The Effects of Comprehensive Caregiver Supports on Aging-in-Place and Health Care Costs

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Acknowledgements and Disclosures: Support for this work was provided by the Center of Innovation to Accelerate Discovery and Practice Transformation at the Durham VA Health Care System (Grant No. CIN 13-410) and the U.S. Department of Veterans Affairs Caregiver Support Program, Quality Enhancement Research Initiative (PEC 14-272). Dr. Jacobs also receives support from the Department of Veterans Affairs (CDA 19-120). Dr. Miller also receives support from the National Institute of Health (R01AG088901, R21AG08938101A1); Department of Veterans Affairs (QUERI PEC 16-001); and Johns Hopkins University Nexus Award. Dr. Shepherd-Banigan received support from the National Institute of Health (AG072364), Department of Veterans Affairs Quality Enhancement Research Initiative (PEC 14-272), Department of Veterans Affairs Office of Research Development (DSR 24-060; I21RD000652-01A1), Department of Veterans Affairs National Oncology Program, the Alzheimer's Association (24HPE-1287087), the Duke Endowment, and the Research Retirement Foundation for Aging. The authors have no conflicts of interest to report.

I. INTRODUCTION

Informal caregivers play a pivotal role in supporting health systems' efforts to rebalance long-term care services away from institutional care and towards home- and community-based services. Informal care can substitute for nursing home care and unskilled home care (Van Houtven and Norton, 2004; Charles and Sevak, 2005; Johnson and Sasso, 2006; Jacobs *et al.*, 2024), and in some instances has been found to decrease inpatient length of stay (Van Houtven and Norton, 2004). Prior studies suggest that this substitution can result in significant cost savings for health systems (Van Houtven and Norton, 2008; Jacobs *et al.*, 2024). However, these benefits do not come without costs – both health related and economic – to caregivers themselves. Relative to non-caregivers, informal caregivers have increased depression symptoms, worse self-rated health, a higher propensity for chronic conditions, and more pain affecting daily activities (Coe and Van Houtven, 2009; Do *et al.*, 2015). In terms of economic costs, caregivers who provide between 10 and 20 weekly hours of care experience lower labor market participation, a higher likelihood of early retirement, fewer hours of work, and in some cases lower wages (Berecki-Gisolf *et al.*, 2008; Jacobs *et al.*, 2013, 2014; Van Houtven, Coe and Skira, 2013). In the context of an aging population, long-term care rebalancing, and persistent home health staffing shortages, there is a growing recognition of the need for policies that facilitate informal care supply by directly addressing the health and economic costs borne by caregivers (Miller *et al.*, 2022).

The Veterans Health Administration (VHA) has recognized the importance of informal caregivers, as well as the challenges and consequences of care provision, by implementing the most generous caregiver support program in the U.S. The Program of Comprehensive Assistance for Family Caregivers (PCAFC) provides services, such as suicide prevention, respite care, peer mentoring, training, and certain legal and financial planning services, as well as a monthly stipend and access to healthcare coverage for eligible caregivers of Veterans with significant care needs. These resources can help ensure caregivers' financial stability, reduce stress, and improve wellbeing, potentially increasing the length and intensity of care provided by family members. As informal care can substitute for some types of long-term care, PCAFC may enhance Veterans' ability to age-in-place and impact health care utilization patterns and costs. When first implemented, PCAFC was only eligible to Veterans who served after September 11, 2001. In October 2020, the program expanded to include Veterans who served prior to May 7, 1975, providing a unique opportunity to assess the impacts of comprehensive supports for caregivers of older Veterans on quality of life, long-term care patterns, and health care costs. We examined the effect of PCAFC expansion on days alive and at home (days at home), nursing home use, as well as long-term care, inpatient, outpatient, and total costs for Veterans who served prior to May 1, 1975.

We assessed 12-month utilization and cost effects for a cohort of Veterans who applied to PCAFC in the first year post-expansion, using difference-in-differences and event study analyses to compare program applicants who qualified for PCAFC with those who did not qualify. We found that Veterans whose caregivers qualified for the program had fewer days in NH and institutional settings in the year post-application, with respective average treatment effects of -0.75 ($p<0.001$) and -1.07 ($p<0.001$) days per quarter. NH costs decreased in the first (-$721, $p<0.001$) and second (-$488, $p<0.001$)) quarters post-application for PFACF recipients, but when averaged over the full year, this decrease was not significant. Quarterly costs for skilled home health increased ($168, $p<0.001$) for recipients, while unskilled home health services violated the parallel trends assumption. Quarterly inpatient costs decreased overall (-$575 ($p<0.10$), while outpatient costs increased ($752, $p<0.001$). Effects on total costs were not statistically significant.

This analysis is the first evaluation of long-term care utilization and costs effects for a comprehensive caregiver support program. Results suggest that while the program does not reduce overall expenditures, it does affect place of care and quality of life, with care shifting away from institutional and inpatient settings and towards home-based and outpatient settings. This aligns with findings of more days spent at home, suggesting the program is effective at supporting Veterans' ability to age-in-place.

II. INSTITUTIONAL CONTEXT

Caregivers of Veterans tend to care for older, more medically complex patients with multiple mental health comorbidities relative to civilian caregivers. Seventy-four percent of military care recipients are over age 60, compared with 57% of civilian caregivers. There is also added complexity in caring for individuals with military service-related injuries. Military caregivers are more likely to care for an individual with vision and hearing impairments, traumatic brain injury, and a behavioral health condition, including mental health or substance use problems. For the population under age 60, military care recipients have, on average, more medical conditions than their civilian counterparts (3 vs. 2.3) and are more likely to receive help with at least one activity of daily living (ADL) limitation (Ramchand *et al.*, 2024).

The higher complexity of its patient population has created significant incentives for VHA to develop programs addressing the unique needs of Veteran caregivers. In 2011, VHA officially launched its Caregiver Support Program (CSP), fully implementing the program by 2014. The CSP provides a breadth of services that facilitate caregiving by Veterans' family members, while addressing the potential economic and health effects of this care provision (Miller *et al.*, 2025). For any caregiver to a VHA-enrolled veteran, supports include a national caregiver support line

which is staffed by VHA clinical social workers who can connect callers with a local caregiver support team, provide information about assistance through the VHA and local resources, and offer counseling if needed. Each VHA medical center also has a caregiver support program team to help caregivers navigate the health care system and connect with targeted supports through the VA and local community resources (Miller *et al.*, 2025).

For veterans that require more intensive caregivers, the VA CSP offers two distinct programs. The Program of General Caregiver Support Services (PGCSS) serves caregivers of Veterans who are enrolled in VA health care, require help with at least one activity of daily living or require supervision or protections, and agree to receive care from the caregivers. Services for family caregivers include skills training specific to the Veteran's needs, one-to-one clinical support, caregiver health and well-being coaching, support groups, and respite care. In 2025, there were approximately 27,500 active caregivers in PGCSS.

The Program of Comprehensive Assistance for Family Caregivers (PCAFC) serves caregivers of Veterans with more substantial care needs who sustained or aggravated a serious injury or illness in the line of duty. Eligible Veterans must have a VHA service-connected disability rating of 70% or higher and be in need of personal care services for a minimum of six continuous months. These needs can be based on an inability to perform at least one ADL, a need for supervision or protection, or a need for regular or extensive instruction or supervision. Determining eligibility is a multi-step process which includes an application, an assessment of both the Veteran and caregiver, caregiving training requirements, and a home-care assessment. In addition to PGCSS services, PCAFC services include skills training, enhanced respite care, counseling/virtual psychotherapy program, a monthly stipend, beneficiary travel, access to Civilian Health and Medical Program of the Department of Veterans Affairs (CHAMPVA) health insurance, and legal and financial planning services for primary family caregivers (Ma *et al.*, 2022; Van Houtven *et al.*, 2022). In 2025, there were around 66,300 active caregivers in PCAFC, with a total of 600,656 caregivers served by the program as of 2023.

Stipend payments, which are meant to address well documented economic and labor market effects of care provision, comprise the largest component of PCAFC expenditures. In 2023, $1.4 billion of the $1.85 billion program expenditures were allocated to these payments. PCAFC stipends can range from $600-$2300 per caregiver per month, depending on the Veteran's level of care needs (Van Houtven et al., 2019), with a median stipend payment of $1794 in 2023. The stipend payments are based on replacement costing methods, compensating caregivers at the Office of Personnel Management (OPM) General Schedule (GS) annual rate for grade 4, step 1.[1]

[1] OPM GS salaries are locality adjusted. The base salary for a full-time grade 4, step 1 position in 2023 was $28,921, with the highest locality adjusted salary being $41,690.

PCAFC has been gradually expanded to cover Veterans of all service eras. When first implemented in 2012, it was available only to Veterans who served after September 11, 2001. Since 2012, there have been two program expansions. The VA Mission Act in 2018 expanded the CSP program eligibility, with the goal of extending availability to Veterans of all service eras. On October 1, 2020, the program was expanded to cover Veterans who served prior May 7, 1975 (i.e., Veterans who served in WWI, WWII, the Korean Conflict, and Vietnam Era Veterans), and was again expanded in 2022 to Veterans who served between May 7, 1975 and September 11, 2001 (i.e., Gulf War Veterans).

The PCAFC has grown significantly since it was first launched, with expenditures on the program growing from $110 million in its first full year of operation in 2012 to $1.85 billion in 2023 (Jacobs *et al.*, 2024). Given the substantial growth of the PCAFC program, VHA policy makers would benefit from better understanding program effects on quality of life, how the outcomes align with VHA's broader goal of promoting aging-in-place, and whether there are potential downstream cost savings due to increased care supply that may partially offset stipend payments.

III. METHODS

Data, Cohort, and Key Variables

Analytic Sample and Exposure Variable

We analyzed Veterans who were newly eligibly for the PCAFC following the October 1, 2020 expansion to Veterans. For our base case analysis, inclusion criteria for the treatment group were: 1) application to the program between October 1, 2020 and September 30, 2021; 2) military service prior to May 7, 1975; and 3) acceptance into the PCAFC by June 2022. We constructed a control group based on the following inclusion criteria: 1) application to the program between October 1, 2020 and September 30, 2021; 2) served prior to May 7, 1975; 3) no acceptance into the PCAFC or PGCSS in the observation period (i.e., between October 2019 and September 2022). Using a control group of denied applicants ensured that the Veterans in the control group had a caregiver with support needs, their caregivers were similarly engaged in and aware of VHA services, and that a common index date (i.e., the application date) could be used for both the treatment and control groups. Application and acceptance into the PCAFC and PGCSS programs are tracked in the CSP's Caregiver Records Management Application (CARMA) database. We obtained all application information, including the application date, acceptance status, and Veteran identifiers to link to the broader VHA electronic health record (EHR) from CARMA.

Cost and Utilization Outcomes

VHA Costs. We consider costs from the VHA perspective, using three data sources. The first source, which was used for institutional long-term care, inpatient, and outpatient costs was the Health Economics Resource Center (HERC) Average Cost data. The HERC Average Cost files include Inpatient and Outpatient files, with encounter-level costs calculated by using non-VA relative value weights to distribute aggregate-level VA costs to encounter-level utilization. Some services (e.g. VHA provided home- and community-based services (HCBS)) are poorly tracked or excluded altogether from the HERC cost files due to the low volume of services. As such, for these services we used VHA's Managerial Cost Accounting data, which is an activity-based cost allocation system that generates estimates of the cost of individual health care encounters. For VHA-paid services provided in a non-VHA setting, which comprise the majority of Veteran's HCBS use, expenditures were calculated as the amount that VHA reimbursed providers for billed services. Using the three data sources, we constructed the following cost categories: 1) nursing home costs, which included costs for Community Living Centers, Contract Nursing Homes, and State Veterans Homes; 2) unskilled HCBS (i.e., homemaker/home health aide services, Medical Foster Home program, Adult Day Health Care, and Veteran Directed Care); 3) skilled HBCS (i.e., skilled nursing, home treatment for specialized populations, including Spinal Cord Injury and Alzheimer's/Dementia populations, Hospital-in-Home, bowel and bladder program, and PACE); 4) inpatient costs (i.e., hospitalizations, rehabilitation, mental health residential, and nursing home care); 5) outpatient costs (i.e., any costs associated with an outpatient clinical encounter); and 6) total costs (the sum of inpatient and outpatient care.

Utilization. We also constructed outcomes for number of nursing home days and days in an institutional setting. Days in an institutional setting (i.e., the inverse of days at home) were considered any day with utilization in a nursing home, skilled nursing facility, hospital emergency department, or rehabilitative setting (Medicare Payment Advisory Commission (MedPAC), 2018). To construct these outcomes, we used the Geriatrics and Extended Care Data & Analysis Center's Residential History File (RHF). This allowed us to track utilization outside of VHA institutional settings as well. The RHF provides a daily chronological history of health service utilization using all available records from VA inpatient and outpatient care, the VA Home Based Primary Care Masterfile, Medicare and Medicaid claims for inpatient, skilled-nursing-facility, hospice and Minimum Data Set nursing home resident assessments from nursing homes in the community, State Veterans Homes nursing homes, and VA Community Living Centers (Intrator *et al.*, 2011). Because it includes utilization across multiple payers (including private payers in Medicare-certified facilities), the RHF allows construction of the most accurate measure of institutional days/days at home possible.

Veteran Characteristics

Selection of baseline covariates for our analyses was informed by the Bass and Noelker (1987) adaptation of the Andersen Model of Health Behavior. This framework outlines enabling, predisposing, and health care need factors that predict health care utilization for older adults (Bass and Noelker, 1987). Enabling factors are the resources that are available to the individual, including social resources and health care access. In addition to marital status, we constructed a rurality indicator (i.e. residence in a rural/highly rural area) and driving distance to the nearest VHA primary care facility to capture health care access. For predisposing (i.e, intrapersonal) characteristics, studies have consistently found that advanced age, gender, and race predict utilization outcomes (Gaugler *et al.*, 2007). As such, our models included a categorical age variable, a binary variable capturing whether the Veteran was female, and a categorical race/ethnicity variable (with categories for non-Hispanic White, non-Hispanic Black, Hispanic, and other or unknown) from VHA's EHR. Finally, we constructed a number of health care need variables from the EHR, including the number of chronic conditions, and indicator for any mental health diagnosis, and a frailty score based on the JEN Frailty Index, which has been mapped to ADL limitations in a VHA population (Kinosian *et al.*, 2018).

Empirical Strategy

We used difference-in-differences (DiD) and event study designs to examine the impact of PCAFC qualification on quarterly cost and utilization outcomes. We focus on the four quarters before and after PCAFC application, with the following DiD specification:

$$Y_{it} = \beta(PCAFC_i * PostApplication_{it}) + X_i\alpha_{cov} + \theta_t + \eta_i + \varepsilon_{it}$$

where θ_t and η_i are respectively time and unit fixed effects, β is the coefficient of interest for the interaction between PCFAC qualification and the period after the application date, and X_i is a matrix of baseline Veteran characteristics outlined above. The event study specification is similarly outlined below:

$$Y_{it} = \sum_{k=-4, k\neq 0}^{k=4} \gamma_k(PCAFC_i * \text{QuarterRelative toPCAFCApplication}_{it}) + X_i\alpha_{cov} + \varepsilon_{it} + \theta_t + \eta_i$$

where $\text{QuarterRelative toPCAFCApplication}_{it}$ was calculated as the quarter of the Veteran's observed cost or utilization outcomes minus the quarter of the Veteran's application to the PCAFC program. The parameter of interest in this context is γ_k, where subscript *k* denotes the quarter relative to PCAFC application and γ_k represents the effects of PCAFC qualification in each quarter pre- and post-PCAFC application.

In base case analyses, we employed the Callaway and Sant'Anna estimator to account for potential biases in traditional two-way fixed effects (TWFE) DiD estimators (Callaway and Sant'Anna, 2021). This literature has highlighted potential biases in staggered TWFE DiD

estimators when there are multiple treatment or exposure periods and when treatment effects vary over time (Sun and Abraham, 2021). For instance, biases may arise in comparisons of late-treated versus early-treated Veterans if there is a growing treatment effect over time, potentially deflating the treatment effect for late treated individuals (Goodman-Bacon, 2021). The Callaway and Sant'Anna estimator addresses these potential biases by separating the identification, aggregation, and estimation/inference steps of the analysis, creating subsets of data which correspond to each affected cohort in a way that avoids using previously exposed units as controls. The Callaway and Sant'Anna estimator aggregates the average treatment effects on the treated (ATTs) for these subsets of data using weighting schemes recommended by Callaway and Sant'Anna and avoiding reliance on the TWFE default weighting scheme that fits a global average for every time period. We implemented the Callaway and Sant'Anna estimator using the CSDID Stata 18 package to obtain ATTs computed for each pre- and post-qualification period (weighted by the affected cohort size) and an overall ATT (the average of the post-qualification effects) (Callaway and Sant'Anna, 2021).

The DiD design assumes that applicants who qualified and did not qualify for PCAFC would have similar outcome trajectories over time in the absence of program qualification. To test this assumption, we visually inspected whether trends of utilization and cost outcomes over time were similar for treated and control groups prior to program application. We also tested for significance of event study estimates in the period before program application. In the absence of significant event study estimates or obvious visual trending, we assumed that any differences observed in the post-application period could be attributable to the PCAFC program. Where trending was present, we assumed we could not make any conclusions about causality for those outcomes.

Given that our observation period overlapped with COVID-19, we conducted visual inspection of calendar trends for the treatment and control groups to assess whether there were similar patterns for our outcomes across both groups.

Sensitivity Analyses

One requirement for implementing CSDID estimation strategy is a balanced panel over the entire observation period (not just the relative time periods). Given the high levels of patient complexity in our sample and high rates of mortality (25% and 35% of control and treated Veterans died within two years of program application), this implied that we would disproportionately omit higher need Veterans from our analyses, particularly those in the treatment group. As such, we conducted analyses applying estimation methods than enabled an unbalanced panel (Wooldridge, 2025), operationalized using the JWDID Stata 18 package (Rios-Avila, Nagengast and Yotov, 2026). This approach addresses bias with the standard TWFE

estimator by fully interacting cohort indicators with time period indicators, as well as covariates, preventing averaging across heterogeneous groups.

Second, our base case analysis focused on first year applicants because we hypothesized that higher documented levels of heterogeneity in assessments earlier in the program expansion phase may serve to decrease systematic differences between the treatment and control groups (Government Accountability Office (GAO), 2014). To assess whether the same effects would be observed when later applicants were included in the analytic cohort, we conducted analyses that included all applicants from the first two years post-program expansion.

Third, we conducted analyses using a traditional TWFE estimator, which allowed us to include time-varying exogenous variables (i.e., unlikely to be directly affected by the treatment) that could control for possible COVID-related effects on our outcome variables. COVID is widely acknowledged to have affected long-term care and in-person care delivery (Van Houtven *et al.*, 2021), so we explored models that included county-level COVID cases in sensitivity analyses.

Finally, we also conducted falsification tests looking at pre- and post-application outcomes amongst only treated or only control Veterans (i.e. using not-yet-applied units as the sole control group). For control Veterans, we treated the application date as a treatment date, expecting *not* to see a program effect similar to what was observed among the treated Veterans.

IV. RESULTS

Descriptive Overview

There were 9,400 Veterans accepted into the PCAFC program and 26,241 applicants who were denied program entry in the first year post-expansion who met our inclusion criteria. Of those, 5,483 Veterans who qualified for PCAFC and 19,097 Veterans who did not qualify were observed over the entire observation period (i.e., through September 30, 2022). These Veterans comprised our analytic sample for our base case analysis. As outlined in Table 1, those who qualified for PCAFC slightly older (74.6 years versus 73.3), had more chronic conditions on average (8.6 versus 7.6), had higher levels of frailty (a JFI of 5.1 versus 4.3), and were more likely to be married (82% versus 78%). They had similar levels of VHA access (i.e., the same proportion lived in rural areas and both groups had the same average drive distance to VHA care) and similar levels of mental health diagnoses. When compared to Veterans in the unbalanced panel (i.e., including those who died in the observation period (Appendix 1), we observed similar patterns across the control and treatment groups. Those in the treatment group, were more likely to have died within two years of the application date (35% versus 25% for the control group).

Calendar Time Trends

Figure 1 summarizes the calendar trends for all outcomes. These trends allow us to assess whether there was a differential effect of COVID on outcomes for the treatment and control groups. Overall, we see similar trends over time across most outcomes. Where differences in calendar trends emerge, these do not appear to be clearly attributable to the onset of COVID, which occurred in March 2020. The similarity in trends across outcomes suggests that the non-qualifying applicants provide a strong counterfactual trend for PCAFC qualifiers even during the COVID period.

Event Study Estimates

Figure 2 outlines the event study graphs for outcomes. Visual inspection of the utilization outcomes (nursing home days (Panel 1a) and institutional days (Panel 1b)) show that there were few significant differences in outcomes between those who were accepted into PCAFC and those who were denied and no meaningful trending in these differences in the quarters prior to PCAFC application. This was followed by significant reductions in both nursing home and institutional days that remained negative through all four quarters post-application. For cost outcomes, we see a similar pre-application lack of trending for nursing home costs (Panel 1c), with an initial reduction in costs that dissipates by the third quarter post-application. For skilled home care (Panel 1d), we see relative clean pre-trends in the pre-application period, with a clear increase in costs for the PCAFC qualifiers in the post-application period. There was significant pre-trending for unskilled HCBS costs (Panel 1e), with a continuation of the upward trend for PCAFC qualifiers that extends into the post-application period. There was no pre-trending for outpatient (Panel 1f), inpatient (Panel 1g), and total costs (Panel 1h). In the post-application period, there was a sustained increase in outpatient services, an initial decrease in inpatient services that dissipated by the third quarter post-application, and no consistent trends in total costs.

Difference-in-Differences Estimates

DiD estimates of the quarterly average treatment effect on the treated (ATT) are summarized in Table 2. In the year post-application, PCAFC applicants who qualified for the program experienced 0.75 fewer days in a nursing home per quarter ($p<0.001$) and 1.07 fewer days in an institutional setting ($p<0.001$) relative to applicants who did not qualify. PCAFC qualifiers had lower nursing homes costs (-$191, $p=0.3$). Though this difference was not statistically significant when averaged over the 12 months post-application, coefficients from the event study estimates by quarter indicated significant decreases of $721 ($p<0.001$) and $488 ($0<0.001$) in the first two quarters post-application. There were increases in both skilled ($147, $p<0.001$) and unskilled ($192, $p<0.001$) HCBS. While skilled HCBS costs had relatively clean pre-trends

according to visual inspection (Figure 2, Panel 2d), both skilled and unskilled HCBS costs were the only outcomes whose joint tests of significance for the pre-application event study coefficients were significant. PCAFC applicants had higher outpatient costs ($752, p<0.001) and lower inpatient costs ($575, p<0.10), with a statistically non-significant increase in total costs of $177 (p=0.63).

Sensitivity Analyses

In sensitivity analyses (Table 3) using an unbalanced panel we found slightly higher ATTs across all outcomes and all coefficients were statistically significant; however, in addition to pre-trends for HCBS outcomes, there were also significant pre-trends for outpatient costs (Appendix 2 presents the event study graphs for these analyses). In analyses looking at applicants from the first two years post expansion, ATTs were larger than in the base case analyses, and again were significant across all outcomes. One notable difference was a negative coefficient in the total cost (-$647, p<0.05). However, with the exception of nursing home days and nursing home costs, there was significant trending across all outcomes (Appendix 3 presents the event study graphs for these analyses). When using manual TWFE estimators with time-varying county-level COVID case controls, we again found qualitatively similar findings, again with the exception of negative total costs (-$609, p<0.05), though there was more pre-trending in the outpatient costs outcome relative the base case analysis.

Finally, we are still in the process of running falsification tests for all outcomes. We present the event study graphs for nursing home days and institutional days using not-yet "treated" in each group as comparators for post-treatment periods in Appendix 4. These results highlight markedly different patterns for nursing home days for the treatment and control groups. For the applicants who qualified for PCAFC, there is a similar pattern as observed in the base case analysis (i.e. a decrease in nursing home days that lessens over time). For the group of PCAFC applicants who were never accepted into the program, however, there is a steady increase in nursing home days in the period after the application date. For institutional days, there is a decrease observed for both the treated and control groups, though the magnitude of the decrease is significantly higher for the treated group.

V. DISCUSSION

This analysis is the first to assess the effects of VHA's comprehensive caregiver support program for caregivers of older Veterans on days at home, long-term care utilization and costs, and overall VHA costs. Overall, we observed decreased nursing home days, institutional days, and inpatient costs alongside increased home-based and outpatient costs, suggesting that the program is effective at supporting Veterans' ability to age-in-place. While there are few

comparable programs with which to compare PCAFC, we can compare our findings to earlier evaluations of PCAFC among post-9/11 Veterans. Van Houtven et al. (2020) found that PCAFC resulted in an overall increase in costs, driven by higher levels of outpatient care use (Van Houtven *et al.*, 2020). The effects we observed for outpatient costs were in line with these findings, suggesting that the program may help caregivers and Veterans access potentially high value outpatient services. Differences in findings relative to the prior PCAFC evaluation (e.g. the significant decrease in inpatient costs among the expanded PCAFC cohort in the present study) may be driven by our focus on an and older patient population that is at higher risk for nursing home care and hospitalizations.

The direction and magnitude of the cost effects that we observed are not sufficient to offset overall program costs, including stipend payments. However, this does not imply that the program is not cost-effective. Prior studies attempting to define a clinically significant decrease in institutional days have concluded that a decrease in the range of 2.5-18.6 days annually can be considered meaningful (Van Houtven *et al.*, 2014; Lee, Shi and Kim, 2019). We found that PCAFC decreased annual institutional days between 4.2 days and 6.3 days, depending on the model specification – all of which fall above the lower threshold of clinically meaningful (but below the upper threshold).

Some findings (e.g. the decrease in nursing home and institutional days) were consistent across model specifications and cohort definitions. Other outcome (e.g. total costs) varied substantially across models and cohorts, with differences in the magnitude, direction, significance, and pre-trends observed across each sensitivity analysis. Given this variation, there are some conclusions we can make more confidently than others. PCAFC does appear to significantly impact *where* care is provided and help limit exposure to less preferred institutional settings. The fact that we observe lower nursing home days and more skilled home health care suggests that supporting caregivers helps Veterans receive needed skilled services in their preferred setting. Unskilled home health care is the type of care most likely to be a direct substitute for informal care (Van Houtven and Norton, 2008; Bonsang, 2009). Our inability to make any causal assessments about this outcome due to consistent pre-trends across model specifications implies that we cannot assess whether comprehensive caregiver supports can directly facilitate this type of substitutive effect.

Limitations

Our findings should be interpreted while keeping certain limitations in mind. First, while we were able to observe and control for some characteristics affecting program qualification, key factors that affect program eligibility (i.e., ADL limitations) are not observable in VHA EHR data. Access to these types of characteristics may have improved pre-trends that we observed for some outcomes (e.g. unskilled HCBS). Second, while we conducted analyses controlling for

COVID-related factors, the decreased reliance on some types of long-term care services during COVID may have important implications for the expected effect sizes for these outcomes. While we did try to address this limitation by conducting analyses among later PCAFC applicants (not shown), there was significantly more trending in the pre-application period for later applicants, making any conclusions from these analyses less robust. Third, we note that we only considered costs form the VHA perspective. Almost all Veterans in our cohort would be eligible for Medicare, and some would be eligible for Medicaid, which includes some long-term care service coverage. This implies that we may be missing important broader public payer cost effects, including the potential for cost shifting between payers. Finally, we not that we focused on a relatively short time period, given the requirement for a balanced panel and the relatively high mortality rate among PCAFC participants. It is possible that those who remain in the program longer experience cost offsets (or increases) over a longer time horizon, which we would not capture.

VI. CONCLUSION

In spite of these limitations, this study provides important evidence about how comprehensive caregiver supports may affect long-term care service mix, costs, and aging-in-place initiatives. The VHA context is unique, given the integrated nature of its health and social services. However, PCAFC still offers important lessons for health systems considering comprehensive caregiver support programs. These programs can be costly, and the expectation of shorter-term cost offsets may not be realistic across a broader population. However, for high need populations who wish to remain at home, these types of supports may offer a potential mechanism to facilitate aging-in-place while ensuring that patient's care needs are met and that the economic and health consequences of caregiving are minimized.

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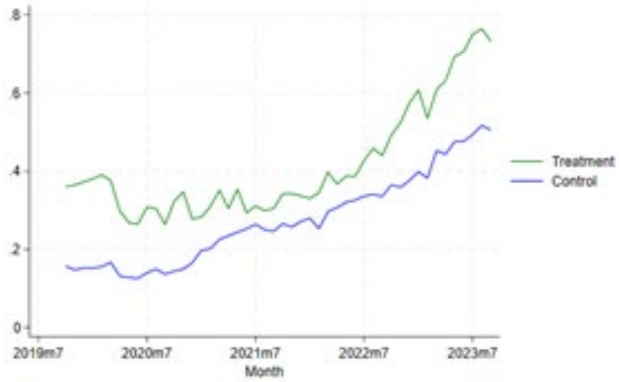
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FIGURES

Figure 1. Unadjusted Calendar Trends in Utilization and Cost Outcomes for PCAFC Qualifiers vs. PCAFC Non-Qualifiers

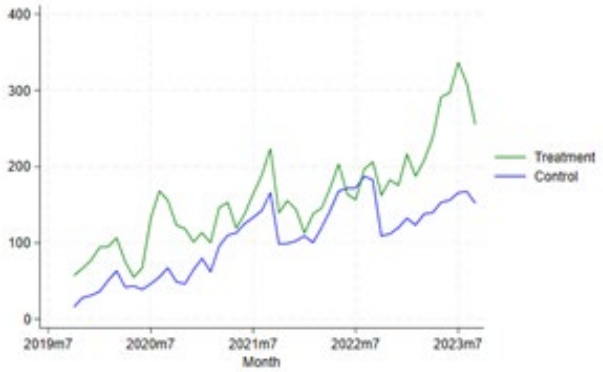
Panel 1a: Nursing Home Days



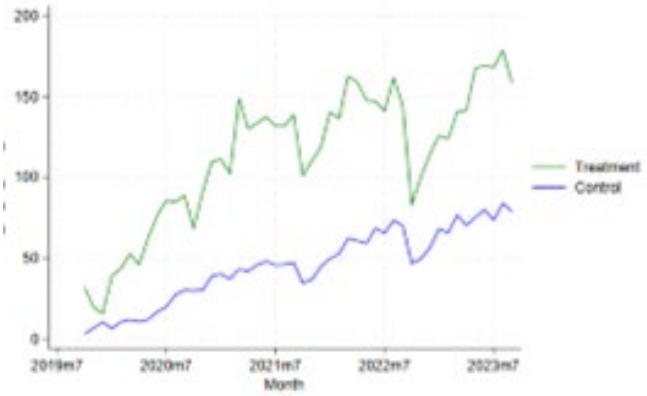
Panel 1b: Institutional Days



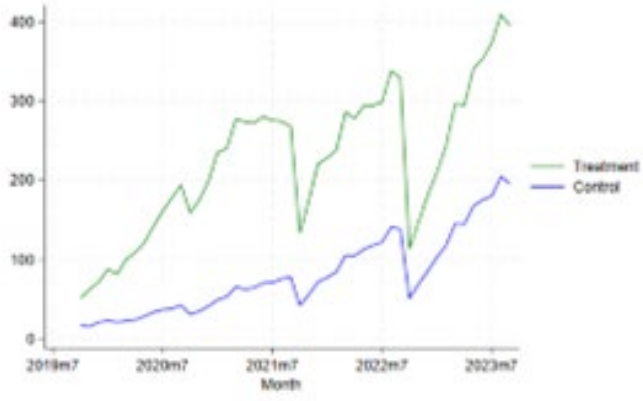
Panel 1c: Nursing Home Costs



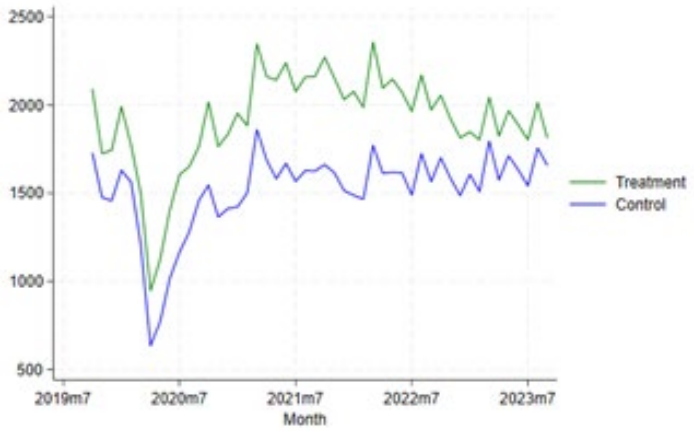
Panel 1d: Skilled HCBS Costs



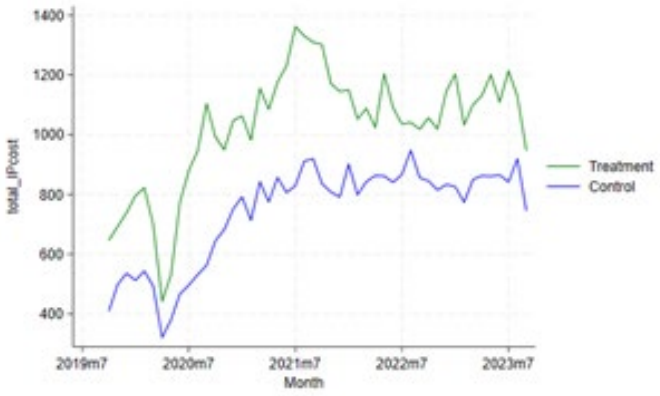
Panel 1e: Unskilled HCBS Costs



Panel 1f: Outpatient Costs



Panel 1g: Inpatient Costs



Panel 1h: Total Costs

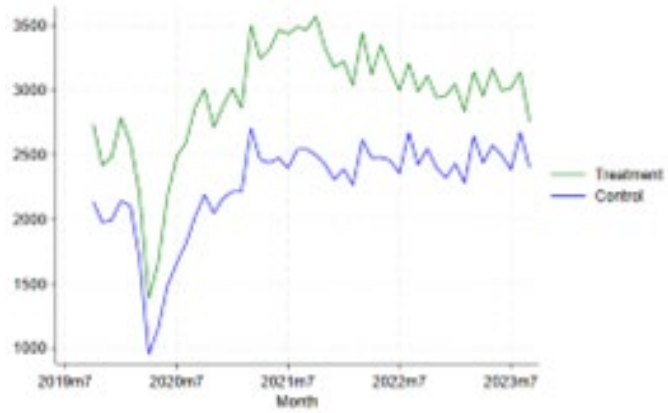
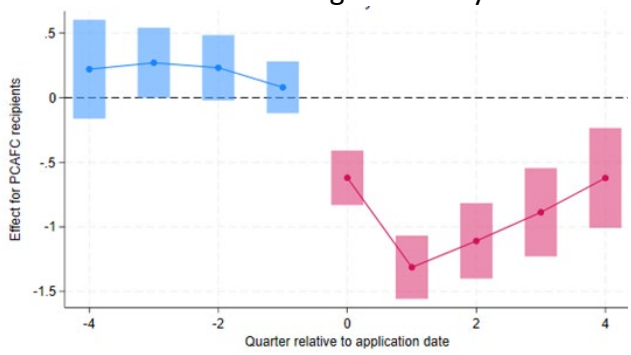
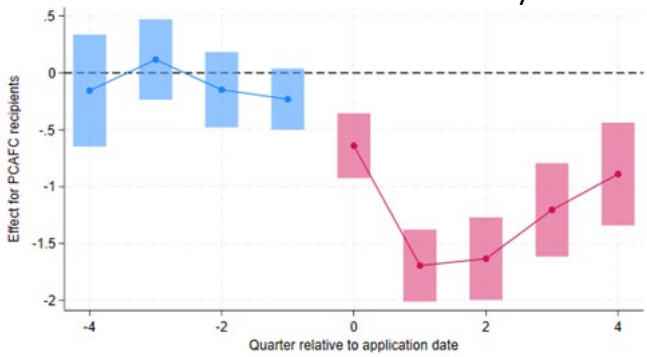


Figure 2. Event Study Estimates of Adjusted Differences in Utilization and Cost Outcomes for PCAFC Qualifiers (n=5,483) vs. PCAFC Non-Qualifiers (n=19,079)

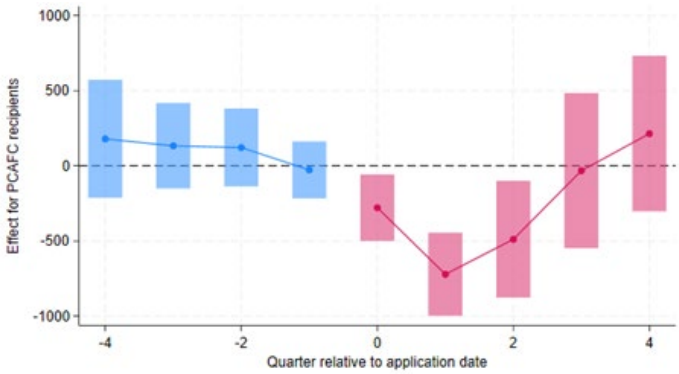
Panel 1a: Nursing Home Days



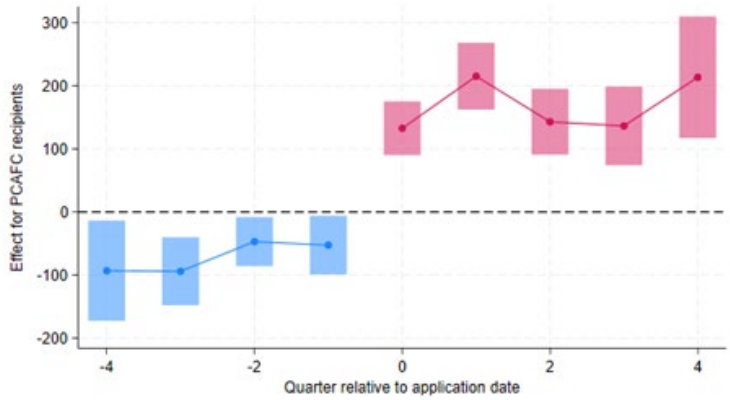
Panel 1b: Institutional Days



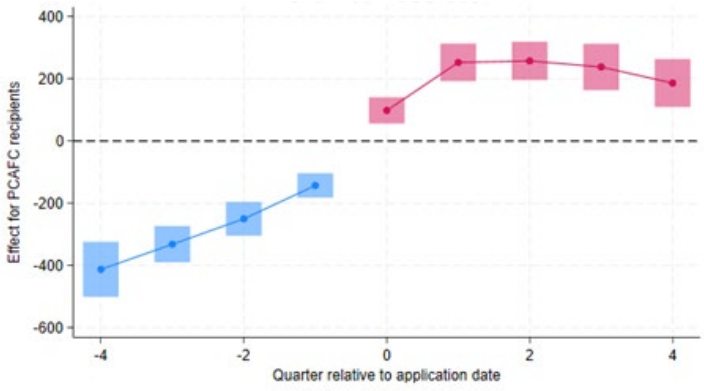
Panel 1c: Nursing Home Costs



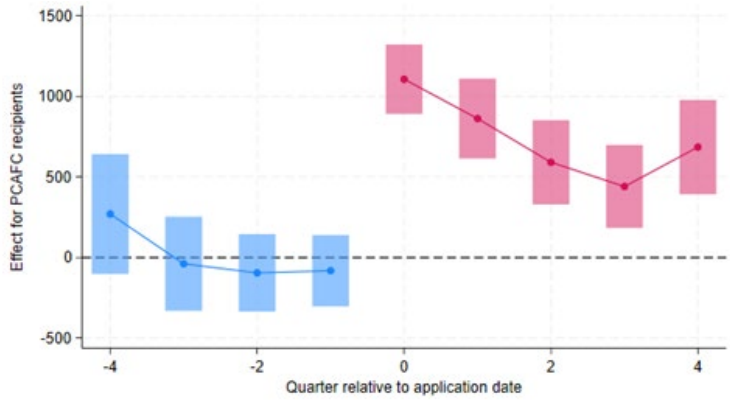
Panel 1d: Skilled HCBS Costs



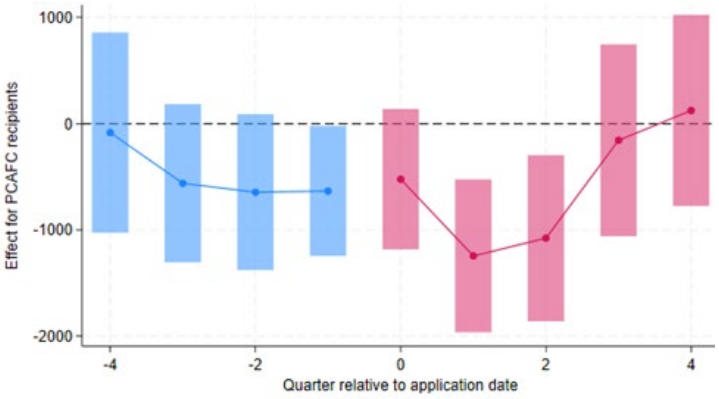
Panel 1e: Unskilled HCBS Costs



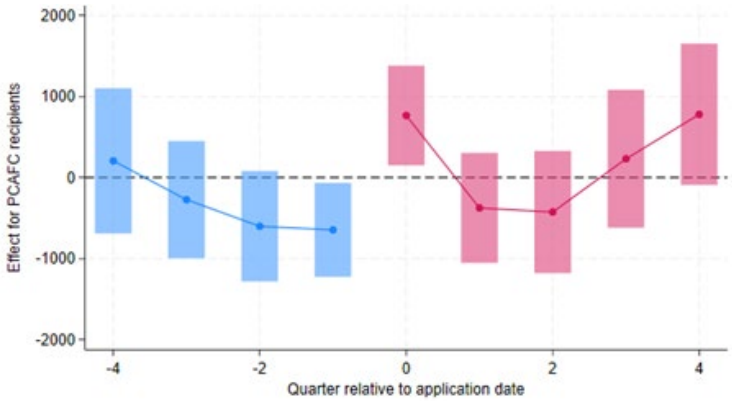
Panel 1f: Outpatient Costs



Panel 1g: Inpatient Costs



Panel 1h: Total Costs



TABLES

Table 1: Characteristics of Applicants who Qualified (Treated) and were Denied (Control) for PCAFC in Fiscal Year 2021 (Balanced Panel Cohort)

	Denied PCAFC (Control)	Accepted into PCAFC (Treated)
Age at baseline	73.29	74.64
Rural or highly rural residence	35%	36%
Drive distance to VHA primary care (miles)	16.04	16.24
# Physical chronic conditions	7.63	8.63
Any mental health diagnosis	66%	67%
Frailty (JFI) at baseline	4.33	5.07
Married	78%	82%
N	19,079	5,483

Table 2: Adjusted differences in outcomes for PCAFC qualifiers vs non-qualifying applicants and results of joint significance test for pre-application periods

Outcome	Quarterly ATT	P-value	Pre-trends significance
Utilization			
NH Days	-0.75	0.00	No
Institutional Days	-1.07	0.00	No
Costs			
Nursing Home Costs	-191.40	0.30	No
Skilled HCBS Costs	146.99	0.00	Yes
Unskilled HCBS Costs	192.28	0.00	Yes
Outpatient Costs	752.40	0.00	No
Inpatient Costs	-574.86	0.09	No
Total Costs	177.54	0.63	No

Table 3: Adjusted differences in outcomes for PCAFC qualifiers vs non-qualifying applicants and results of joint significance test for pre-application periods for sensitivity analyses

	JWDID Unbalanced			CSDID 2-year Applicants			TWFE Manual Time Varying COVID Controls		
Outcome	**Quarterly ATT**	**P-value**	**Pre-trends significance**	**Quarterly ATT**	**P-value**	**Pre-trends significance**	**Quarterly ATT**	**P-value**	**Pre-trends significance**
Utilization									
NH Days	-0.90	0.00	No	-0.94	0.00	No	-0.59	0.00	No
Institutional Days	-1.14	0.00	No	-1.59	0.00	Yes	-1.04	0.00	No
Costs									
Nursing Home Costs	-273.16	0.03	No	-352.80	0.01	No	-180.96	0.28	No
Skilled HCBS Costs	171.50	0.00	Yes	183.73	0.00	Yes	94.16	0.02	No
Unskilled HCBS Costs	246.67	0.00	Yes	199.10	0.00	Yes	170.60	0.00	Yes
Outpatient Costs	1014.14	0.00	Yes	891.99	0.00	Yes	156.04	0.19	Yes
Inpatient Costs	-523.98	0.04	No	-1539.00	0.00	Yes	-697.04	0.01	No
Total Costs	490.17	0.08	No	-647.77	0.02	Yes	-609.72	0.04	No

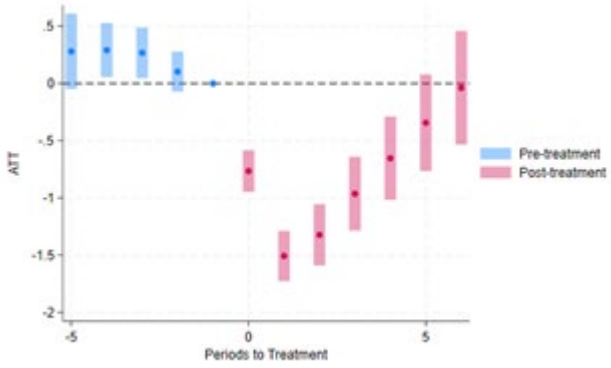
APPENDICES

Appendix 1: Characteristics of Applicants who Qualified (Treated) and were Denied (Control) for PCAFC in Fiscal Year 2021 (Unbalanced Panel Cohort)

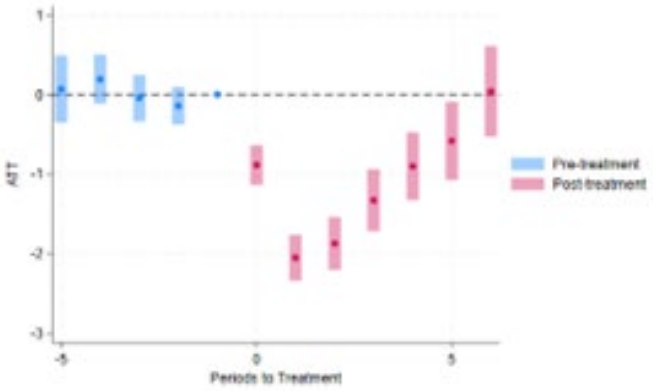
	Denied PCAFC (Control)	Accepted into PCAFC (Treated)
Age at baseline	74.10	75.80
Rural or highly rural residence	35%	36%
Drive distance to VA	16.09	16.26
# Physical chronic conditions	7.98	8.80
Any mental health diagnosis	63%	64%
JFI at baseline	4.54	5.21
Married	78%	82%
Died within 3 months of application date	7%	2%
Died within 2 years of application date	25%	35%
N	26,421	9,400

Appendix 2: Event Study Estimates of Adjusted Differences in Utilization and Cost Outcomes for PCAFC Qualifiers (n=9400) vs. PCAFC Non-Qualifiers (n=26,421) Using JWDID and an Unbalanced Panel

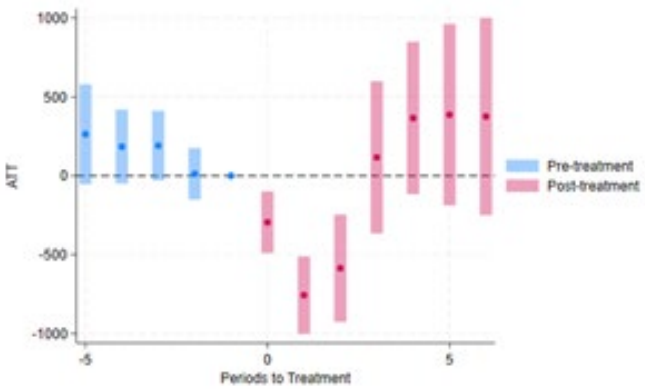
Panel A2a: Nursing Home Days



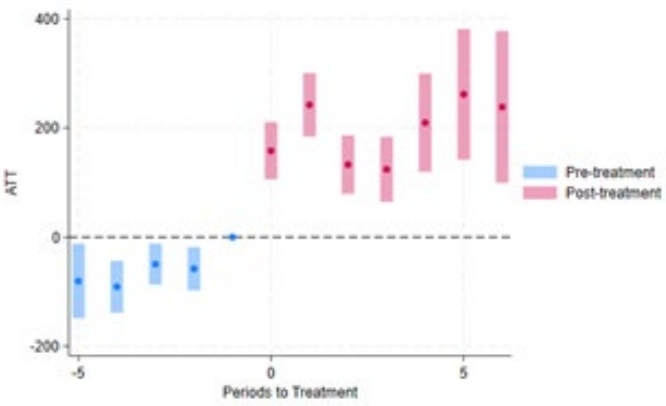
Panel A2b: Institutional Days



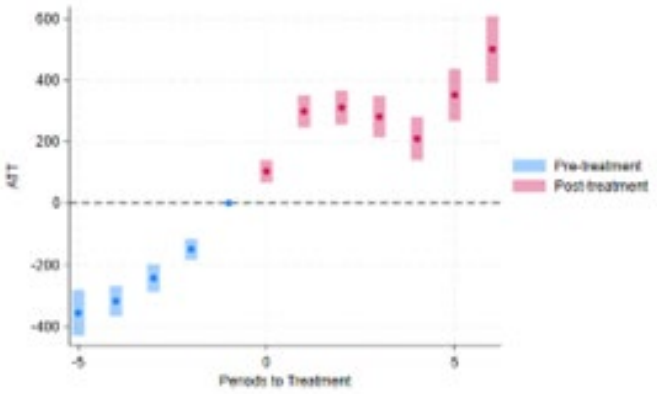
Panel A2c: Nursing Home Costs



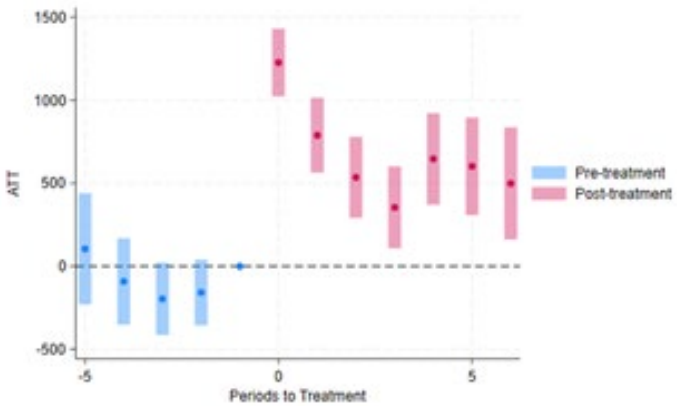
Panel A2d: Skilled HCBS Costs



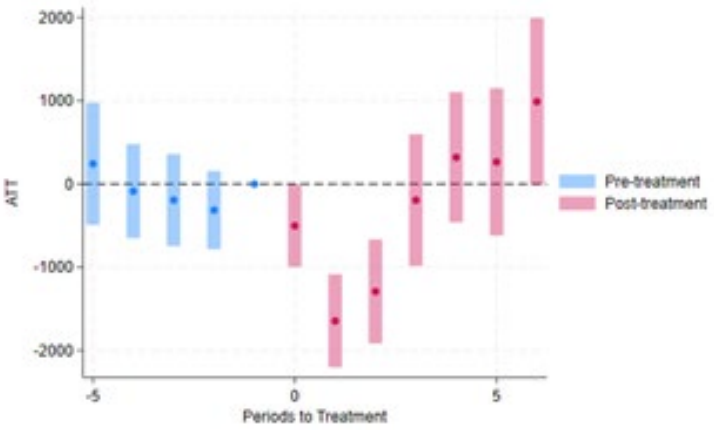
Panel A2e: Unskilled HCBS Costs



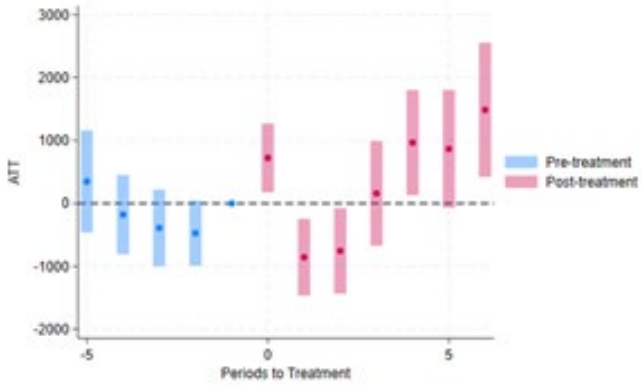
Panel A2f: Outpatient Costs



Panel A2g: Inpatient Costs

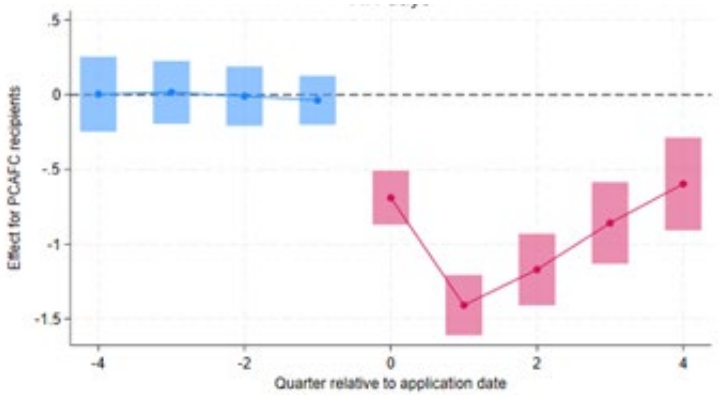


Panel A2h: Total Costs

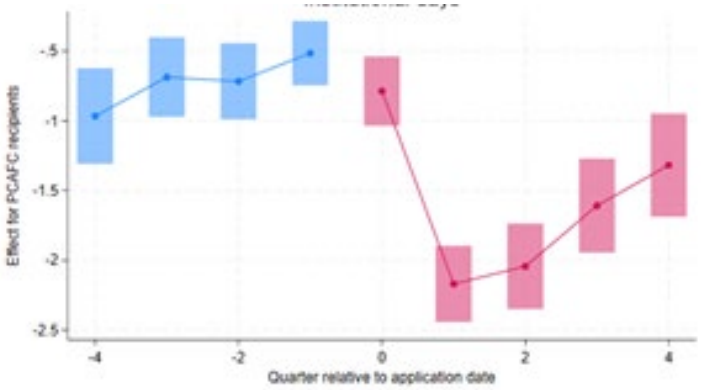


Appendix 3: Event Study Estimates of Adjusted Differences in Utilization and Cost Outcomes for PCAFC Qualifiers (n=15,164) vs. PCAFC Non-Qualifiers (n=38,759) Using First Two Year Applicants

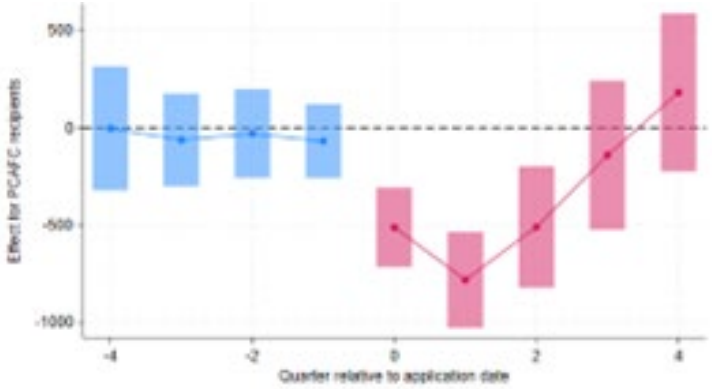
Panel A3a: Nursing Home Days



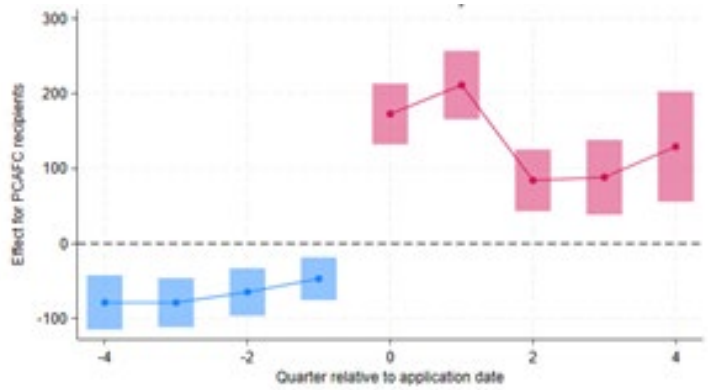
Panel A3b: Institutional Days



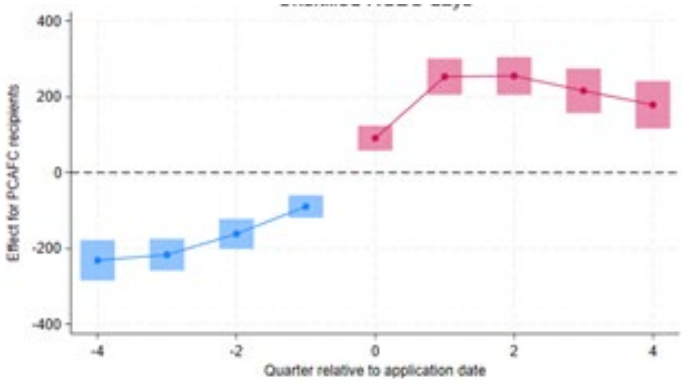
Panel A3c: Nursing Home Costs



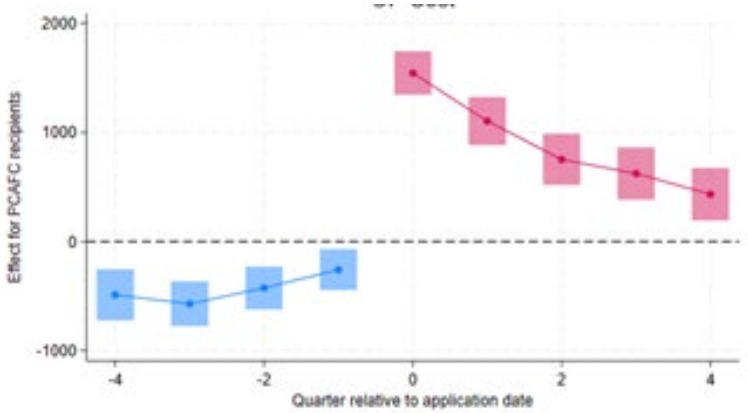
Panel A3d: Skilled HCBS Costs



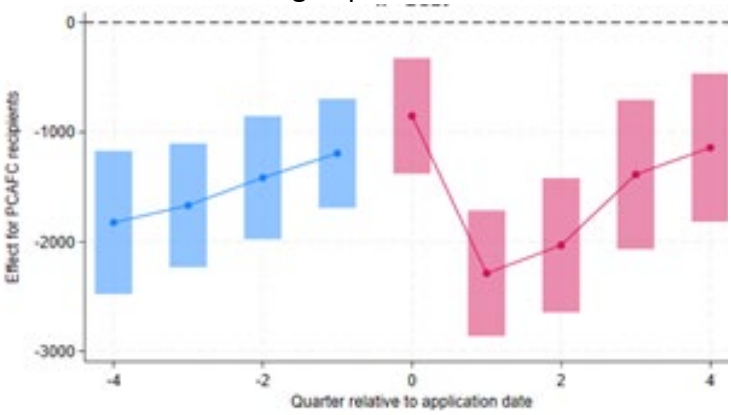
Panel A3e: Unskilled HCBS Costs



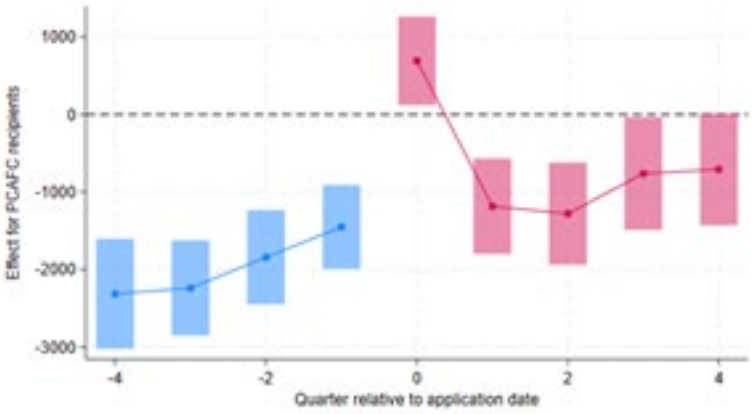
Panel A3f: Outpatient Costs



Panel A3g: Inpatient Costs

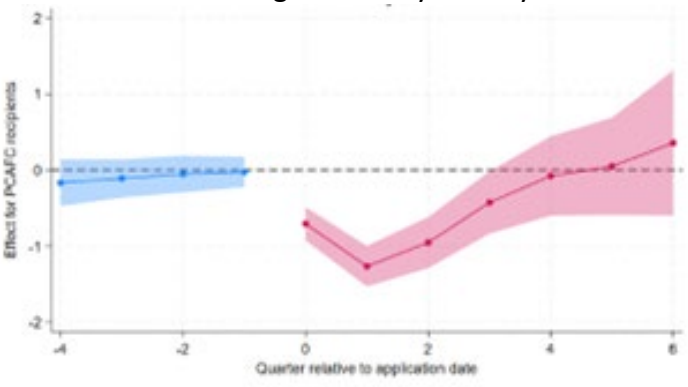


Panel A3h: Total Costs

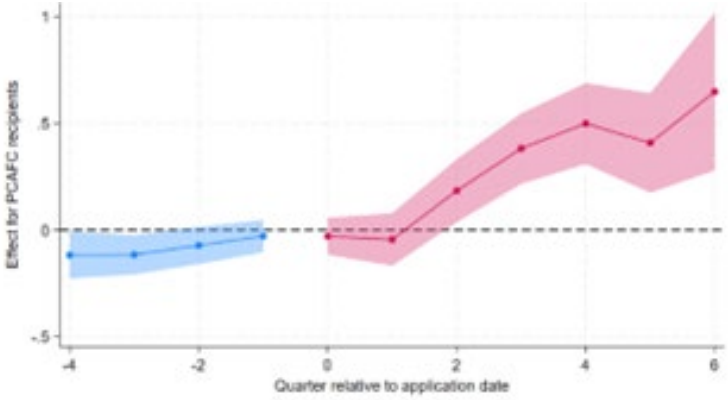


Appendix 4: Event Study Estimates of Adjusted Differences in Utilization and Cost Outcomes among PCAFC Qualifiers and PCAFC Non-Qualifiers Using Not-Yet Treated Veterans as Comparators in each Group

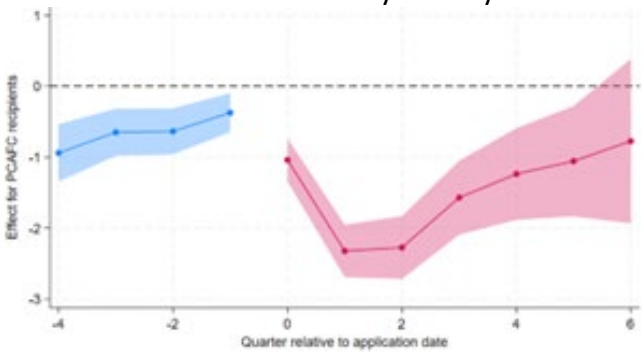
Panel A4a: Nursing Home Days – Only Treated



Panel A4b: Nursing Home Day – Only Controls



Panel A4c: Institutional Days – Only Treated



Panel A4d: Institutional Days – Only Controls

