Improving Continuity by Increasing Clinic Frequency in a Residency Setting

Jon O. Neher, MD; Gary Kelsberg, MD; Drew Oliveira, MD

Background and Objectives: *Continuity of care is required in family practice training programs. However, continuity for some patients may not be adequately served in the traditional training model that has residents in the family practice center (FPC) for 1 to 3 half-day clinics per week. This study sought to determine if increasing clinic frequency in a family practice residency has an effect on continuity of care.* Methods: *On January 1, 1999, the residency program changed from a traditional clinic scheduling model to one where all residents saw patients in the FPC 4 to 5 days a week. By using shorter clinic sessions, total resident time in the FPC was nearly unchanged (decreasing 5% overall). We reviewed 1,709 randomly selected billing records for residents' patients who frequently utilized medical care (three or more visits within 6 months) and assessed continuity for 1 year before and after this intervention, using both the modified, modified continuity index (MMCI) and the percentage of visits to the primary care provider (PCP).* Results: *Overall, the MMCI for patients who frequently saw residents increased from .59 to .64. The average frequency with which these patients saw their PCPs improved for the first-year class (from 51% of visits before implementation to 72% after) and the third-year class (from 66% of visits to 72%).* Conclusions: *Scheduling daily resident clinics in the FPC increased continuity among patients who frequently saw residents beyond that achieved using traditional scheduling, without increasing total resident time in the FPC.*

(Fam Med 2001;33(10):751-5.)

Continuity of medical care between residents and patients is believed to be important to the quality of an ambulatory medical residency training program.[1] Studies consistently find a strong correlation between higher continuity and improved patient and physician satisfaction.[2-7] Better continuity has also been associated with fewer hospital admissions,[3,8] improved compliance,[9-11] and lower emergency room use[3,12,13] in some studies but not in others.[14-16]

Family practice residents who are in the family practice center (FPC) for the minimum frequency and duration of patient care specified by the Accreditation Council for Graduate Medical Education (ACGME)'s *Program Requirements for Residency Education in Family Practice*[17] may not develop or maintain high levels of continuity. According to ACGME specifications, first-year residents must have a minimum of one clinic per week (which lasts at least 3 hours). Second-year residents must have at least two clinics per week, and third-year residents must have at least three clinics per week. However, residents who are in clinic for only the aforementioned times would seem to have poor availability to patients who have acute or rapidly evolving medical problems requiring multiple visits over a short period of time. Our review of the current literature found no publications on how clinic frequency influences continuity.

In January 1999, our family practice residency program changed from a traditional clinic scheduling model to one where residents are scheduled to be in their continuity clinics for some part of every day. This paper describes that change and quantifies its effect on continuity of care (using the modified, modified continuity index [MMCI] and percentage of visits with the primary care provider [PCP]) for residents' patients who made frequent visits.

Methods

This was a quality improvement project for the FPC and, as such, was exempt from formal review by our Institutional Review Board.

From the Valley Medical Center Family Practice Residency, Renton, Wash.

Program Overview

Valley Medical Center Family Practice Residency Program is a 14-year-old fully accredited program with 24 residents and 8 family physician faculty. The program is based at a suburban community hospital in a mixed-ethnicity middle-class neighborhood. The FPC has 42,000 visits a year, 66% by women and 34% by men. About 12% of visits are insured by Medicare and 30% by Medicaid. Pregnancy care accounts for 5% of visits and children's visits for 22%. The FPC is located in an office building adjacent to the hospital, and most required rotations are conducted on the hospital campus or in the immediate area.

All patients are assigned to a resident or faculty PCP at the time of registration; however, patients frequently elect to change their PCP after meeting several providers. Most patients initiate this change by consistently requesting to see a new provider, requests that are accommodated by the clinic schedulers. Registration materials are updated to reflect the new PCP only after the new relationship has formed. Patients are more likely to be scheduled with their provider of choice for services (such as health maintenance visits) that can be arranged several weeks in advance.

Scheduling Changes

Prior to our intervention, the residents' clinic schedule was designed along ACGME guidelines. All clinic sessions were 3 or 3.5 hours in length. Each week, first-year residents were in one to two half-day clinics, second-year residents were in two to four clinics, and third-year residents were in four to five clinics. Many third-year residents and some second-year residents "bunched" their clinics, scheduling two clinic sessions on the same day (one in the morning and the other in the afternoon). After our intervention, all residents were in clinic 4 to 5 different days per week and "bunching" was not permitted. Clinic durations were set at 3 hours for third-year residents, 2 hours for second-year residents, and 1.5 hours for first-year residents. Both before and after the change, standard appointment times for first-, second-, and third-year residents remained at 45, 20, and 15 minutes, respectively. The effects of these changes are summarized in Table 1. Overall, there was a 5% reduction in resident appointment availability.

Both before and after the intervention, the program's 24 residents were divided into four patient care teams. Each team consisted of two residents from each class and used its own nursing staff and dedicated exam rooms. Table 2 summarizes the new clinic scheduling system for one resident team.

Activities on many resident rotations were altered to accommodate residents leaving daily for clinic. There was no change in the number of rotations or in their focus.

Continuity of Care Measures

There are many ways to measure continuity, and each method has its own individual strengths and weaknesses. A simple way to measure continuity from the perspective of the patient is the usual provider of care (UPC) index[18,19] (defined as the number of visits a patient makes to the most frequently seen provider divided by the patient's total number of visits). However, a key limitation of the UPC index is that it is insensitive to the total number of providers a patient sees. Two mathematical models that correct for the number of providers can be found in the family medicine literature: the modified, modified continuity index (MMCI)[20] and the continuity of care coefficient (COC).[18,19] All three models produce a score between 0 (no continuity) and 1 (perfect continuity), but the values are not directly comparable. Averaging all residents' patients, one training program[19] reported a UPC index of .46 and

Table 1

Changes in Clinic Activity Per Resident

	Traditional Scheduling	*Daily Scheduling*	*Change* #	*Change* %
Clinic duration (hours)				
First-year residents	3.25	1.5	-1.75	-54
Second-year residents	3.25	2.0	-1.25	-38
Third-year residents	3.25	3.0	-.25	-8
Clinics sessions per week*				
First-year residents	1.5	4.25	+2.75	+183
Second-year residents	3.0	4.50	+1.5	+50
Third-year residents	4.5	4.50	0	0
Clinic time per week (hours)				
First-year residents	4.9	6.4	+1.5	+31
Second-year residents	9.8	9.0	-.8	-8
Third-year residents	14.6	13.5	-1.1	-8
Appointment slots per week				
First-year residents	6.5	8.5	+2.0	+31
Second-year residents	29.4	27.0	-2.4	-8
Third-year residents	58.4	54.0	-4.4	-8
All resident appointments per week	753.6	716	-37.6	-5

* Values are adjusted for taking post-call afternoons off. Values do not reflect vacations or away rotations.

Table 2

New Resident Team Clinic Schedule

Time	*Third-year Residents*	*Second-year Residents*	*First-year Residents*
8:00			
8:30			Resident A (1.5 hours)
9:00	Resident A (3 hours)		
9:30			
10:00		Resident A (2 hours)	
10:30			
11:00			
11:30			
12:00			
12:30	Lunch conferences		
1:00			
1:30			Resident B (1.5 hours)
2:00	Resident B (3 hours)		
2:30			
3:00		Resident B (2 hours)	
3:30			
4:00			
4:30			
5:00			

a COC of .21. A second program[20] reported an average resident MMCI of .59.

Because the MMCI has been the predominant model in recent family medicine literature,[13,20] it was chosen for our study. It should be noted, however, that none of these models take into account a feature of continuity important in family practice residency programs—the percentage of visits to the primary care provider (PCP).

Data Collection

Data on continuity were collected for 1 year before and after implementation of the new clinic schedule. Because the scheduling change occurred in January, we needed a way to avoid measuring continuity over the academic transitions on July 1st. Therefore, continuity in each year was assessed independently in two 6-month time blocks. Our billing office generated a list of all patients who had had three or more appointments during each 6-month block (January through June 1998, July through December 1998, January through June 1999, and July through December 1999). A three-visit minimum was used since larger numbers of visits help assure more meaningful continuity scores.

Patients were randomly selected from each list using a random number generator available on the World Wide Web.[21] We reviewed the billing record for each patient selected and extracted the following information for the period of interest: (1) the number of times the patient was seen, (2) the type of visit (health maintenance or acute), and (3) the provider that the patient saw.

PCP Determination

Because of the variable lag time between when patients change their provider of choice and when registration materials are updated, we felt we could not rely on formal PCP assignment records. Therefore, we used a retrospective assignment of PCP based on who the patient actually saw for primary care services. We determined the PCP by rank order criteria as the provider who performed (1) a complete adult physical during the academic year, (2) the most Pap and pelvic visits during the academic year, (3) the most well-child checks during the academic year, (4) the most acute visits during the academic year, or (5) the most acute visits in the 6-month period under consideration. Patients were excluded from the study only if (1) they completed fewer than three visits in the 6-month block of interest or (2) their PCP was a faculty member or physician assistant. Patients who had three or more visits in 6 months, never saw the same provider twice, and had no health maintenance visits were included in the study but labeled "unassignable."

Data Analysis

All data extraction and PCP determinations were performed by two of the authors. One quarter of the records were analyzed by both reviewers to assure consistency. We randomly selected enough records to allow us to identify at least 50 patients of first-year residents in each 6-month block. This provided a 95% probability of finding a 10% difference in continuity between the pre-intervention and post-intervention first-year residents' patient panels.

The key measure of the study, the MMCI,[20] takes the form:

$$\text{MMCI} = \frac{1-(\#\text{ of providers}/[\#\text{ of visits} + .1])}{1-(1/[\#\text{ of visits} + .1])}$$

The MMCI was calculated for each patient. As a secondary measure, we also calculated the percentage of visits each patient had with the PCP. This produced a numerical value that was highly intuitive and answered the question, "How often did patients see the provider they would identify as the PCP?" All analyses were done using SPSS version 7.0.1 for Windows 95.® The nonparametric Mann-Whitney U test was used to compare continuity scores between groups because we did not expect the scores to be normally distributed.

Results

A total of 2,995 patient billing records were reviewed. Of these, 1,709 (57%) were determined to be for patients of residents. Further details of the record review and PCP determinations are shown in Table 3.

Changes in MMCI continuity before and after the intervention are shown in Table 4. The scheduling intervention was associated with an improvement in the annual average MMCI from .59 to .64 (P=.001) even

Table 3

Results of Record Review

	Before Intervention n (%)	After Intervention n (%)	Total n (%)
Patients of third-year residents	425 (50)	435 (51)	860 (50)
Patients of second-year residents	284 (33)	247 (29)	531 (31)
Patients of first-year residents	122 (14)	143 (17)	265 (16)
Unassignable patients	28 (3)	25 (3)	53 (3)
All patients included in study	859 (100)	850 (100)	1,709 (100)

Table 4

MMCI Values*

	Before Intervention	After Intervention	P Value
Patients of third-year residents	.62	.68	.008
Patients of second-year residents	.62	.59	NS
Patients of first-year residents	.46	.67	<.001
Unassignable patients	.19	.15	NS
All patients included in study	.59	.64	.001

MMCI—modified, modified continuity index
NS—nonsignificant

* Values shown are the averages of all individual MMCI scores within each group.

P value by Mann-Whitney U test.

when the group of patients that included those who could not be assigned to a PCP (3% of total). Removing these 37 outpatients from the analysis increased the total average MMCI for both pre-intervention and post-intervention groups by .01 and did not change the *P* value (data not shown).

The percentages of visits with the PCP are shown in Table 5. The unassignable patients were not included in this table since, by definition, a PCP could not be determined. For patients of first-year residents, the intervention was associated with an increase in the rate of visits with the PCP from 51% to 72% ($P<.001$). For patients of third-year residents, the rate of visits with the PCP increased from 66% to 72% ($P=.005$). For patients of second-year residents, visits with the PCP remained unchanged at 65%. Calculations of the MMCI and percentage of visits with the PCP for individual 6-month blocks yielded similar results and are not shown.

Discussion

We found that continuity improved for frequently seen patients after scheduling residents in the FPC 4 to 5 days a week. This improvement occurred even with a slight overall decrease in resident clinic time and appointment numbers. The largest effect was seen in the continuity of the first-year residents' patients, where providers had a 31% increase in clinic time. However, a significant improvement in continuity also occurred with third-year residents' patients, in spite of an 8% decrease in clinic time. The continuity of second-year residents' patients, also with an 8% decrease in clinic time, was unchanged.

This study's major strengths are the large number of patients, the use of data from a full year before and after the intervention, and the absence of other curricular or policy changes that might have confounded the findings. The study's main weaknesses include using retrospective PCP assignments and having data extractors who were not blinded as to whether a patient was in the preintervention or postintervention group. Additionally, since this study was conducted at a single community program, it is unclear if the gains noted would be achieved in other settings. Differences in patient demographics, staff motivation, and institutional structure (eg, at a university) might all influence outcome. Indeed, daily clinic scheduling itself might not be feasible at some programs, such as those having rotations located far from the FPC.

The probable mechanism by which an increase in clinic frequency improves continuity, without increasing total clinic time, is evident when one considers patient preferences surrounding physician appointments. Many patients, especially those with acute trauma, who are missing work or who are in pain, would rather have a same-day appointment than wait until their PCP is available.[22,23] This would most heavily influence first-year residents' patient continuity since, in the traditional model, the first-year residents are present in clinic the fewest days. Third-year residents' patient continuity may have been influenced similarly, however, since prior to our intervention, many third-year residents chose to schedule two of their half-day clinics on the same day. So, even with four clinics, many were in the FPC only 2 days a week.

The reasons that the intervention failed to improve second-year residents' patient continuity are unclear. One factor may have been the effect of panel size. In

Table 5

Percentage of Visits With Primary Care Provider*

	Before Intervention %	*After Intervention* %	P *Value*
Patients of third-year residents	66	72	.005
Patients of second-year residents	65	65	NS
Patients of first-year residents	51	72	<.001
All patients with clear resident primary care provider	64	70	<.001

NS—nonsignificant

* Values shown are the averages of all individual primary care physician visit rates within each group.

P value by Mann-Whitney U test

our study, we made no attempt to control or adjust residents' patient panel sizes. It is possible that the second-year resident class had a critically large panel size prior to our intervention so that reducing their appointment slots by 8% created overbooked clinics. From the perspective of the second-year residents' patients, it would have become more difficult to get appointments with the doctor, forcing some of them to see other providers (and putting downward pressure on the group's average continuity score).

The introduction of daily resident clinic had other beneficial effects on the program not directly measured in this study. The staff time required to schedule provider clinics was reduced by about 75%. Nurses gained the ability to communicate directly with all their team's providers on a daily basis. Providers gained the opportunity to make same-day responses to lab reports and requests for referral. In contrast, however, patient volumes on inpatient rotations had to be reduced to allow time for residents to attend their clinics, and, at least initially, there was significant resident resistance to the change.

Several avenues of further research are suggested by our experience. These include (1) measurements of continuity at other programs before and after significant changes in clinic scheduling, (2) qualitative studies of provider experiences with traditional and daily clinic scheduling, (3) the effect of daily clinic on educational experiences inside and outside the FPC, and (4) the effect of patient panel size on continuity. In a larger sense, it also remains to be determined what constitutes optimum continuity, both for resident education and for patient care in general.

Acknowledgment: We acknowledge Janinne Mishkin and Jovelyn Lloren for their invaluable assistance with data management.

Corresponding Author: Address correspondence to Dr Neher, Valley Medical Center Family Practice Residency, 3915 Talbot Road South, Suite #401, Renton, WA 98055. 425-656-4287. Fax: 425-656-5395. jneher@vmc.fammed.washington.edu.

References

1. Irby DM. Teaching and learning in ambulatory care settings: a thematic review of the literature. Acad Med 1995;70:898-931.
2. Hjortdahl P, Laerum E. Continuity of care in general practice: effect on patient satisfaction. BMJ 1992;304:1287-90.
3. Wasson JH, Sauvigne AE, Mogielnicki RP, et al. Continuity of outpatient medical care in elderly men: a randomized trial. JAMA 1984;252:2413-7.
4. Becker MH, Drachman RH, Kirscht JP. A field experiment to evaluate various outcomes of continuity of physician care. Am J Public Health 1974;64:1062-70.
5. Randall CS, Bergus GR, Schlechte JA, McGuiness G, Mueller CW. Factors associated with primary care residents' satisfaction with their training. Fam Med 1997;29(10):730-5.
6. Blankfield RP, Kelly RB, Alemango SA, King CM. Continuity of care in a family practice residency program: impact on physician satisfaction. J Fam Pract 1990;31:69-73.
7. Mainous AG III, Baker R, Love MM, Gray DP, Gill JM. Continuity of care and trust in one's physician: evidence from primary care in the United States and the United Kingdom. Fam Med 2001;33(1):22-7.
8. Gill JM, Mainous AG III. The role of provider continuity in preventing hospitalizations. Arch Fam Med 1998;7:352-7.
9. Ettner SL. The timing of preventive services for women and children: the effect of having a usual source of care. Am J Public Health 1996;86:1748-54.
10. Deitrich AJ, Morton KI. Does continuity of care from a physician make a difference? J Fam Pract 1982;15:929-37.
11. Christakis DA, Mell L, Wright JA, Davis R, Connell FA. The association between greater continuity of care and timely measles-mumps-rubella vaccine. Am J Public Health 2000;90:962-5.
12. Christakis DA, Wright JA, Koepsell TD, Emerson S, Connell FA. Is greater continuity of care associated with less emergency department utilization? Pediatrics 1999;103:738-42.
13. Gill JM, Mainous AG III, Nsereko M. The effect of continuity of care on emergency department use. Arch Fam Med 2000;9:333-8.
14. Susman J, Zervanos NJ, Byerly B. Continuity of care and outcome in nursing home patients transferred to a community hospital. Fam Med 1989;21(2):118-21.
15. Flynn FP. Continuity of care during pregnancy: the effect of provider continuity on outcome. J Fam Pract 1985;21:375-80.
16. Gordis L, Markowitz M. Evaluation of the effectiveness of comprehensive and continuous pediatric care. Pediatrics 1971;48:766-76.
17. Accreditation Council for Graduate Medical Education. Program requirements for residency education in family practice, revised October 1, 1996. Chicago: Accreditation Council for Graduate Medical Education, 1996.
18. Ejlertsson G, Berg S. Continuity-of-care measures: an analytic and empirical comparison. Med Care 1984;22:231-9.
19. Patten RC, Friberg R. Measuring continuity of care in a family practice residency program. J Fam Pract 1980;11:67-71.
20. Magill MK, Senf J. A new method for measuring continuity of care in a family practice residency. J Fam Pract 1987;24:165-8.
21. http://www.random.org
22. Kibbe DC, Bentz E, McLaughlin CP. Continuous quality improvement for continuity of care. J Fam Pract 1993;36:304-8.
23. Love MM, Mainous AG III. Commitment to a regular physician: how long will patients wait to see their own physician for acute illness? J Fam Pract 1999;48:202-7.