Evaluation of Veterans Affairs primary care nurse practitioner residency: Achievement of competencies

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ABSTRACT

Background: The Institute of Medicine has recommended the establishment of residency programs for advanced practice nursing graduates. Currently, the evidence about program effectiveness is limited.

Purpose: To describe the nurse practitioner (NP) resident outcomes on seven competency domains established by the VA Centers of Excellence in Primary Care Education (VA CoEPCE).

Methods: We evaluated mean NP resident competency self-ratings and mean mentor ratings over the 12-month program across NP residency programs at five sites. Highest and lowest rated items and differences between NP resident self-ratings and mentor ratings were analyzed.

Results: Mean NP resident self-ratings and mean mentor ratings demonstrated statistically significant improvement in all domains ($p < .0001$). At 12 months, NP residents were rated by their mentors as able to practice without supervision in all competency domains. At 1 and 12 months, clinical, leadership and quality improvement/population management competencies were the lowest scored domains while patient-centered care, interprofessional team collaboration, shared decision-making and sustained relationships competencies were highest.

Conclusions: These results provide initial evidence for the effectiveness of VA CoEPCE NP residency programs and also highlight areas of needed improvement.

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Introduction

The Institute of Medicine (IOM) report, *The Future of Nursing: Leading Change, Advancing Health*, identified the need for transition-to-practice programs for those completing an advanced practice nursing degree and recommended the establishment of residency programs (IOM, 2010). Nurse practitioner (NP) post-graduate residency or fellowship training programs have expanded rapidly since the report was issued, with more than 90 programs in the United States in numerous specialty areas and clinical settings (https://apgap.enpnetwork.com). The Veterans Affairs (VA) funds 16 NP residency programs that focus on primary care, acute care, and psychiatry/mental health. All these training programs are in high demand from new graduate NPs. The Carolinas Health System, which has NP and physician assistant fellowship programs in acute care, primary care, and mental health, had 823 applicants for 158 positions over seven cohorts (Taylor, Broyhill, Burris, & Wilcox, 2017). The VA Centers of Excellence in Primary Care Education (CoEPCE) 2017 to 2018 cohort is competitive, with at least five applicants for each NP residency position across all sites.

To ensure the quality of education provided by NP post-graduate training programs, the following accreditation organizations were recently established: the American Nurse Credential Center (ANCC) http://www.nursecredentialing.org/Accreditation/PracticeTransition and the National Nurse Practitioner Residency and Fellowship Training Consortium (NNPRFTC) (http://www.nppostgradtraining.com/). The ANCC standards focus on program leadership, organizational enculturation, development and design, practice-based learning, professional development, and quality outcomes. The NNPRFTC standards include mission/vision/objectives, curriculum, evaluation, program eligibility, administration, operations, staff, and trainee services.

To date, the literature articulating the effectiveness of NP post-graduate residency programs on trainee outcomes is sparse. For example, several articles described NP post-graduate training programs (Flinter, 2011; Goudreau et al., 2011; Harris, 2014; Varghese, Silvestri, & Lopez, 2012); yet, only seven articles discussed outcomes (Bush & Lowery, 2016; Flinter & Hart, 2017; Schofield & McComiskey, 2015; Taylor et al., 2017; Thabault, Mylott, & Patterson, 2015; Wallace, 2013; Zapatka, Conelius, Edwards, Meyer, & Brienza, 2014). Of these, four articles were qualitative reports with small sample sizes and included (a) why individuals sought out a post-graduate NP training program (Zapatka et al., 2014), (b) feasibility of establishing a post-graduate NP program from the stakeholder perspective (Wallace, 2013), (c) strengths of a post-graduate NP training program from the perspective of the NPs and their preceptors (Thabault et al., 2015), and (d) analysis of reflective journaling to understand how the residency facilitated transition to practice (Flinter & Hart, 2017). The quantitative reports include (a) job satisfaction comparing NPs with post-graduate education with new NPs without post-graduate education (Bush & Lowery, 2016); (b) NP residents' perceptions about readiness to practice, performance, decision-making, physician and NP satisfaction, role confusion, and transition to independence (Schofield & McComiskey, 2015); and (c) increased clinical knowledge and confidence in practice (Taylor et al., 2017).

Given both the high demand from new NP graduates for post-graduate training programs and the rapidly growing number of these programs, data are needed to demonstrate effectiveness of these programs. In addition, the IOM (2010) recommends that organizations "should evaluate the effectiveness of the residency programs in improving the retention of nurses, expanding competencies, and improving patient outcomes" (p. 12).

In 2011, the CoEPCE initiative developed a 12-month NP residency program embedded within an interprofessional primary care learning environment (Gilman, Chokshi, Bowen, Rugen, & Cox, 2014; Rugen et al., 2014). The primary goal of the residency is the attainment of competency to work in, lead, and improve team-based primary care. In 2012, the NP leaders at the five CoEPCE sites and the CoEPCE national NP and physician consultants, all with primary care expertise, developed a competency tool. Sources reviewed in the development of the competency tool were the National Organization for Nurse Practitioner Faculties adult-gerontology primary care nurse practitioner competencies and NP core competencies, the American Association of Colleges of Nursing doctor of nursing practice (DNP) essential competencies, the National Committee for Quality Assurance patient-centered medical home standards, the Interprofessional Education Collaborative Expert Panel core competencies, and the Accreditation Council for Graduate Medical Education core competencies. The development was an iterative process with the experts across the sites. In addition, content validity was determined by revising the tool based on input from an NP resident completing the program and experienced VA primary care NPs. A detailed description of the competency tool development is published elsewhere (Rugen, Speroff, Zapatka, & Brienza, 2016). The intent of the competency tool was to (a) standardize evaluation across the sites, (b) demonstrate effectiveness, (c) show individual NP resident progression over the course of the program, and (d) measure individual and aggregate attainment of competence across the seven competency domains. It was imperative to provide evidence of effectiveness of the NP residency program as a step toward sustainment of the program because it was funded as a novel pilot program with no precedence in VA. In addition, standardization of evaluation and aggregation of data across the sites was appropriate

as each site had small numbers of NP residents in each cohort.

The purpose of this article is to describe the aggregate NP resident outcomes across 69 items in seven competency domains across the five VA CoEPCE from 2012 to 2015. Specifically, we evaluated NP resident competencies with respect to (a) NP progress (self and mentor evaluation) over the 12-month program using mean scores, (b) the identification of the aggregate highest and lowest scores at 1 and 12 months, and (c) differences between aggregate mean self and mentor scores at 1, 6, and 12 months.

Methods

The analysis of the competencies was categorized as program evaluation in accordance with the Veterans Health Administration Handbook 1058.05 and determined to be exempt from institutional review board oversight.

Participants

The data from all NP residents who enrolled in the CoEPCE NP primary care residency program and their mentors at five sites from 2012 to 2015 were analyzed.

Description of CoEPCE NP Residency

The 1-year full-time CoEPCE NP primary care residency program was developed to enable new graduate NPs to learn to work in, lead and improve interprofessional patient-centered care teams. Interprofessional learning and collaborative practice occurs with physician residents, postdoctorate pharmacy residents, and postdoctorate psychology fellows. Admission requirements included (a) graduation from an accredited master's or DNP adult-gerontology primary care or family NP program within the prior year, (b) attainment of board certification and state advanced practice registered nurse licensure within 90 days of starting the residency, and (c) a rigorous interview and selection process.

The CoEPCE NP residency curriculum focuses on the advancement of clinical and diagnostic skills, veteran-specific care needs, leadership and scholarship skills through interprofessional workplace learning opportunities and collaborative care. The NP residents are assigned a primary care patient panel and at some sites also share or cross cover patients with physician residents in practice partnership models. They work in a patient-centered medical home model with a team composed of an registered nurse care manager, licensed practical nurse or licensed vocational nurse, and clerk. They are also assigned a mentor who is a VA primary care provider. The mentor could be an NP or a physician; mentor selection is based on availability and other trainee assignments. At some sites, they are precepted by physician—NP dyad mentors. Optional specialty care rotations, and in some sites inpatient rotations, are available. NP residents are mentored to lead shared medical appointments, case conferences, and team huddles. Scholarly pursuits, such as leading journal clubs, presenting and publishing are encouraged and mentored. Trainees of all professions learn and work collaboratively on population management and performance improvement projects. In the second half of the program, the NP residents participate in precepting NP students and trainees of other professions with supervised mentorship (Rugen et al., 2016).

VA CoEPCE NP Residency Competency Assessment Tool

The VA CoEPCE NP resident competency assessment tool consists of 69 items within seven domains: clinical, leadership, interprofessional collaboration, patient-centered care, shared decision-making, sustained relationships, and performance improvement/population management. The rating scale is based on entrustment of professional activities with the level of supervision needed to carry out the activity (Ten Cate, 2005). The levels are as follows: 0—not performed/not observed, 1—observes task only, 2—needs full supervision, 3—needs supervision periodically, 4—is able to perform without supervision, and 5—able to supervise others. NP residents are intended to demonstrate proficient independent practice in all domains by the completion of the program. The NP resident and his and/or her designated mentor independently completed the competency tool at 1, 6, and 12 months. The mentor is the individual the NP resident presents patients' cases to; therefore, the mentor has direct knowledge of the resident's performance. Mentors also gather information about performance from electronic medical record review and feedback from other providers and clinic staff. After completion at each of 1, 6, and 12 months, the NP resident and mentor discuss their competency ratings (Rugen et al., 2016). Preliminary psychometric analysis demonstrates high internal consistency (among the items) for each of the seven domains when scored by the NP resident and mentor (Cronbach alpha, 0.86—0.95).

Data Analysis

Descriptive statistics (including frequencies and measures of central tendency and dispersion) were conducted to evaluate the distributional characteristics of each item rated by the NP resident and mentor. Domain subscale scores were calculated at 1, 6, and 12 months separately for NP resident and mentor ratings by averaging item ratings when at least 80% of the items were rated. If less than 80% of the items within a domain were rated, the subscale score was set to missing, and averages were not calculated. Two-tailed standardized t tests were used to test for statistically

Table 1 − Demographic Characteristics of NPRs (n = 38)	
Characteristic	N (%)
Gender	
Female	32 (84.2)
Male	6 (15.8)
Prior CoEPCE NP student	
Yes	19 (50.0)
No	19 (50.0)
Type of NP program	
BSN to MSN	21 (55.2)
Graduate entry	17 (44.8)
Years of RN experience before NP residency	
Mean (y)	5.46
Median	4.0
SD	7.13
Range	0−31
Age*	
Mean (y)	34.1
SD	9.4
Range	27−59

Note. BSN, Bachelor of Science in Nursing; CoEPCE, Centers of Excellence in Primary Care Education; MSN, Master of Science in Nursing; NP, nurse practitioner; NPRs, nurse practitioner residents; RN, registered nurse; SD, standard deviation.
p = .04.
* Age was reported by 10 participants.

significant mean differences between NP resident and mentor mean scores for each domain at each time point. Generalized linear models were used to statistically test (for each domain) whether NP residents (when assessed by either themselves or by their mentors) progressed with increasing score values over the 12 months. All analyses were conducted using SAS software, version 9.4 (SAS Institute Inc, 2013).

Findings

Sample Characteristics

Between 2012 and 2015, 38 participants enrolled at the five VA CoEPCE sites. Thirty-six NP residents completed the yearlong program. Two left early for nonperformance-related issues. NP residency enrollment and site participation increased over time, 2012−2013: eight NP residents across three sites; 2013−2014: 11 NP residents across four sites; and 2014−2015: 19 NP residents across five sites. Most of the NP residents were females (84.2%), and 50% had prior training in a CoEPCE as an NP student. NP residents were either graduates of a Bachelor of Science in Nursing to Master of Science in Nursing (MSN) program (55.2%) or a graduate entry to advanced practice nursing program (44.8%) (Table 1).

Twenty-six of the 38 NP residents (68.4%) had complete self-assessments and mentor assessments at all time points. NP resident self-assessment completion

was lowest at 12 months (81.2%) as some left the program without completing the assessment. Mentor assessment completion was lowest at the 6-month time point (89.5%) in part because one site did not collect the 6-month competency assessments until 2013. The two NP residents who did not complete the program account for some of the missing assessments at 6 and 12 months.

NP Resident Competency Scores and Progression Over the 12-Month Program

The trend of increasing mean domain scores over time for NP residents and mentors is displayed in Figure 1A to 1G. The educational goal was attained with a mean score of 4 or above (4 = able to perform without supervision) for all domains. For each domain, the mean changes in domain scores over the 12-month training program were statistically significant for both NP residents and mentors ($p < .0001$).

At the beginning of the NP residency program, the highest mean scores for both NP residents and mentors were in the interprofessional collaboration, sustained relationships, patient-centered care, and shared decision-making competency domains. Both mentor and NP resident mean scores in these same competency domains were the highest at the end of the 12-month training program. Both mentors and NP residents scored the following competency domains lowest at 1 month: clinical competency, leadership, and performance improvement/population management. Performance improvement/population management was the lowest scored at 12 months by both mentor and NP resident self-report.

Identification of Highest and Lowest Scores at 1 and 12 Months During NP Residency Program

Analysis of each item within each competency domain enabled identification of specific areas where NP residents and mentors scored higher or lower. We describe our findings later for each competency domain. Table 2 includes each item and aggregate scores by NP residents and mentors at 1 and 12 months.

Clinical Competency Domain
At 1 month, the NP residents scored on average 22 of 28 items lower than 3 (3 = needs supervision periodically); with mentors in agreement for 18 of these items. The items scored highest by the mentors at 1 month were clear and concise case presentation, management of obesity, perform comprehensive history and physical examination, and perform medication reconciliation. The lowest scoring items by mentors at 1 month were management of military sexual trauma and management of traumatic brain injury (TBI), which remained the lowest scoring items at 12 months as well. At 12 months, NP residents scored all items higher than 4 (4 = able to perform without supervision) with the exception of management of chronic renal failure,
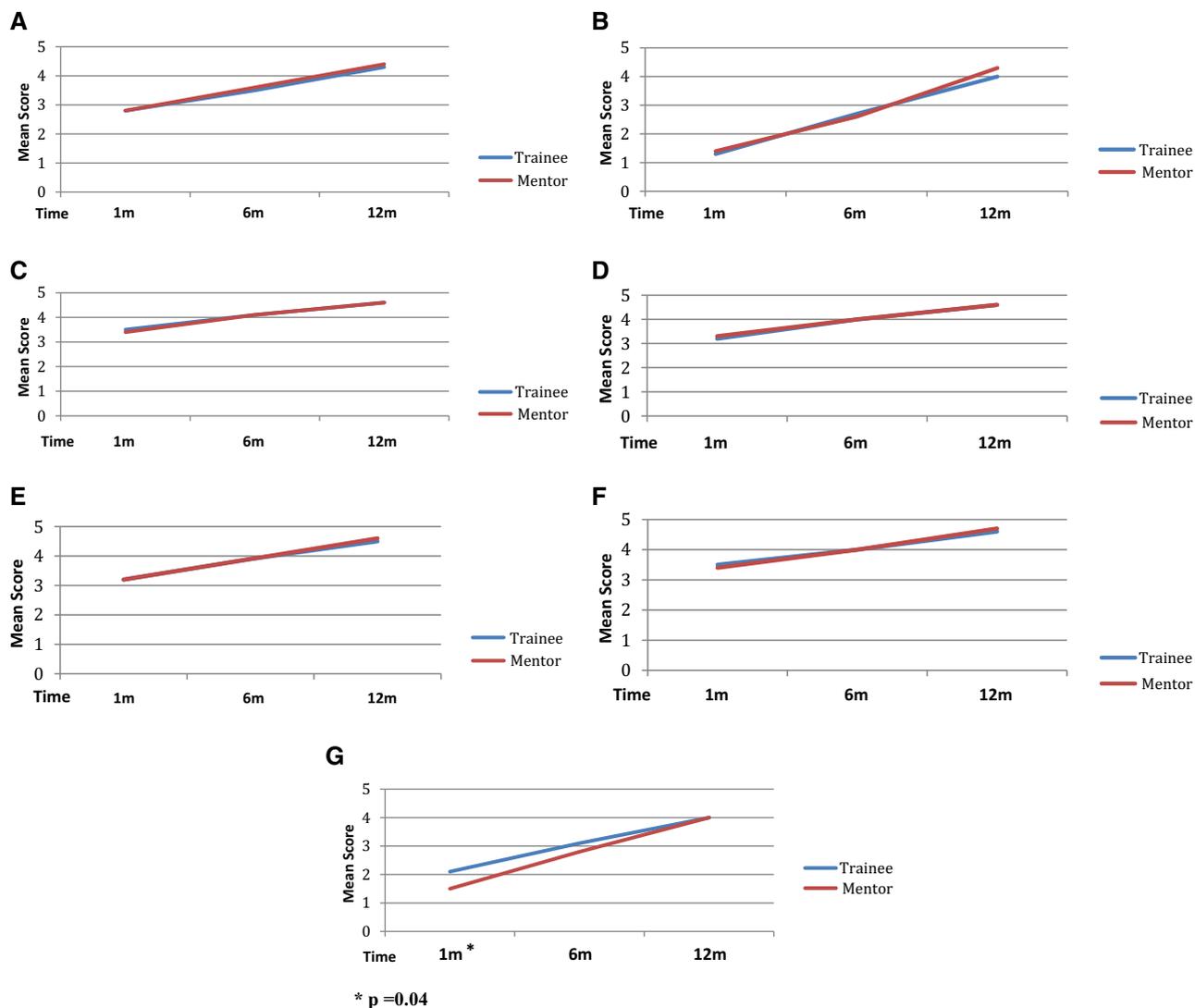
Figure 1 − **(A)** Clinical competency subscale scores by rater over time. **(B)** Leadership competency subscale scores by rater over time. **(C)** Interprofessional team collaboration subscale scores by rater over. **(D)** Patient-centered care subscale scores by rater over time. **(E)** Shared decision-making subscale score by rater over time. **(F)** Sustained relationship subscale scores by rater over time. **(G)** Quality improvement/population management subscale scores by rater over time.

management of heart failure, management of military sexual trauma, and management of TBI.

Leadership Competency Domain
At 1 month, NP residents' mean score on all seven items was lower than 2 (2 = requires direct supervision); similarly, mentors scored six of seven items in this way. The only item with a mean score higher than 2 by mentors was apply leadership strategies to support collaborative practice/team effectiveness. At 12 months, mentors' mean scores on all items were 4 or higher; however, NP residents only scored three items higher than 4. The two lowest scored items by NP residents at the 12 months were lead huddles and lead team meeting using conflict management/resolution. The lowest mentor mean score was

lead team meeting using conflict management resolution.

Interprofessional Collaboration, Patient-Centered Care, Shared Decision-Making, and Sustained Relationship Competency Domains
At 1 month, mentors and NP residents scored most items 3 or higher (3 = needs partial supervision). The items that both mentors and NP residents scored on average lower than 3 at 1 month included the following: use motivational interviewing; activate community resources to meet patient/population needs; give timely, sensitive, and instructive feedback to others about their performance on team; devise, follow, review, and adjust longitudinal care plan to meet assigned patient panel needs; and track/coordinate

Table 2 – NP Resident and Mentors Mean Scores of Competency Items at 1 and 12 Months

Competency Item	NP Resident	Mentor	NP Resident	Mentor
	Mean (SD) at 1 mo		Mean (SD) at 12 mo	
Clinical competency				
Management of military sexual trauma	2.0 (1.0)	2.0 (1.4)	3.8 (0.93)	3.9 (1.4)
Management of TBI	2.2 (1.1)	2.1 (1.2)	3.9 (0.75)	3.9 (1.4)
Management of PTSD	2.4 (0.93)	2.5 (0.90)	4.0 (0.79)	4.2 (0.94)
Management of hepatitis C	2.4 (1.0)	2.3 (1.1)	4.2 (0.64)	4.3 (0.61)
Management of suicidality	2.4 (1.3)	2.3 (1.2)	4.1 (0.80)	4.2 (1.1)
Management of ischemic heart disease	2.6 (0.72)	2.5 (0.77)	4.1 (0.67)	4.2 (0.73)
Management of peripheral arterial disease	2.6 (0.72)	2.7 (0.94)	4.0 (0.68)	4.3 (0.67)
Management of chronic renal failure	2.6 (0.76)	2.6 (0.92)	3.8 (0.65)	4.2 (0.72)
Management of anemia	2.6 (0.79)	2.7 (0.97)	4.0 (0.65)	4.3 (0.70)
Management of COPD	2.6 (0.86)	2.7 (0.98)	4.2 (0.43)	4.4 (0.60)
Management of asthma	2.6 (0.89)	2.8 (0.81)	4.3 (0.61)	4.4 (0.61)
Management of substance abuse	2.6 (0.96)	2.6 (1.0)	4.0 (0.71)	4.2 (0.96)
Management of heart failure	2.7 (0.58)	2.6 (0.65)	3.9 (0.72)	4.1 (0.78)
Order appropriate screening and diagnostic tests	2.8 (0.42)	3.0 (0.72)	4.5 (0.68)	4.4 (0.69)
Order appropriate medications	2.8 (0.51)	2.7 (0.64)	4.2 (0.77)	4.3 (0.72)
Construct pertinent differential diagnosis	2.8 (0.56)	2.9 (0.81)	4.2 (0.71)	4.4 (0.76)
Management of diabetes	2.8 (0.65)	2.9 (0.63)	4.3 (0.70)	4.3 (0.68)
Management of depression	2.8 (0.76)	2.9 (0.61)	4.3 (0.69)	4.5 (0.50)
Use evidence-based guidelines	2.8 (0.92)	3.0 (0.91)	4.3 (0.76)	4.5 (0.65)
Management of osteoarthritis	2.9 (0.68)	3.0 (0.85)	4.5 (0.57)	4.6 (0.49)
Management of enlarged prostate	2.9 (0.92)	2.9 (0.79)	4.2 (0.64)	4.5 (0.51)
Management of gastroesophageal reflux	2.9 (0.95)	3.1 (0.83)	4.5 (0.57)	4.7 (0.48)
Order appropriate consults	3.0 (0.69)	3.0 (0.66)	4.6 (0.49)	4.5 (0.66)
Clear and concise case presentation	3.1 (0.76)	3.2 (0.75)	4.6 (0.56)	4.6 (0.56)
Management of hypertension	3.1 (0.89)	3.0 (0.62)	4.6 (0.61)	4.6 (0.49)
Management of obesity	3.3 (0.97)	3.3 (0.71)	4.6 (0.49)	4.7 (0.48)
Perform comprehensive history and physical examination	3.5 (0.65)	3.2 (0.85)	4.7 (0.46)	4.7 (0.47)
Perform medication reconciliation	3.5 (0.83)	3.5 (0.87)	4.7 (0.47)	4.6 (0.59)
Leadership				
Lead case conference	1.5 (1.5)	1.6 (1.5)	4.1 (1.3)	4.2 (1.2)
Lead shared/group medical appointment	1.5 (1.5)	1.2 (1.5)	3.9 (1.5)	4.4 (0.99)
Lead PACT team performance improvement project	1.5 (1.5)	1.4 (1.5)	3.9 (1.1)	4.2 (1.3)
Lead team meeting using conflict management resolution	1.5 (1.5)	1.4 (1.5)	3.7 (1.4)	4.0 (1.4)
Lead group education activities for patients/families	1.6 (1.6)	1.7 (1.7)	4.3 (0.69)	4.6 (0.60)
Apply leadership strategies to support collaborative practice/team effectiveness	1.9 (1.6)	2.2 (1.5)	4.4 (0.55)	4.4 (0.70)
Lead PACT team huddles	1.9 (1.8)	1.6 (1.8)	3.8 (1.9)	4.2 (1.4)
Interprofessional team collaboration				
Function as a resource	3.1 (0.98)	3.3 (1.2)	4.5 (0.50)	4.5 (0.91)
Engage self/others to manage disagreements	3.1 (1.2)	2.8 (1.3)	4.4 (0.50)	4.5 (0.64)
Safely transition patients among team; handoffs	3.2 (1.1)	3.0 (1.4)	4.7 (0.48)	4.5 (0.56)
Engage in professional and interprofessional development	3.3 (1.1)	3.3 (1.2)	4.7 (0.47)	4.6 (0.49)
Develop own professional identity; explain role and responsibilities	3.7 (0.61)	3.6 (1.1)	4.7 (0.47)	4.6 (0.49)
Maintain open communication with team for quality care	3.7 (0.66)	3.6 (0.96)	4.7 (0.44)	4.7 (0.48)
Seek feedback from faculty and team members	3.7 (0.81)	3.7 (0.77)	4.6 (0.50)	4.5 (0.50)
Use respectful language	3.7 (0.94)	3.7 (0.97)	4.7 (0.46)	4.6 (0.49)
Appreciate contribution of other team members	3.8 (0.73)	3.9 (0.70)	4.8 (0.42)	4.7 (0.44)
Patient-centered care				
Track/coordinate care for patients ensuring follow-up	2.9 (0.91)	3.1 (1.2)	4.5 (0.56)	4.6 (0.55)
Uses motivational interviewing	2.9 (1.1)	2.7 (1.5)	4.3 (0.64)	4.5 (0.56)
Communicate with patient between visits by phone, secured message, and MyHealtheVet	3.0 (1.1)	3.2 (1.1)	4.7 (0.44)	4.6 (0.54)
Engage health professionals in shred patient-centered problem solving	3.1 (0.79)	3.1 (1.1)	4.6 (0.50)	4.5 (0.56)
Identify, accommodate, customize care for patients with language, cognitive, functional, or cultural barriers	3.3 (0.89)	3.4 (0.94)	4.6 (0.50)	4.6 (0.49)
Assess/provide education to empower patients to self-manage chronic conditions	3.5 (0.84)	3.4 (1.1)	4.7 (0.46)	4.6 (0.49)

Table 2 — (Continued)				
Competency Item	NP Resident	Mentor	NP Resident	Mentor
	Mean (SD) at 1 mo		Mean (SD) at 12 mo	
Elicit patient values, preferences, and cultural beliefs	3.7 (0.60)	3.8 (0.58)	4.7 (0.47)	4.6 (0.54)
Shared decision-making				
Activated community resources to meet patients or population needs	2.8 (1.0)	2.8 (1.3)	4.3 (0.70)	4.5 (0.56)
Share accountability with others	3.0 (0.86)	3.4 (1.1)	4.5 (0.50)	4.6 (0.60)
Engage patients in advanced care planning	3.0 (1.2)	2.8 (1.5)	4.3 (0.71)	4.5 (0.94)
Engage patients as care team members in tracking care	3.1 (0.95)	3.1 (1.1)	4.4 (0.57)	4.7 (0.49)
Facilitate patient participation in health care decisions	3.2 (0.99)	3.1 (1.0)	4.5 (0.56)	4.5 (0.94)
Counsel/support patient in self-management of chronic disease	3.4 (0.86)	3.4 (0.80)	4.6 (0.56)	4.7 (0.52)
Use active listening skills	3.7 (0.68)	3.8 (0.57)	4.7 (0.47)	4.7 (0.44)
Sustained relationships				
Devise, follow, review, and adjust longitudinal care plan	2.7 (0.95)	3.0 (1.0)	4.4 (0.57)	4.6 (0.60)
Give timely, sensitive, instructive feedback to others about their performance on team	2.9 (1.4)	2.7 (1.4)	4.5 (0.57)	4.6 (0.60)
Develop/sustain respectful and trusting relationship with clinic staff	3.7 (0.80)	3.7 (0.97)	4.6 (0.49)	4.7 (0.44)
Develop/sustain respectful and trusting relationship with peer trainees	3.7 (0.97)	3.9 (0.71)	4.5 (0.51)	4.6 (0.90)
Develop/sustain respectful and trusting relationship with patients/families	3.8 (0.70)	3.9 (0.66)	4.7 (0.47)	4.7 (0.44)
Develop/sustain respectful and trusting relationship with faculty, preceptor, and mentor	3.9 (0.75)	3.7 (0.93)	4.6 (0.49)	4.7 (0.44)
Performance improvement/population management				
Query registries to determine the health status/needs of entire practice/population of interest	1.8 (1.4)	1.8 (1.5)	4.0 (0.74)	4.1 (1.2)
Perform root cause analysis and reflect on critical incidents	2.1 (1.7)	1.2 (1.3)	3.8 (1.1)	3.2 (1.8)
Improve care via plan—do—study—act cycles	2.1 (1.7)	1.7 (1.8)	3.8 (1.0)	3.9 (1.4)
Access/interpret performance data	2.2 (1.6)	1.8 (1.5)	4.1 (0.67)	4.2 (1.2)
Reflect on individual/team performance and introduce strategies for improvement	2.5 (1.5)	2.0 (1.6)	4.2 (0.70)	4.3 (1.0)

Note. COPD, chronic obstructive pulmonary disease; NP, nurse practitioner; PACT, patient-aligned care team; PTSD, post-traumatic stress disorder; SD, standard deviation; TBI, traumatic brain injury.
The levels are as follows: 0—not performed/not observed, 1—observes task only, 2—needs full supervision, 3—needs supervision periodically, 4—is able to perform without supervision, and 5—able to supervise others.

care for patients ensuring follow-up on messages, tests, consults, and care at other facilities. Other items scored lower than 3 by mentors at 1 month included the following: engage self/others to manage disagreements about values, roles, goals, and actions as well as engage patient in advanced care planning. At 12 months, NP resident and mentor scores were higher than 4 (4 = able to perform without supervision) on all 29 items.

Performance Improvement/Population Management Competency Domain

NP residents and mentors' mean scores were low on this domain. Mentors' mean scores on four of the five items was less than 2 (2 = requires direct supervision). The lowest scored item by both NP residents and mentors at 1 month was query registries to determine the health status/needs of entire practice/population of interest. At 12 months, mentors scored only three of five items higher than 4. The lowest mean scores from mentors and NP residents at 12 months were perform root case analyses and reflect on critical incidents as well as improve care via plan—do—study—act cycles.

Concordance Between Mentor and NP Resident Mean Competency Scores at 1, 6, and 12 Months

At 1 month, the difference in mean scores was statistically significant for only one of the seven domains (performance improvement/population management, $p = .04$) for which mean mentor scores were lower than mean NP resident scores (Figure 1g). There were no statistically significant differences between NP resident and mentor mean scores for any domain at 6 or 12 months.

Discussion

The most important results of our analytical work are that by the completion of the program, VA CoEPCE NP residents demonstrated readiness for independent practice in all seven competency domains and significant improvement by self and mentor ratings over the 12-month training program. NP residents began the

program with strengths in interprofessional collaboration, sustained relationships, patient-centered care, and shared decision-making domains. This is no surprise as these concepts are foundational to the nursing profession. The NP residents demonstrated further competency in these domains by the end of the program including in areas they initially scored lower (i.e., motivational interviewing, advanced care planning, seeking feedback, functioning as a resource to other health professionals and using resources, safely transition patients among team/settings, and managing disagreements). The lower ratings on these competency items at the beginning of the residency may be due to minimal exposure as a student to longitudinal learning experience in which they become part of the clinical team and establish relationships with patients/families, peer learners, and clinic staff. Some NP programs may teach these concepts, but NP students require additional workplace learning to become proficient as we have observed over the past 6 years. Alternatively, academic NP programs may seek to enhance their educational approaches to these domains so that NP graduates may be better prepared.

NP residents entered the program with numerous areas for improvement, particularly in clinical competency, leadership, and performance improvement/population management. Given the competitive selection process of CoEPCE, these NP residents represent very successful graduates of high-caliber academic programs. Therefore, these may be common areas of improvement for many new NP graduates, and our CoEPCE sites will strive to improve learning experiences in these areas.

Many of the clinical competency items rated less than 3 at the 1-month rating period are common conditions essential for primary care providers to be competent in assessing and treating. The fact that new NP graduates are requiring direct to periodic supervision at 1 month supports the IOM (IOM, 2010) recommendations for the development of transition-to-practice programs. At the end of the NP residency program, the NP residents rated themselves lowest in the management of chronic renal failure, heart failure, military sexual trauma, and TBI. These findings are similar to the survey by Hart and Bowen (2016) in which NPs reported that they were least prepared for management of multiple or complex health concerns, management of mental health concerns, and specialty areas including cardiology on completion of their NP education. The low ratings in sexual trauma and TBI specifically are not unexpected as academic curricula may cover them briefly; however, the low ratings raise concern because veterans have a high prevalence for these conditions. Our CoEPCEs plan to incorporate many of the resources VA has to offer on these conditions and will partner with psychology staff to develop curricula. Didactic sessions, self-learning modules, and/or specialty rotations to cardiology/heart failure and nephrology clinics have been put into place at most of the sites to address the low

ratings in the management of heart failure and chronic kidney disease. Academic NP programs could consider a review of their curricula on these health conditions to evaluate why they are rated low and possibly enhance the content so new NP graduates are better prepared.

An aim of the residency program is to prepare NPs to be leaders within primary care. The NP residents showed the most dramatic improvement in the leadership domain, although there remained room for further improvement, particularly in leading huddles and shared medical appointments. Review of these scores highlights opportunities for more intentional leadership coaching, for example, during daily huddles, journal club meetings, case conferences, and participation in clinic or facility-wide committees or councils. Across all our CoEPCE sites, we are working on the development of a leadership and mentorship curriculum for trainees and mentors of all professions that may enhance the existing leadership experiences.

Both the mentor and NP residents' evaluation of performance improvement/population management competencies was low. This is not surprising as few NP students in our program (50% of NP students became NP residents) had performance improvement learning opportunities due to limited time in clinic (1−1.5 days per semester). It is important to note that many NP residents and mentors gave a 0 score or left blank the performance improvement/population management domain early in the program due to lack of exposure or lack of explicit focus on the content. This could be due to the fact that at some CoEPCEs these skills were also new for the staff responsible for teaching the content. Both limited exposure as students and novice staff in the early years of the CoEPCE program can account for the low scores at 1 month. An opportunity exists to enhance performance improvement curricular components specifically around plan−do−study−act cycles, root cause analysis, and evaluation of critical incidents for our trainees in all professions. In addition, as NP entry into practice moves to the DNP, perhaps new NP graduates will be more competent in both leadership and performance improvement.

Finally, it was of interest to note that there was no statistically significant difference between the mean scores of the NP residents and mentors throughout the yearlong program with the exception of performance improvement/population management at 1 month. It is commonplace for self-assessment to have methodological limitations and flaws; although it is commonly used in health professions education (Eva & Regehr, 2005). But in this case, self-assessment scores were consistent with mentor assessment scores on an array of topics needed for primary care practice. Further work needs to be conducted to understand factors influencing NP residents' self ratings, how they identify gaps in knowledge, weaknesses and strengths, and their ability to accurately differentiate and find a balance between them.

A common question often arises related to the recommended length of post-graduate NP training. No available evidence either supports or refutes the length of an NP residency program. Hart and Bowen (2016) found that 90% of their survey respondents were either extremely or somewhat interested in a post-graduate NP residency program, and of those, 77% would have been extremely or somewhat likely to have applied, but the desired length of the program was split with half desiring a 6-month program and the other half desiring a yearlong program. All the NP residency programs in VA and many in the community and private sectors are yearlong programs. We feel very strongly that our programs remain yearlong. We have designed our programs to focus on acclimation to provider role, accountability, and clinical competency attainment in the first 6 months, with the additional focus in the second 6 months on learning how to precept, teach, increase productivity and patient panel size, and do scholarly work and quality improvement (QI) projects. Similarly, the Commission on Collegiate Nursing Education, which accredits RN residency programs, requires a continuous program over a minimum of 12 months for role transition and role integration. The role transition phase bridges the gap between academia and practice and focuses on skills competency, whereas the role integration phase focuses on competent, autonomous practice, assimilation into workgroup, and demonstration of professional identity (Commission on Collegiate Nursing Education, 2015).

Limitations

One limitation of these findings is the low response rate that could result in selection bias. Only 68% of NP residents had data complete for all three time points. This is due to several reasons including mentors not receiving clear instruction on how and when to complete the competency tool and transitioning from paper to a web-based portal entry format. Since implementing the portal entry system in 2014, response rates have significantly improved. A second limitation is the small program size, at only 5 VA sites, each with small numbers of NP residents. Program variability exists, as each site developed the program within their local context. This variability was specifically noted in the QI/population management domain, with several sites having no purposeful exposure to this content in the inaugural year of their residency program. A third limitation is the potential for variability in how mentors were trained to complete the competency tool and the potential for positive bias (grade inflation) especially for NP residents who were former students and well known to the mentors vs. those NP residents from the outside. A fourth limitation is the inability to assess inter-rater reliability given that only one mentor (in most cases) completed the competency tool.

Conclusion

VA CoEPCE NP residents demonstrated (from both mentors' ratings and self-ratings) the ability to practice without supervision at program completion. The use of the VA CoEPCE competency assessment tool provided value to both formative and summative evaluations. In addition to identifying areas of strength and weakness for individual NP residents, these findings offer important initial evidence for the effectiveness of the VA CoEPCE NP residency programs and insight into areas in which improvements in the curriculum can be made.

These findings strongly support the need for residencies to prepare new graduate NPs for independent practice. Our key stakeholders in VA may use our results to advocate for expanding NP residency programs outside the CoEPCEs, especially in light of VA implementing full practice authority for NPs and other advanced practice nurses.

Further work and faculty development needs to be done to standardize mentor assessment, potentially through increased direct observation and portfolios, to make the competency tool as relevant as possible to objectively measure competency achievement. We plan to have our current NP residents join a focus group to offer advice on improving the tool and evaluation process in general with the intent to continue iterative adaptations of the competency tool. In addition, we are in the process of analyzing the qualitative data components of the competency tool to broaden our understanding of the learning needs of the NP residents and hope to have patient outcome data to further determine effectiveness of our NP residency programs.

Our VA CoEPCE NP residency programs are preparing for accreditation, and we believe they are well prepared to address the standard on program evaluation based on this analysis. As other NP residency programs plan to apply for accreditation, they may consider implementing a similar competency assessment strategy to assist with meeting the accreditation standard on program evaluation.

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