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The Growing Primary Care Nurse Practitioner Workforce: A Solution for the Aging Population Living with Dementia

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Abstract

Redesigning the health care workforce to meet the needs of the growing population of persons living with dementia (PLWD), most of whom reside in the community and receive care from primary care providers, is a national priority. Yet, the shortage of adequately trained providers is raising concerns that the primary care system is not equipped to care for PLWD. The growing nurse practitioner (NP) workforce could bridge this gap. In this review, we synthesized the existing evidence from fourteen studies on the utilization of NPs to care for PLWD in primary care. Although we found that most NPs were engaged in co-management roles, emerging evidence suggests that NPs also serve as primary care providers for PLWD. Findings describe the impact of NP care on the health system, PLWD, and caregiver outcomes. We conclude that the optimal utilization of NPs can increase the capacity of delivering dementia-capable primary care.

Introduction

Currently, more than 5.7 million Americans have Alzheimer's disease and related dementias (referred to as persons living with dementia [PLWD]), and this number is expected to double by 2030 and triple by 2050.[1,2] Almost two-thirds of PLWD live in the community and receive health and disease management in primary care practices.[3] Primary care is also the first place where community-dwelling PLWD and their families raise initial concerns about cognition, attention, and behavioral issues and where the majority are diagnosed with cognitive impairment.[2] However, community-dwelling PLWD have high

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Author Contributions

All authors have made substantive contributions in the submitted review. More specifically, JB and VH performed the literature review with support from MP and AS. LP and TS verified the analytical methods. All authors discussed the results and contributed to the final manuscript.

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unmet needs for medical, cognitive, and behavioral management[4] and are more likely to use the emergency department and experience unnecessary hospitalizations compared to PLWD who are institutionalized.[5,6] This evidence points to potential failures in the primary care management of this vulnerable population and necessitates new approaches that begin with developing a dementia-capable workforce.[7]

Optimal primary care extends time spent living in the community, promoting a higher quality of life, health, and wellness for PLWD.[8] However, care delivery is often stifled due to lack of adequately trained primary care providers (PCPs) and geriatricians.[7,9] Currently, only ~6,200 physicians in the United States (US) specialize in geriatrics, and it is estimated that by 2030 an additional 36,000 geriatricians will be needed to meet the needs of the rapidly aging population.[10,11] As the number of PLWD in the US is growing, the US health care system cannot rely on specialists to meet the increasing care demands.[12] Thus, optimizing the capacity of the existing primary care workforce to meet the diverse and complex health needs of PLWD and their families has emerged as a top priority.

The growing NP workforce, which increased by 109% from 2010–2017 and continues to expand, could be the key to a rapid transformation in dementia primary care.[13] Foundational NP training emphasizes patient-family centered approaches, focusing on population-community health, care coordination, and chronic disease management.[14,15] Furthermore, geropsychiatric competencies are increasingly included in graduate nursing curricula, which may better prepare NPs to care for PLWD and support their family caregivers.[16,17] While the American Academy of Nurse Practitioners Certification Board retired the Gerontology National Certification in 2012,[18] the Family-NP certification, the Adult-Gerontology NP certification, and the Emergency NP certification all include an assessment of clinical knowledge on the elderly and frail elderly, attesting to NP training for care across the lifespan.[19] Beyond this, there are also opportunities for NPs to further specialize in geriatrics and dementia care. The Gerontology Nursing Certification Commission offers certification as a Geriatric Specialist[20] and the John A. Hartford Foundation, the UCLA Alzheimer's and Dementia Care program, and the Gerontological Advanced Practice Nurses Association (GAPNA) cosponsor a Dementia Care Specialist certificate.[21] Therefore, NPs are well-positioned to bridge the critical gap in primary care, but the evidence about NP proficiency and effectiveness in this setting for caring for PLWD has not yet been synthesized, and the outcomes of different dementia NP primary care models have not been reviewed in aggregate. Therefore, the goals of this literature review were to evaluate the evidence and to develop recommendations about maximizing NP contributions to dementia primary care.

Methods

The comprehensive literature search was performed using the following databases: MEDLINE, PubMed, CINAHL, EMBASE, PsycINFO, Scopus, and Web of Science. The search included studies published in English from January 2010 through February 2020 that concentrated on NPs providing primary care to PLWD. This timeframe allowed us to have up-to-date evidence. Initial search of all fields (titles, abstracts, other) included the following keyword terms: ("nurse practitioner" + dementia), ("nurse practitioner" +

Alzheimer's), and ("collaborative dementia care"). The search yielded 1,425 studies. One hundred and twenty-six duplicates were removed, leaving 1,399 records for inclusion criteria screening. In addition, a hand search of 44 relevant, high-impact factor journals (e.g., The Journal of the American Medical Association, Health Affairs, American Journal of Geriatric Psychiatry, and Journal of the American Geriatrics Society) in the fields of health services, nursing, and geriatrics/gerontology research was also completed.

Together, the searches yielded 1,416 results. Sixty-six studies met the following inclusion criteria: (a) published between 2010 and 2020, (b) published in English, (c) focused on NPs delivering primary care to PLWD, (d) peer reviewed, and (e) reported quantitative findings. Fifty-two out of 66 studies were removed after applying the following exclusion criteria: (a) a focus on long-term care, hospital, inpatient, or specialty settings (n = 17), (b) conducted outside of the US (n = 10), (c) not an empirical study (e.g., opinion editorials, study design description; n = 11), (d) systematic or narrative reviews (n = 8), (e) qualitative studies (n = 4), and (f) studies in which only RNs or other non-NP health care professionals provided care (n = 2). Any disagreements about the inclusion of the articles were resolved through consensus.

Results

Overview of the Reviewed Studies

After applying the inclusion/exclusion criteria, the combined search strategies yielded 14 articles, which are summarized by design, model, study duration, sample size, and study aims in Table 1. Selected studies had various research designs, including observational, nonequivalent control group, pre/post-survey, randomized clinical trial, and cross-sectional analyses. As shown in Table 2, 13 out of the 14 studies reported outcomes that we grouped into five categories: (1) quality indicators, (2) patient outcomes, (3) health service utilization, (4) health care costs, and (5) caregiver outcomes. Some of the selected studies provided evidence for several categories.

The Roles of NPs in the Provision of Dementia Primary Care

Across all reviewed studies, there was a wide variability in terms of NP role in caring for PLWD. While only two studies reported NPs serving as the main primary care provider,[22,23] the majority of the studies utilized NPs in co-management roles with physicians.[24–35] These programs were not directly embedded into primary care clinics, but instead were integrated through shared electronic medical records and consistent communication/consultation between providers to optimize primary care delivery. Nine out of 12 co-management studies were based on the University of California, Los Angeles (UCLA) Alzheimer's and Dementia Care (ADC) program.[25–30, 33–35] Two other studies reported on the Care Ecosystem, a telephone/web-based dementia care model in which NPs supervise non-licensed trained care navigators within a primary care setting.[31,32] One study reported on a model of care referred to as Proactive Primary Dementia Care which deploys NPs to conduct screening, medication reconciliation, education, and triage for primary care physicians caring for newly and recently diagnosed PLWD.[24]

Most of the evidence in this review on NP role in co-managing PLWD in primary care practices comes from the studies based on the UCLA ADC program. In 2006, the UCLA program began as a quality improvement study at a large outpatient clinic, in which 18 geriatricians referred patients to NPs for co-management of five chronic conditions including dementia.[25] In 2009, the program expanded to two additional primary care practices where two NPs co-managed patients aged 75 years and older who had dementia or other geriatric conditions.[33] Building upon the initial success, the UCLA ADC program was officially launched and began enrolling patients in 2012.[28,35] In the program, patients are assigned to dementia care managers who are NPs with specialized training and expertise in dementia care working with primary care physicians and community-based organizations to provide comprehensive dementia care.[28] NPs partner with referring physicians, PLWD, and their family caregivers in identifying goals and developing and updating comprehensive, patient-centered care plans and deliver care management services to PLWD who are seen at least annually. NPs make follow-up phone calls or in-person visits to make sure the plan is implemented or modified as needed and collaborate with other support staff to offer 24/7, 365-days-a-year access to family caregivers for assistance and advice to avoid acute care encounters. Care management continues for the remainder of the patient's life, or until the transition to hospice, and extends through the bereavement period for families.[26,29] Since 2012, the UCLA ADC program has provided care to over 3,000 patients with dementia and their caregivers or families.[34]

Quality Indicators (QI) of Dementia Care—Four reviewed studies evaluated whether NP co-management of dementia care resulted in the improvement of quality indicators —the utilization of appropriate protocols for the evaluation and management of dementia.[25,28,30,33] Overall, findings across the studies were consistent in showing that NP care for PLWD translated into improved quality indicators. One study assessed the percentage of recommended care received for 17 dementia QIs.[28] These indicators were grouped into three domains: assessment and screening (7 QIs), treatment (6 QIs), and counseling (4 QIs). These domains were also aggregated to assess the overall quality of care for PLWD. The study found that co-management by NPs resulted in the delivery of high-quality care for PLWD, especially for assessment, screening, and counseling. The total aggregated QI pass-rate was 92%.[28] Ganz and colleagues[25] also reported that quality of care was higher for PLWD when co-managed by NPs, compared to a group treated solely by physicians (51% vs. 30%, $p < 0.001$). Similarly, another study concluded that NP co-management was significantly associated with PLWD receiving recommended care ($p < .001$), and that the quality of this care was higher compared to PLWD who were treated by physicians alone (59% vs. 38%).[33] One study focused on QIs in preventive, diagnostic treatment as well as follow-up care processes for PLWD.[30] Although the findings did not reach statistical significance ($p = .05$), the study concluded that delegation of specific care processes to other clinicians, including NPs, was linked with high quality of care for PLWD.

Patient Outcomes

Four studies assessed patient outcomes for models of care involving NPs in the co-management of PLWD.[24,27,32,34] One intervention study did not detect an improvement in patient outcomes, such as reduction in behavioral and neuropsychiatric symptoms or

increased quality of life, but did find that patients and their caregivers were highly satisfied with the care provided by NPs.[24] Jennings et al.[27] reported that in one dementia care co-management program, which included NPs, the majority of PLWD and their caregivers reported benefits of comprehensive care planning which included setting and achieving common goals such as improving physical safety, continuing to live at home, and receiving medical care related to dementia such as fewer appointments and better pain management. About 85% of PLWD found the program helpful and, in addition, at six months following the development of goal and action plans, most patients (74%) attained or exceeded their goals. In another study, when NPs were used as dementia care managers, patient outcomes such as behavioral, psychological, and depressive symptoms improved.[34] Possin et al.[32] reported that, according to caregiver reports, PLWD enrolled in a telephone-based NP co-management program experienced a slower decline in quality of life compared to those receiving usual care.

Health Care Service Utilization

We also examined the impact of NP dementia care on health care service utilization, including admissions or readmissions to hospitals, emergency department use and transitions to long-term and hospice care. The findings were mixed across the three studies.[22,26,32] Among Medicare beneficiaries, patients in a dementia care management program were less likely to be admitted to long term care facilities over a three year follow-up; however, there were no differences in hospitalization rates, emergency department visits, or 30-day readmissions.[26] Others found that dementia programs reduced emergency department use, but not hospitalizations.[32] The NP-involved dementia comprehensive care program particularly reduced acute care utilization near the end of life.[26] Among medically-complex dementia patients with diabetes and a high illness burden, those receiving care from NP and physician assistant primary care provider had reduced hospitalizations and acute care encounters.[22] Although not all studies reported reduced rates of acute care encounters, evidence points to the important role that NPs play in reducing over-utilization of acute care services.

Health Care Costs

Two studies evaluated the impact of NP-delivered dementia care on health care costs.[22,29] One study of a dementia care management program for Medicare fee-for-service beneficiaries, in which patients were co-managed by NPs and physicians, reported that although patients were less likely to be admitted into long term care facilities, the program was cost-neutral.[29] In the second study, researchers focused on a cohort of medically-complex patients, including those with dementia as a comorbidity (6%−7% of the total sample), and compared costs depending on whether the primary care provider was a physician, NP, or physician assistant.[22] The study found that total care costs were 6%–7% lower for patients who received care by NPs and physician assistants than for those receiving care from physicians alone.[22]

Family Caregiver Outcomes

Lastly, we assessed the impact of NP care on caregiver outcomes. Caregiver burden, strain, depression, satisfaction, and self-efficacy were the most commonly evaluated outcomes

across the six studies that reported family caregiver outcomes.[24,27,31,32,34,35] Most studies demonstrated that dementia care models, which included NPs, improved certain caregiver outcomes.[27,31,32,34,35] Reuben et al.[34] reported that all evaluated caregiver outcomes (i.e., strain, burden, and depression) improved after one year in a dementia co-management program by NPs. In an evaluation of another dementia co-management program, caregivers reported goal setting was a valuable intervention strategy that improved the dementia care process.[27] Caregiver chosen goals entailed maintaining the caregiver's own health, managing stress, and minimizing family conflict related to dementia caregiving.[27] In another study evaluating a program in which NPs served as care managers, caregivers reported that the visits with NPs represented time well spent as NPs listened to their concerns, and important decisions were made for the patients.[35] Overall in this intervention, 96% of family caregivers had high levels of satisfaction and expressed that they would recommend the program to others.[35] A telephone-based dementia co-management program where NPs supervised non-licensed individuals in the assessment and care for PLWD demonstrated that caregivers' depression and burden were improved after one year of intervention.[32] Family caregivers also reported being satisfied with the service and that they would recommend the program to others.[31,32] Only one study reported that caregiver outcomes such as burden, depression, and self-efficacy did not improve in the NP-guided dementia care intervention.[24] Nevertheless, in this study, family caregivers expressed high levels of satisfaction with NPs' skills.[24]

Discussion

Guided by the publication of the National Academy of Medicine's Future of Nursing Report in 2010 calling for optimal utilization of NPs,[36] we performed a comprehensive review of recent evidence on NP role in care of PLWD in primary care practices. The growing body of research on the role of primary care NPs in the clinical management of dementia suggests promising improvements in quality of care, health services utilization, and certain PLWD and caregiver outcomes. These results are consistent with the findings from research on novel models of collaborative dementia care conducted outside of primary care settings, such as integrated memory clinics directed by NPs.[37–39] However, the findings across the studies in this literature review vary in terms of consistent impact of NP care on specific outcomes as most studies utilized NPs variably and evaluated different outcomes and quality indicators.

Although evidence exists about the quality, safety, and cost-effectiveness of primary care delivered by NPs, most studies that met our inclusion criteria assessed the impact of NP care for PLWD in a co-management model (the majority were based on the UCLA ADC program), and little evidence was identified about NPs' autonomous practice in dementia primary care. Two studies[22,23] reported NPs serving as primary care providers for PLWD with only one[22] of them investigating the impact on health care service utilization and cost outcomes among medically-complex patients with diabetes and a high illness burden including comorbid dementia. Given the fact that by 2025 almost one third of all primary care providers will be NPs,[13] it is critically important to understand how to maximally utilize NPs as primary care providers for PLWD. While this review was focused on investigating the role of NPs, physician assistants (PAs) also play an increasingly important

role in expanding the primary care workforce to meet the growing needs of PLWD.[9] While over half of NPs work in primary care settings, over 40% of PAs do as well and future work should consider the role of the interdisciplinary team in managing PLWD as well as optimal team configuration for improving outcomes in this population.[40]

Re-engineering US primary care practices to engage NPs in autonomous and co-management roles may offer an innovative solution to the current limited access to high quality primary care of PLWD and might optimize primary care delivery for PLWD.[41–43] The roles of NPs employed in dementia co-management in primary care might include various job functions and tasks, including symptom and medication screening; ongoing assessments of cognitive, behavioral, and neuropsychiatric symptoms; care plan re-evaluations; care coordination; outpatient services referral; follow-up on imaging and test results; and patient and family education on pharmacological and non-pharmacological interventions.[44–46] In addition, the autonomous role for NPs in dementia primary care could involve the entire continuum of primary care services, including appropriate screening, initial diagnosis, chronic disease management, goal-setting in the context of new or acute illness, prescribing anti-dementia medication, creating a care plan, and reviewing testing and imaging results.[44] The roles or scope of practice of NPs, however, varies by state.[44]

Only in 23 states, the District of Columbia, and two U.S. territories can PLWD receive the full range of health care services from NPs as scope of practice regulations in these areas allow full, independent NP practice.[47] Full scope of practice regulations allow NPs to care patients according to their education and training. Other states impose restrictions on NP practice, limiting their ability to care for their patients including PLWD. States with reduced and restricted NP scope of practice should invest in efforts to remove scope of practice restrictions to allow NPs to practice at the top of their education and licensure, which is consistent with the recommendations of the Federal Trade Commission, the National Academy of Medicine (formerly known as the Institute of Medicine), and previous research.[48,49] The expansion of the NP workforce not only meets important national objectives of NP workforce development,[36] but also is aligned with the Center for Medicare and Medicaid Services (CMS) value-based vision[50] and the Quadruple Aim of delivering person-centered care, improving outcomes, containing costs, and improving the work life of health care providers.[51]

In 2015, the CMS set out to improve health and cost outcomes for older adults, including PLWD, by implementing payment to practices providing chronic care management of Medicare recipients with two or more chronic conditions.[52] This services package includes assessment, care planning, care coordination, follow-up, and 24/7 access to a healthcare professional. Since the majority of PLWD have at least one other chronic disease,[53] most would qualify for chronic care management services. The evaluation revealed that Medicare beneficiaries who used these services had fewer hospitalizations and emergency room visits and total cost savings of more than $38 million.[54] Another CMS reimbursement mechanism was developed in 2017 to incentivize assessment and care planning for PLWD and their care partners.[55] However, to date, the billing codes and corresponding chronic disease management and dementia care planning services have not been widely adopted,

and racial/ethnic minority and lower social-economic status Medicare beneficiaries have disproportionately low access to these benefits.[56]

The emergence of chronic care management[57] and cognitive impairment care planning[55] as reimbursable primary care services, and the increasingly broad adaptation of the Age-Friendly Health System 4M model[58] (i.e., what matters, medications, mentation, mobility) offer infrastructure for the sustainable delivery of high quality, cost-effective dementia primary care by NPs. Creating a state-level policy environment for NPs to effectively deliver care to PLWD will help improve access to care. There are several post-graduate geriatric certifications and continuing nursing education (CNE) opportunities, but their uptake is low. Less than 2% of NPs are certified in gerontology, and less than 8% in adult-gerontology primary care.[57] Certifications and CNE can help nurses to improve their knowledge, skills, confidence, and quality of care they deliver. It is therefore essential for policymakers and health systems to create awareness and incentives for NPs to seek specialty training in these areas.

Limitations

Our review has several limitations. We limited our search to the past ten years, as the NP workforce grew significantly during the past decade. Our review does not reflect potentially relevant, earlier studies. Our findings are limited by the quality of the reviewed studies, which had several limitations. For example, most of the included studies used an observational design and were conducted at single study sites. Also, across the studies, the implemented interventions had diverse duration timelines, attributes, and characteristics, and used different outcome measures. Although some studies included in the final synthesis do not exemplify the highest level of evidence, these were the only studies currently available, and therefore make an important contribution to understanding the NP role in providing care to PLWD in primary care.

Conclusion

Our review suggests that there is emerging evidence on the improvements in quality of care, health services utilization, and certain PLWD and caregiver outcomes in dementia primary care programs that include NPs. However, there is limited evidence on the impact of NPs in delivering care to PLWD in autonomous primary care provider roles. Primary care settings and states should continue to expand the scope of practice of NPs in the delivery of dementia care. Further research is needed to understand NP role as primary care providers in caring for PLWD.

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Highlights

- **What is the primary question addressed by this study?** To synthesize the existing evidence on the utilization of nurse practitioners (NPs) in caring for persons living with dementia (PLWD) in primary care and develop recommendations about maximizing NP contributions.
- **What is the main finding of this study?** We conclude that the optimal utilization of NPs can increase the capacity of delivering dementia-capable primary care.
- **What is the meaning of the finding?** Primary care settings and states should continue to expand the scope of practice for nurse practitioners in the delivery of dementia care, and more research is needed regarding NP role as primary care providers caring for PLWD.

Table 1

Description of studies (n=14)

Reference	Design	Model	Study Duration	Sample Size	Study Aim
Ganz et al., 2010[25]	Observational	UCLA ADC	12 months	200	Quality assessment of NP co-management of dementia and 4 other chronic conditions compared to a control group
Reuben et al., 2013[33]	Observational	UCLA ADC	10 months	485	Quality assessment of physician–NP co-management for geriatric conditions including dementia
Fortinsky et al., 2014[24]	Nonequivalent control group	PPDC	12 months	62	Preliminary testing of an NP-guided dementia care intervention for newly diagnosed patients and family caregivers
Tan et al., 2014[35]	Post-Survey	UCLA ADC	16 months	100	Preliminary evaluation of caregiver satisfaction with dementia care program
Lichtenstein et al., 2015[30]	Observational	UCLA ADC	144 months	4,776	Quality assessment of the delegation of specific dementia care processes
Jennings et al., 2016[28]	Observational	UCLA ADC	3 months	797	Quality assessment of dementia care provided by NP dementia care manager
Yang et al., 2016[23]	Cross-sectional analysis	N/A	12 months	2,598,719	Identification of predominant providers of care to persons with dementia
Possin et al., 2017[31]	Post-Survey	Care Ecosystem	4 months	400	Intervention development description and caregiver participant satisfaction with a new dementia care program
Jennings et al., 2018[27]	Observational	UCLA ADC	12 months	202	Evaluation of goal attainment among persons with dementia and their caregivers in a dementia care program
Jennings et al., 2019b[29]	Observational	UCLA ADC	48 months	322	Evaluation of the end-of-life acute care and hospice use in the last 6 months of life for persons enrolled in a comprehensive dementia care management program
Jennings et al., 2019a[26]	Observational	UCLA ADC	40 months	3,249	Comparison of health care use and cost outcomes for Medicare fee-for-service beneficiaries enrolled and not enrolled in a comprehensive dementia program
Morgan et al., 2019[22]	Observational	N/A	12 months	47,236	Evaluation of health care use and costs in medically complex veterans with diabetes and co-occurring conditions such as dementia by comparing primary care provider type
Possin et al., 2019[32]	Single-blind, pragmatic randomized clinical trial	Care Ecosystem	12 months	1,560	Effectiveness testing of a model of care using centralized hubs across broad geographic areas to caregivers and persons with
Reuben et al., 2019[34]	Observational and Pre/Post-Survey	UCLA ADC	12 months	1,023	Testing of the potential effectiveness of a 1-year, health system-based comprehensive dementia care program

Note: UCLA ADC is University of California, Los Angeles Alzheimer's and Dementia Care.

PPDC is Proactive Primary Dementia Care. NP is nurse practitioner.

Table 2

Findings from 13 outcomes-based studies and their effects on patients and caregivers

Reference	Effects
	QUALITY INDICATORS
Ganz et al., 2010[25]	Compared to controls, an increased number of intervention patients were eligible for more processes of care and showed a higher quality of care in the UCLA ADC program.
Reuben et al., 2013[33]	There was an improvement in 14 quality indicators based on principles of a chronic care model for dementia in the UCLA ADC program.
Lichtenstein et al., 2015[30]	The delegation of specific care processes to NPs and other non-physician health care providers was associated with higher quality of care for persons with dementia and other geriatric conditions.
Jennings et al., 2016[28]	Improvement in assessment, screening, and counseling indicators occurred in the UCLA ADC program. There was variable improvement in treatment indicators.
	PATIENT OUTCOMES
Fortinsky et al., 2014[24]	There were no changes in neuropsychiatric symptoms and quality of life for patients enrolled in the 1-year PPDC program; however, patients reported high satisfaction with the intervention.
Jennings et al., 2018[27]	Goal setting in the UCLA ADC program was reported by patients to be important and helpful in improving the dementia care process. The majority of patients attained or exceeded goals.
Possin et al., 2019[32]	In comparison to usual care, the Care Ecosystem improved quality of life in persons with dementia when reported by caregivers.
Reuben et al., 2019[34]	There were reduced neuropsychiatric and depressive symptoms after the 1-year UCLA ADC intervention despite worsening in neurocognitive impairment and functional activities and status.
	HEALTH SYSTEM OUTCOMES
Jennings et al., 2019b[29]	Patients in the UCLA ADC program had high rates of hospice use and low acute care utilization near the end of life.
Morgan et al., 2019[22]	Compared to primary care physicians, the use of NPs and as primary care providers for complex patients with diabetes and co-occurring conditions (e.g., dementia) was associated with decreased use of acute care services.
Possin et al., 2019[32]	Patients in the Care Ecosystem program showed reduced emergency department use but no decrease in ambulance use or hospitalizations.
	HEALTH CARE COSTS
Jennings et al., 2019a[26]	Compared to Medicare fee-for-service beneficiaries not enrolled in the UCLA ADC intervention, there were reduced patient costs for those enrolled in the UCLA ADC intervention. However, after accounting for program costs, the
	intervention was found to be cost neutral for Medicare.
Morgan et al., 2019[22]	Compared to primary care physicians, the use of NPs and PAs as primary care providers for complex patients with diabetes and co-occurring conditions (e.g., dementia) was associated with lower overall costs.
	CAREGIVER OUTCOMES
Fortinsky et al., 2014[24]	There were no changes in caregiver depression, burden, and self-efficacy in dementia caregivers enrolled in the 1-year PPDC program; however, caregivers reported high satisfaction with the intervention.
Tan et al., 2014[35]	Improvement in caregiver satisfaction in the UCLA ADC program was reported.
Possin et al., 2017[31]	Improvement in caregiver satisfaction in the 1-year Care Ecosystem program was reported.
Jennings et al., 2018[27]	Goal setting in the UCLA ADC program was reported by caregivers to be important to improving the dementia care process.
Possin et al., 2019[32]	Caregiver depression and caregiver burden decreased in the Care Ecosystem program.
Reuben et al., 2019[34]	There was reduced caregiver strain, dementia burden, distress, and depressive symptoms after 1-year UCLA ADC intervention.

Note: The total number of studies do not represent unique studies; the 13 outcomes-based studies might have reported more than one category of outcomes. UCLA ADC is University of California, Los Angeles Alzheimer's and Dementia Care. PPDC is Proactive Primary Dementia Care. NP is nurse practitioner. PA is physician assistant.