicaid NH residents according to condition. Using the shorter list for waiver enrollees, COPD, asthma, and CHF accounted for more than half of all PAH hospitalizations in the PACE and waiver populations (Table 2). Rates of PAH for these chronic conditions were substantially lower in PACE than in the waiver population (20/1,000 vs 59/1,000 for COPD, 34/1,000 vs 83/1,000 for CHF). Comparisons between PACE and waiver are particularly noteworthy for two other conditions: dehydration and urinary tract infection (UTI). PAH rate for dehydration was 11/1,000 in PACE and 46/1,000 in the waiver population. PAH rate for UTI was 16/1,000 in PACE and 39/1,000 for waiver enrollees.

Based on the NH list, four conditions (CHF, COPD and asthma, falls and trauma, and pneumonia) accounted for approximately 60% of all PAH in PACE and NH populations (Table 3). Several conditions are noteworthy. For example, PAH rates due to pneumonia were 36/1,000 in PACE and 111/1,000 in NH residents. Hospitalizations due to dehydration and UTI were also considerably higher in the NH populations (35/1,000 and 48/1,000, respectively) than in PACE (11/1,000 and 16/1,000, respectively).¹²

Table 1. Hospitalization and 30-Day Readmission Rates in Program of All-Inclusive Care for the Elderly (PACE) and Comparable Populations

Population	Study Period	Hospitalization Rate/1,000 Person-Years	30-Day Readmissions Rate,%
		Mean (Range)	Mean (Range)
PACE Year 1	6/1/08–5/31/09	539 (189–1,321) ^a	19.3 (4.0–43.9) ^a
PACE Year 2	5/1/09–4/30/10 ^d	547 (251–1,378) ^a	19.1 (5.5–36.6) ^a
Medicare FFS ^{18,19}	2010, 10/1/03–12/31/04 ^e	352 (199–426) ^b	19.6 (13.3–23.2) ^b
Dually eligible in Medicaid nursing homes (unpublished data)	2005	719	
≥ 65 dually eligible home- and community-based services waiver enrollees (unpublished data)	2005	962	
≥ 65 Medicare fee-for-service dually eligible enrollees ²⁰	2008		22.9 (14.8–30.9) ^c

^aRates for PACE sites with 20 or fewer hospitalizations were excluded in depicting range.

^bBetween states.

^cBetween regions.

^dAlthough Years 1 and 2 overlap in dates by 1 month, each year accounts for a full 12-month period.

^eFor hospitalization rates and readmission rates, respectively.

Table 2. Rates of Potentially Avoidable Hospitalization (PAH) per 1,000 Person-Years According to Condition: Program of All-Inclusive Care for the Elderly (PACE) and 65 + Dually Eligible Home- and Community-Based Services (HCBS) Aged or Disabled Waiver (ADW) Enrollees

Condition	PACE		Dually Eligible HCBS ADW Enrollees Aged $\geq 65^{12}$	
	PAH/1,000 Person-Years	Distribution,%	PAH/1,000 Person-Years	Distribution,%
All	100 (7–281) ^a	100.0	250	100.0
Chronic obstructive pulmonary disease and asthma	20	19.9	59	23.6
Congestive heart failure	34	33.9	83	33.0
Constipation, impaction	2	1.9	5	2.0
Dehydration	11	11.3	46	18.4
Hypertension	6	5.6	3	1.0
Poor glycemic control	7	6.6	5	2.0
Seizures	3	3.4	9	3.6
Urinary tract infections	16	16.0	39	15.7
Weight loss and malnutrition	1	1.4	2	0.7

^aRates for PACE sites with 20 or fewer hospitalizations were excluded in depicting range.

Table 3. Rates of Potentially Avoidable Hospitalization (PAH) per 1,000 Person-Years According to Condition: Program of All-Inclusive Care for the Elderly (PACE) and Dually Eligible Medicaid Nursing Home (NH) Residents

Condition	PACE		Dually Eligible Medicaid NH Residents ¹²	
	PAH per 1,000 Person-Years	Distribution,%	PAH per 1,000 Person-Years	Distribution,%
All	188 (37–547) ^a	100.0	338	100.0
Altered mental status, acute confusion, delirium	1	0.6	2	0.6
Anemia	4	2.1	7	2.2
Chronic obstructive pulmonary disease and asthma	20	10.6	20	6.0
Congestive heart failure	34	18.1	39	11.6
Constipation, impaction	2	1.0	4	1.1
Dehydration	11	6.0	35	10.3
Diarrhea, gastroenteritis, <i>Clostridium difficile</i>	9	4.6	6	1.6
Falls and trauma	27	14.6	32	9.4
Hypertension	6	3.0	1	0.2
Pneumonia	36	19.2	111	32.8
Poor glycemic control	7	3.5	2	0.7
Psychosis, agitation, organic brain syndrome	1	0.8	5	1.4
Seizures	3	1.8	9	2.6
Skin ulcers, cellulitis	9	4.9	17	4.9
Urinary tract infections	16	8.5	48	14.2
Weight loss and malnutrition	1	0.8	1	0.4

^aRates for PACE sites with 20 or fewer hospitalizations were excluded in depicting range.

DISCUSSION

Rates of hospitalization, readmission, and PAH are lower for PACE enrollees than for comparable populations. Hospitalization and PAH rates of PACE enrollees were substantially lower than for dually eligible and NH certifiable populations (HCBS waiver and Medicaid NH residents). These findings are consistent with findings from earlier studies based on older data and considerably fewer sites.^{7–10}

The PACE model of care contains multiple components that may affect hospitalization. In addition to Medicare and Medicaid capitation, PACE is a provider-based model with direct and frequent interaction between enrollees and members of the program's interdisciplinary team.

Through the program, enrollees have access, as needed, to a day center setting that includes adult day health and medical services. Although the current study does not identify the components of the PACE model that may be important in achieving lower hospitalization rates, a prior study suggested that capitation alone is not likely to effect the differences in rates observed. That study showed that a capitated variant of PACE (Wisconsin Partnership Program) serving a PACE-like population but lacking other PACE elements was not successful in reducing hospitalizations.²¹

Several study limitations should be mentioned. First, calculated rates in PACE were compared with those from published studies that may have used different data

sources, covered somewhat different time periods, and employed populations with possibly different case-mixes, although it is not likely that these differences would have invalidated the results. The main comparisons were with those reported in two previous studies^{2,12} which were based on CMS data from 2005. A comparable administrative database was used for the current study. Furthermore, no major changes in hospitalization rates for the comparison population have been reported between 2005 and 2008 to 2010.²² Although differences in health status could not be adjusted for, prior literature suggests that taking these differences into account may only have magnified the differences between PACE and waiver service recipients.²³ Another potential limitation may be that five PACE sites elected not to participate, although these sites were not substantially different in size, location, or program age from the 61 that participated. Anecdotal evidence suggests that the main obstacle to their participation was the administrative burden associated with data provision.

Although overall hospitalization in PACE appears to be substantially lower than in the comparison groups, substantial variation was found between PACE plans. Although the PACE model has evolved from a single local initiative, it is now a healthcare program operating widely across the country and influenced by differences in case-mix and specific program-level factors that may directly influence the observed variation in hospitalization rates between sites. These may include maturity and experience of the interdisciplinary team, staffing, availability of transitional housing, proximity to and relationship with acute care hospitals, type and effectiveness of case management services, state NH eligibility and referral differences, and local medical culture. Nevertheless, the observed variations suggest that an opportunity for narrowing the gap between PACE plans with regard to these hospitalization metrics may exist. Further research is necessary to identify how best-performing PACE organizations prevent acute care conditions from arising and how such conditions are detected and managed on site.

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