

Factors Associated With Resident Continuity in Ambulatory Training Practices

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ABSTRACT

Background Continuity of care is a critical element of residents' educational experience in primary care programs.

Objective We examined how continuity in resident practices compares to nonteaching practices, identified factors associated with increased continuity, and explored the association between continuity and quality measures.

Methods We analyzed 117 235 patient visits to 4 resident practices (26 resident teams in internal medicine, pediatrics, family medicine, and medicine-pediatrics) and 270 242 visits to nonteaching community practices between July 2013 and May 2014. We defined continuity from both clinician and patient perspectives, and used logistic regression models to examine the influence of factors on continuity while controlling for postgraduate year, patient age, gender, race, and insurance.

Results Continuity was greater at nonteaching sites compared to resident practices (87.3% versus 56.2%, $P < .001$). Resident continuity ranged from 33.1% to 83.7% among resident sites. Factors associated with improved resident continuity included absence of advanced practice providers (71.5% versus 52.3%); consistent use of scheduling protocols (77.5% versus 33.1%); rescheduling policies (71.5% versus 41.3%); increased faculty clinical time (71.5% versus 46.3%); and dismissal policies for excessive missed appointments (71.5% versus 62.5%, $P < .001$ for all). Increased continuity was associated with improved rates of diabetic control (62.8% versus 54.6%); hypertension control (82.8% versus 57.5%); screening colonoscopy (69.2% versus 31.9%); and mammography (74.8% versus 38.2%, $P < .001$ for all).

Conclusions Increased clinical faculty time, scheduling protocols, and absence of advanced practice providers were most strongly associated with increasing continuity. Increased continuity was associated with improved quality measures.

Introduction

Continuity of care is a fundamental component of primary care, yet maintaining adequate continuity for patients and residents in academic settings remains a challenge. Continuity has long been associated with improved clinical outcomes, improved satisfaction, and improved adherence to treatment.^{1–8} Thus, providing a longitudinal primary care experience has become a key goal of primary care residency training. Many Accreditation Council for Graduate Medical Education Review Committees have stipulated a minimum amount of ambulatory training for that specialty and have stressed the need for continuity. There are, however, many challenges to developing and maintaining continuity in a resident clinic; most notably, residents' division of time between inpatient and outpatient rotations and the inherent complexities of large academic medical centers.^{9–13}

With the advent of the patient-centered medical home (PCMH), there has been a heightened recognition of the importance of primary care and the need to improve ambulatory experiences.^{14–16} In fact, a recent study found that one of the strongest predictors

of entering a primary care specialty was the continuity of relationships formed with patients during training.¹⁷ Continuity of care also contributes to patient satisfaction and clinical outcomes.^{6,8} Despite its importance, studies documenting resident continuity with patients generally illustrate disappointing findings.^{18–21} One study found that pediatrics patients assigned to a resident physician saw their primary physician at only 25% of their visits.²²

Although past studies have demonstrated varied levels of continuity in resident teaching practices, factors that may improve continuity have not been evaluated. Our objectives were to (1) examine how continuity in resident practices compares to nonteaching practices for both provider continuity and patient continuity; (2) identify discrete factors associated with increased continuity in resident practices; and (3) examine the association between resident continuity and quality measures.

Methods

Program Structure and Continuity Data Collection

We examined continuity at 4 ambulatory residency training programs (internal medicine, pediatrics, family medicine, and medicine-pediatrics) in Upstate

DOI: <http://dx.doi.org/10.4300/JGME-D-15-00755.1>

New York between July 2013 and May 2014. All practices were certified as Level 3 PCMH. Residents spent between 1 and 3 sessions per week in clinic, depending on specialty and postgraduate year status. In total, there were 26 clinical teams composed of a lead attending preceptor, supporting preceptors, and 3 to 8 residents. For each visit, we determined the rendering provider (ie, treating provider), the primary care provider, the primary resident provider, and patient's age, gender, race, and insurance. We also pulled visit data from 30 affiliated nonteaching primary care practices located in the community. All practices shared a common electronic health record.

Continuity Definitions

We defined continuity from both the resident and patient perspectives (TABLE 1). Resident continuity was defined as the percentage of patients seen by residents who were their primary patients. We defined patient continuity based on 2 methods. Patient continuity with his or her resident was defined as the percentage of all patient visits at which the patient was seen by his or her primary resident physician. Patient continuity with his or her primary attending *or* resident physician was defined as the percentage of all visits at which the patient was seen by either his or her primary resident or team attending. We chose these definitions to prioritize the teaching dyad of the resident-attending pairing that is essential to teaching programs.^{23,24}

Program-Level Data Collection

At each resident practice, we surveyed the residency program director, clinic director, office manager, nurse leader, and chief resident to determine what factors each site used to promote continuity. The survey addressed a number of factors, including (1) the presence of advance practice providers (APPs; nurse practitioners or physician assistants); (2) scheduling protocols; (3) organized patient handoffs between residents; (4) dismissal policies; (5) number of resident sessions per week; and (6) clinical full-time equivalent (FTE) of faculty. Scheduling protocols varied among sites, but stipulated how acute and chronic appointments were scheduled to accommodate continuity.

TABLE 1
Definitions of Continuity

Continuity	Definition
Resident continuity	Continuity = Resident visit with <u>primary patient</u> All resident visits
Patient continuity with resident	Continuity = <u>Patient visit with primary resident</u> All patient visits from resident panel
Patient continuity with resident or attending	Continuity = <u>Patient visit with primary resident or primary attending</u> All patient visits from resident panel

What was known and gap

Continuity of care is important to patient care and to primary care residents' educational experience.

What is new

This study compared continuity in 4 resident primary care practices, identified factors associated with continuity, and explored the association between continuity and quality metrics.

Limitations

Sample size may not have been sufficient to detect potentially important relationships.

Bottom line

Increased time by clinical faculty, defined scheduling protocols, and not having advanced practice providers were strongly associated with increasing continuity. Increased continuity was associated with improved quality.

Dismissal policies monitored missed appointments and permitted the dismissal of a patient after 3 missed appointments if approved by the primary care physician. To account for variation in adherences to reported processes, we asked respondents to rate the site's adherence to each process. Adherence to scheduling protocols, patient handoffs, and dismissal policies were measured on a 5-point scale, anchored with "Never" to "Always." Mean scores were calculated from all respondents at each site and adherence to each measure was reported and analyzed as "Never/rarely," "Sometimes," and "Often/always."

The survey also recorded the number of clinical sessions per week that each resident was assigned in the standard schedule and the clinical FTE of faculty on each of the attending physicians on the 26 teams. The survey recorded the amount of time that each faculty devoted to precepting, clinical care, administration, and research. Clinical FTE ranged from 0.1 to 1.0 FTE and included direct patient care and precepting.

Comparison of Resident Practices and Nonteaching Practices

To provide a broader community context, we compared continuity in resident practices to continuity in nonteaching practices across the community. In addition, all sites were certified as Level 3 PCMH. We examined continuity rates for resident practices, attending practices

within teaching sites, and nonteaching community practices. We subsequently determined the resident practices with the highest continuity and compared this “best case” scenario to nonteaching practices.

Quality Metrics

We measured 4 adult-focused quality metrics for each of the applicable resident teams. The quality metrics were based on the 2014 Healthcare Effectiveness Data and Information Set and measured the (1) percentage of diabetic patients aged 18 to 75 years with a HgA1c less than 8%; (2) percentage of hypertensive patients aged 18 to 85 years with a blood pressure less than 140/90 mm Hg; (3) percentage of women aged 40 to 74 years with a mammogram within the last 2 years; and (4) percentage of patients aged 50 to 75 years with a colonoscopy within the last 10 years.

This study was approved by the University of Rochester Research Subjects Review Board.

Statistical Analyses

We performed statistical analyses using SAS version 9.3 (SAS Institute Inc, Cary, NC). We compared continuity rates with chi-square test statistics and used Cochran-Armitage tests to examine trends in binomial proportions. We used logistic regression models to compare resident practices to nonteaching practices and to examine the association of various factors with continuity. We used general linear models to examine the association between resident-team continuity and team quality scores. Models were adjusted for postgraduate year status, patient age, race, gender, and insurance.

Results

Between July 2013 and May 2014, a total of 117 235 visits occurred to the 4 resident teaching programs (26 resident teams) and 270 242 visits to the nonteaching community practices. The sites included 140 resident physicians, 66 faculty physicians, and 134 community physicians. TABLE 2 shows the characteristics of visits to resident practices and nonteaching practices.

Continuity at Resident Practices Compared to Nonteaching Practices

TABLE 3 demonstrates continuity at residency practices compared to nonteaching practices. Continuity for physicians was higher in nonteaching community practices (87.3%) compared to resident practices (56.2%) or faculty practices (61.9%, $P < .001$). Similarly, patient continuity was higher at nonteaching practices compared to residency practices. The residency practices with the highest continuity ap-

TABLE 2

Characteristics of Patients' Visits to Resident Practices and Nonteaching Practices

Characteristic	Resident and Faculty Practices, ^a N (%)	Nonteaching Practices, N (%)
Total	117 235 (100)	270 242 (100)
Age, y		
≤ 18	38 800 (33.1)	9492 (3.5)
19–64	66 329 (56.6)	156 755 (58.0)
≥ 65	12 106 (10.3)	103 995 (38.5)
Gender ^b		
Female	68 457 (60.4)	155 047 (57.4)
Male	44 893 (39.6)	115 195 (42.6)
Race		
White	44 753 (38.2)	240 947 (89.2)
Black	52 056 (44.4)	19 371 (7.2)
Asian	3357 (2.9)	3722 (1.4)
Other ^c	17 069 (14.6)	6202 (2.3)
Insurance		
Medicaid	59 202 (50.5)	20 142 (7.4)
Medicare	22 717 (19.4)	96 846 (35.8)
Private	24 521 (20.9)	142 946 (52.9)
None	4858 (4.1)	5022 (1.9)
Other ^d	5937 (5.1)	5286 (2.0)

Abbreviations: MVA, motor vehicle accident; CHAMPUS, Civilian Health and Medical Program of the Uniformed Services.

^a Total visits seen at teaching practices.

^b Less than 1% missing.

^c Includes American Indian, Alaska Native, Native Hawaiian, and unknown.

^d Includes MVA insurance, Workers Compensation, CHAMPUS/TRICARE.

proached that of nonteaching practices for both resident continuity (83.7% versus 87.3%) and patient continuity (77.5% versus 84%).

Factors Associated With Resident Continuity

TABLE 4 demonstrates factors associated with resident continuity. Factors associated with improved resident continuity included the consistent use of scheduling protocols (77.5% versus 33.1%, adjusted odds ratio [AOR] = 6.9); absence of APPs (71.5% versus 52.3%, AOR = 3.1); fewer annual visits (83.7% versus 43.1%, AOR = 6.5); rescheduling policies (71.5% versus 41.3%, AOR = 4.4); increased faculty clinical time (71.5% versus 46.3%, AOR = 3.4); policies for handoffs from graduating seniors to interns (52.9% versus 33.1%, AOR = 2.5); and dismissal policies for excessive missed appointments (71.5% versus 62.5%, AOR = 1.8).

Factors Associated With Patient Continuity

TABLE 4 also demonstrates factors associated with patient continuity. The consistent use of scheduling

TABLE 3

Continuity at Resident Practices and Nonteaching Practices

Practices	Physician Continuity			Patient Continuity ^a		
	Continuity, %	P ^b	AOR ^c (95% CI)	Continuity, %	P ^b	AOR ^c (95% CI)
All residency practices	56.2	< .001	1.0	43.0	< .001	1.0
All faculty practices	61.9		1.1 (1.1–1.2)	47.8		3.0 (2.9–3.1)
Nonteaching practices	87.3		3.7 (3.6–3.8)	84.0		5.1 (4.9–5.2)
Select residency practice ^d	83.7	< .001	1.0	77.5	< .001	1.0
Select faculty practice ^d	81.3		1.0 (0.9–1.1)	78.4		0.9 (0.9–1.0)
Nonteaching practices	87.3		1.1 (1.0–1.2)	84.0		1.1 (1.0–1.1)

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval.

^a Patient continuity in residency practices defined as continuity with either the assigned resident or attending physician.^b Chi square test.^c Adjusted odds ratio adjusted for patient age, gender, race, and insurance.^d Faculty and residency practice with highest continuity. Separate practices were selected to represent the highest continuity in each area.

protocols, absence of APPs, rescheduling policies, increased faculty clinical time, dismissal policies, and processes for handoffs were all associated with increased patient continuity ($P < .001$ for all).

Quality Metrics

Increased resident continuity was associated with improved rates of diabetic control, hypertension control, screening colonoscopy, and screening mammography (FIGURE 1). This association between continuity and quality markers persisted in adjusted regression models (FIGURE 2).

Discussion

We found substantial variation in continuity across training sites and community practices and identified several modifiable factors associated with continuity. The consistent use of scheduling protocols, increased faculty clinical time, and the absence of APPs were most strongly associated with increasing continuity in resident practices. Increased continuity was also associated with improved clinical quality measures in resident practices.

Continuity was lower on average in residency training sites compared to nonteaching community practices, which is consistent with prior literature.²⁵ However, we found significant variability in continuity among residency sites and found that resident practices with the highest continuity approached that of the nonteaching practices in the community. This suggests that, under the right circumstances, residency practices can achieve continuity rates comparable to those of nonteaching practices.

Scheduling protocols and adherence to those protocols were most strongly associated with increased continuity from both resident and patient perspectives. Several tools exist to support designing patient schedules,^{26–28} yet processes will ultimately need to

be adapted to individual programs. Overall, our results suggest that the commitment of office staff to prioritize continuity and follow scheduling protocols will enhance continuity. Similarly, a process to transition patients from graduating senior residents to new residents was associated with increased continuity. A previous trial demonstrated similar benefits with sign-out procedures implemented between graduating residents and incoming interns, improving the rate of follow-up of important clinical tasks.²⁹ We also found both scheduling protocols and sign-out strategies offer tangible opportunities for resident practices to improve continuity without expending substantial resources.

The absence of APPs (ie, nurse practitioners or physician assistants) was also strongly associated with both increased resident and patient continuity. Absence of APPs in a resident practice may encourage follow-up with either the resident physician or primary attending. At the same time, not having APPs has the potential to limit access for patients. Thus, there is a potential tradeoff between continuity and patient access that must be balanced within training sites when considering the use of APPs. Team-based care is an integral aspect of PCMHs, but the importance of continuity for residents must be factored into its implementation.

With the passage of the Affordable Care Act in 2010 and progress toward the medical home model, there has been a heightened focus on improving quality metrics, continuity of care, and patient satisfaction.³⁰ We found that increased continuity was associated with improved quality measures for diabetes, hypertension, and cancer screening. Prior literature also suggests that improved continuity may be correlated with improved preventive care, control of chronic conditions, and patient satisfaction.^{6,31,32} As medicine moves toward value-based care, quality and continuity will become increasingly important in resident practices. Training

TABLE 4
Factors Associated With Resident Continuity and Patient Continuity

Factors	Resident Continuity			Patient Continuity			
	Patient and Resident			Patient and Attending or Resident		Patient and Resident	
	Continuity (N = 36 195)	P ^a	AOR ^b (95% CI)	Continuity (N = 52 943)	P ^a	AOR ^b (95% CI)	Continuity (N = 52 943)
Total continuity	56.2%			43.0%			38.5%
APP (NP or PA)							
Yes	52.3%	< .001	1.0	35.7%	< .001	1.0	34.3%
No	71.5%		3.1 (2.9–3.3)	77.5%		6.9 (6.5–7.4)	58.0%
Acute scheduling protocol							
Never/rare	33.1%	< .001	1.0	20.6%	< .001	1.0	16.5%
Sometimes	44.1%		1.3 (1.2–1.4)	36.5%		1.5 (1.4–1.7)	35.7%
Often/always	77.5%		6.9 (6.3–7.6)	59.4%		8.7 (7.9–9.6)	51.4%
Rescheduled if pulled							
Never/rare	41.3%	< .001	1.0	30.9%	< .001	1.0	28.9%
Sometimes	83.7%		7.1 (6.6–7.7)	46.8%		2.9 (2.7–3.1)	46.7%
Often/always	71.5%		4.4 (4.1–4.8)	77.5%		24.7 (22.6–27.0)	58.0%
Patient handoff at resident graduation							
Never/rare	33.1%	< .001	1.0	20.6%	< .001	1.0	16.5%
Sometimes	83.7%		13.0 (11.7–14.4)	46.78%		4.7 (4.3–5.2)	46.7%
Often/always	52.9%		2.5 (2.3–2.8)	49.7%		3.6 (3.3–3.9)	42.8%
Dismiss patients for missed appointments							
Never/rare	62.5%	< .001	1.0	35.0%	< .001	1.0	33.2%
Sometimes	44.1%		0.3 (0.3–0.4)	36.5%		0.4 (0.4–0.5)	35.7%
Often/always	71.5%		1.8 (1.6–1.9)	77.5%		12.9 (11.9–14.1)	58.0%
No. sessions/wk							
1	62.9%	< .001	1.0	37.5%	< .001	1.0	33.4%
> 1	52.2%		0.5 (0.5–0.5)	47.7%		1.2 (1.1–1.2)	42.9%
Patient visits per resident							
> 500	43.1%	< .001	1.0	36.5%	< .001	1.0	35.6%
251–500	55.5%		2.2 (2.1–2.3)	47.0%		2.5 (2.3–2.6)	35.7%
> 250	83.7%		6.5 (6.0–6.9)	46.8%		7.6 (7.0–8.2)	46.7%

TABLE 4
Factors Associated With Resident Continuity and Patient Continuity (continued)

Factors	Resident Continuity			Patient Continuity					
	Patient and Resident			Patient and Attending or Resident					
	Continuity (N = 36 195)	P ^a	AOR ^b (95% CI)	Continuity (N = 52 943)	P ^a	AOR ^b (95% CI)	Continuity (N = 52 943)	P ^a	AOR ^b (95% CI)
Average clinical FTE faculty									
≤ 0.33	46.3%	< .001	1.0	29.1%	< .001	1.0	26.6%	< .001	1.0
0.34–0.66	55.8%		1.2 (1.1–1.2)	40.6%		1.1 (1.1–1.2)	40.0%		1.2 (1.2–1.3)
≥ 0.67	71.5%		3.4 (3.1–3.7)	77.5%		7.4 (6.9–7.9)	58.0%		2.9 (2.7–3.0)
PGY level resident									
PGY-1	55.3%	< .001	1.0	30.9%	< .001	1.0	25.8%	< .001	1.0
PGY-2	62.9%		1.3 (1.2–1.4)	42.0%		1.6 (1.5–1.7)	38.5%		1.8 (1.7–1.9)
PGY-3	48.5%		0.7 (0.6–0.7)	52.2%		2.5 (2.4–2.6)	48.2%		2.7 (2.6–2.9)
PGY-4	69.9%		1.9 (1.7–2.1)	79.7%		9.3 (8.4–10.3)	67.0%		6.3 (5.8–6.9)
Patient age, y									
≤ 18	45.2%	< .001	1.0	34.2%	< .001	1.0	27.9%	< .001	1.0
19–64	60.1%		2.4 (2.3–2.5)	46.6%		1.9 (1.8–2.0)	43.0%		2.3 (2.2–2.4)
≥ 65	69.7%		3.1 (2.8–3.5)	56.0%		2.7 (2.5–3.0)	52.7%		3.3 (3.0–3.6)
Insurance									
Medicaid	53.8%	< .001	1.0	40.3%	< .001	1.0	35.3%	< .001	1.0
Medicare	67.1%		1.2 (1.1–1.3)	50.9%		1.1 (1.0–1.1)	47.7%		1.0 (1.0–1.2)
Private	49.9%		0.7 (0.7–0.8)	43.4%		1.0 (0.9–1.0)	38.6%		0.9 (0.9–1.0)
None	59.9%		1.3 (1.2–1.4)	41.5%		1.0 (1.0–1.1)	35.8%		1.0 (0.9–1.1)
Other	63.2%		1.7 (1.4–2.0)	48.3%		1.1 (1.0–1.2)	45.3%		1.0 (0.9–1.1)

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; APP, advance practice provider; NP, nurse practitioner; PA, physician assistant; FTE, full-time equivalent; PGY, postgraduate year.

^a Chi square or Cochran-Armitage trend test.

^b Adjusted for resident PGY status, patient age, gender, insurance, and race.

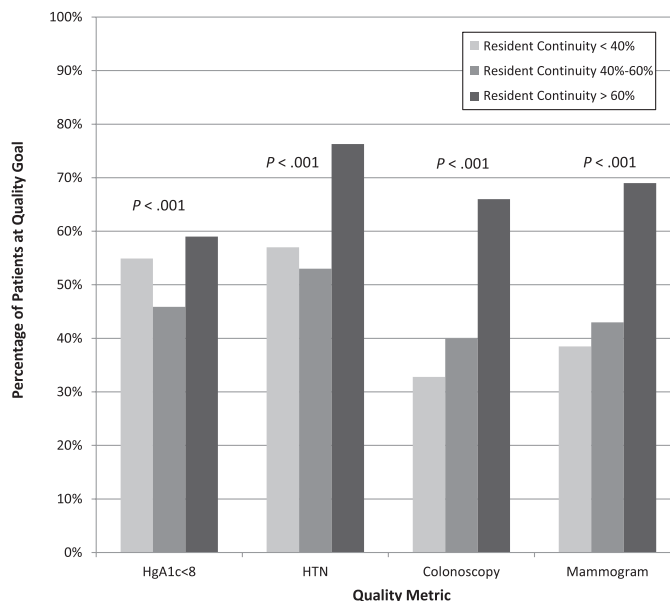


FIGURE 1
Association Between Overall Patient Continuity and Quality Markers

Abbreviations: HgA1c, Hemoglobin A1c; HTN, hypertension.

residents in well-functioning continuity clinics is thus vital for perpetuation of the medical home model.

This study has several limitations. First, it was confined to 4 resident practices, which limited the ability to determine the independent effect of different factors on continuity due to overfitting of regression models and colinearity. Second, for several of the factors evaluated, the sample may have resulted in

insufficient power to detect a potentially existing relationship. Third, adherence to clinic policies was determined by subjective survey response. Finally, we provided the comparisons to nonteaching community practices, which included more white, privately insured, and older patients compared to resident practices. Regression models were adjusted for these demographic differences.

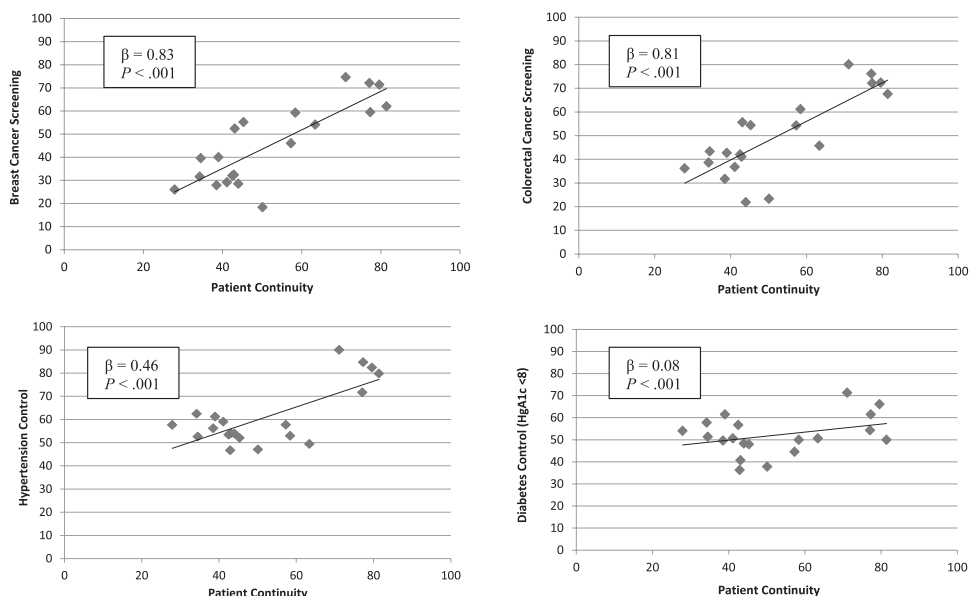


FIGURE 2
Association Between Resident Team Continuity and Quality Markers

Abbreviation: HgA1c, Hemoglobin A1c.

Note: Generalized linear models were adjusted for resident postgraduate year, patient age, gender, race, and insurance.

Conclusion

This study demonstrates that continuity in a resident practice can approach that of nonteaching community practices. Several factors, including increased clinical faculty time, scheduling protocols, and the absence of APPs, were most strongly associated with increased continuity. Continuity, in turn, was associated with higher quality measures. All of these findings have implications for clinical practice and resident education in primary care.

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Funding: The authors report no external funding source for this study.

Conflict of interest: The authors declare they have no competing interests.

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Received December 6, 2015; revision received March 22, 2016; accepted April 10, 2016.