Quality of Student Learning and Preceptor Productivity in Urban Community Health Centers

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Background and Objectives: *Clinicians in community health centers find it difficult to balance the demands of increased productivity and effective teaching. We hypothesized that precepting third-year students would decrease clinical productivity and that many elements related to the quality of the learning experience (eg, amount of patient contact, student autonomy) would be adversely affected by pressure to see increasing numbers of patients.* Methods: *Students and preceptors in a 6-week family medicine clerkship completed daily surveys that measured the presence of quantifiable elements of the ambulatory teaching experience. They also rated the overall quality of learning during each session.* Results: *For 62 sessions for which both students and preceptors completed evaluations, students rated the overall quality of learning more highly than preceptors. For students, the elements most positively associated with quality of learning were total teaching time and the frequency with which family issues were raised. For preceptors, the elements that predicted quality of learning were the number of patients that students saw independently and total teaching time. The clinical productivity of preceptors did not differ for sessions with and without a student.* Conclusions: *Preceptors can be effective teachers who encourage student autonomy and who model behaviors central to family practice, without decreasing productivity.*

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Health care system reform has reduced reimbursement to community health centers (CHCs) and other "safety net" care providers, thus increasing expectations for efficiency in ambulatory care delivery.[1] Funded in part by federal and other grants, CHCs evolved to provide care for low-income patients. However, a growing number of these sites are now involved in teaching, as medical education has shifted from hospitals to outpatient settings.[2] Many clinicians in CHCs find it difficult to balance the demands of high-volume patient care and effective teaching. Thus, there is a need to understand factors that contribute to effective teaching in this setting, as well as the effect of preceptor productivity on the quality of the learning.

Studies that identify characteristics of effective undergraduate ambulatory teaching are relatively few. Some authors have found a relationship between high-level learning and more direct patient contact,[3] student involvement in actively managing problems or performing procedures,[4] and increased delegation of responsibility to students.[5] Irby et al[6] asked both students and residents to identify characteristics of effective clinical teachers in ambulatory settings. Respondents identified the following keys to effective teaching: 1) involving students in the learning process, 2) communicating expectations of student performance, and 3) positive modeling of clinical skills.

A number of studies in a variety of settings have examined the effect of teaching medical students in primary care practices. Several investigators have shown a decrease in productivity or revenue[7-11] or an increase in time spent at work[12] (ie, overtime) when a student is present. Vinson et al[11] investigated academic and private family physicians, demonstrating that private physicians had a longer work day when precepting a student. Kearl,[13] however, examined outpatient practice at an academic health center and found no effect on productivity, although the baseline producitivity of 1.6 patients per hour was well below that of a typical practicing physician. This is an important factor, because as CHCs and academic practices that have historically been less productive are

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Table 1

Response to Daily Surveys, by Type of Provider

	Respondents	*Nonrespondents*
Family physicians	10	32
Pediatricians	5	3
Internists	4	1
Mid-level practitioners	2	3

asked to increase productivity, the presence of students may be seen as a factor that decreases revenue or productivity, as it may do in private practice.

We hypothesized that precepting third-year students may decrease clinical productivity in the setting of urban CHCs and that many of the elements that contribute to quality of learning in ambulatory settings (eg, amount of patient contact, student autonomy) may be affected adversely by pressure to see increasing numbers of patients. To our knowledge, no other study to date has evaluated the relationship between quality of learning and clinical productivity. Similarly, no study has directly compared the perceptions of students and their preceptors about the quality of learning.

In this study, we compared assessments by both students and preceptors of the quantifiable elements cited in previous studies that contribute to the quality of ambulatory teaching. We also assessed the association of precepting with the productivity of clinicians working in CHCs and compared students' and preceptors' ratings of the overall quality of these learning experiences.

Methods

Of the 21 third-year students placed in ambulatory sites for our 6-week family medicine clerkship during September and October of 1996, 16 were placed in 10 CHCs. Prior to the rotation, students submitted rank-order requests for site placement, and approximately 75% of students were assigned to one of their desired clerkship sites. Students in the clerkship during the months of the study had experience in two previous inpatient clinical rotations. After a 1-hour orientation session at the beginning of the clerkship, we gave students two sets of survey forms—one for the students and one for the preceptors. We numerically coded the questionnaires so they could be completed and returned anonymously.

Both students and preceptors were asked to complete short survey forms documenting information about the number of patients seen; the time spent teaching or waiting for the preceptor; the amount of observation, direct feedback, and other learning-enhancing behaviors that preceptors accomplished; and their overall evaluation of the quality of learning during that particular session. Students and preceptors each ranked the quality of learning during each session on a scale of 0–100; 100 represented the highest quality. The student and preceptor surveys were similar, except that preceptors were also asked to report the scheduled and actual hours of the session and the total number of patients seen during the session. Preceptors submitted information separately about their training and teaching experience, including years of teaching experience, percentage of time allotted to clinical work, faculty status, and years of practice since completion of training.

Data were collected beginning on the first clinical day of the rotation and ending on the last clinical day. Surveys were collected periodically by the clinical site coordinator and taken back to the medical school by the students. For purposes of comparison, preceptors were also asked to complete an equal number of survey forms after clinic sessions when they did not have a student with them.

Data were analyzed using SAS.® Correlation analyses were performed to determine the relationship between 1) student and preceptor reports for various elements of the learning experience, 2) student reports of the elements of the learning experience and their quality-of-learning score, and 3) preceptor reports of elements of the learning experience and their quality-of-learning score. Results from the latter two

Table 2

Mean Scores on Elements of the Ambulatory Learning Environment

	Students n=232 sessions		*Preceptors n=203 sessions*	
Element	*Mean*	*(SD)*	*Mean*	*(SD)*
Number of patients seen this session	4.45	(3.34)	11.9	(4.8)
Average time spent with each patient (minutes)	26.4	(14.3)		
Total time spent waiting for patients (minutes)	14.5	(24.7)		
Total time spent waiting for preceptors (minutes)	15.9	(24.3)		
Number of times preceptor observed student:				
Doing a history	.27	(.95)	.89	(1.31)
Doing a physical exam	.87	(1.69)	1.83	(2.28)
Presenting a case	2.37	(1.72)	2.25	(1.40)
Writing a progress note	1.74	(1.75)	2.06	(1.40)
Number of patients students saw independently	2.52	(1.71)	2.34	(1.30)
Number of times preceptor gave student feedback	2.44	(2.73)	2.76	(1.75)
Total teaching time this session (minutes)			27.6	(26.20)

SD—standard deviation

groups of analyses that reached statistical significance were chosen for inclusion in separate multiple regression analyses, one for students and one for preceptors, to determine which items from the student and preceptor surveys were most strongly associated with higher quality-of-learning scores.

Results

Surveys were completed by 14 of the 16 students (87%) working in 8 of the 10 CHCs and by 21 of 60 clinical preceptors (35%). There were nearly equal numbers of sessions without a student (n=105) and sessions with a student (n=98).

Matched data from students and preceptors were obtained for a total of 62 of 480 possible precepted sessions (13%). Comparison of preceptors who responded to the surveys versus nonrespondents revealed that the two groups did not differ in years in practice, level of experience as preceptors, or faculty appointments. Comparison of the students' quality-of-learning scores for responding preceptors versus nonrespondents also revealed no difference (49.5% versus 52.4%, P=.59.) The groups differed in that family physicians were less likely to return questionnaires (Table 1) than other clinicians (24% versus 63%, P=.008), and respondents had more scheduled clinical time per week than nonrespondents (mean=83% of their time spent in clinic versus 63% for nonrespondents, P=.016).

Elements of Clinical Training

Table 2 shows mean scores for elements of the ambulatory learning environment noted by students and preceptors. Students reported seeing an average of 4.5 patients per clinical session, 2.5 of whom they saw alone. Students reported spending an average of 26 minutes with each patient. On average per session, students presented 2.4 cases and were observed writing progress notes 1.7 times but were observed doing a history only .27 times and doing a physical exam only .87 times. They reported receiving direct feedback 2.4 times per session.

Preceptors reported spending an average of 27.6 minutes directly teaching students per session. They also reported giving students feedback 2.8 times per session, which is close to the value reported by students. In addition, the students reported that preceptors raised family issues frequently or always in 68% of sessions.

Quality of Learning

Students rated the overall quality of learning more highly than preceptors (mean score=63 versus 54, P=.0003). However, the scores assigned for quality of learning by students and preceptors were not correlated. Table 3 summarizes the significant relationships between quality-of-learning scores and specific learning activities for students and preceptors. The students' quality-of-learning score was most positively associated with the amount of time preceptors spent teaching during the session and the degree to which the preceptor raised family issues. The preceptors' evaluations of the quality of learning for precepted sessions was most highly correlated with the number of patients that students were able to see independently and the number of times students were observed presenting a case.

The items from the students' and preceptors' surveys that were found to correlate significantly with quality-of-learning score were included in a multiple regression analysis (Table 4). For students, the elements most predictive of quality-of-learning score were total teaching time and the discussion of family issues during the session. For preceptors, the significant predictors of quality of learning were the number of patients seen independently by the student and total teaching time.

Table 3

Significant Correlations Between Quality-of-learning Scores and Specific Activities*

Activity	*Students* r	*Preceptors* r
Total teaching time student spent with preceptor	.50	.22
Frequency with which preceptor raised family issues	.43	
Number of times preceptor observed case presentation	.30	.31
Number of patients student saw independently	.29	.36
Time student spent waiting for preceptor	-.29	
Whether preceptor suggested further reading	.23	
Average time student spent with each patient	.22	
Number of times preceptor observed physical exam	.17	
Time student spent waiting for patients	-.17	
Number of times preceptor observed note writing	.14	.31

* Results of bivariate analyses

Productivity

The clinical productivity of preceptors, measured by patients seen per hour, did not differ for sessions in which a student was precepted, compared with those without a student (2.74 patients/hour versus 2.81 patients/hour, P=.58). There was also no difference in minutes worked beyond the end of sessions (34 versus 41 minutes, P=.27). Table 5 describes the relationship between preceptor workload and perceived quality of learning. Clinical productivity was not correlated with the rating of the quality of the learning environment as assessed by preceptors or students. Similarly, the overall rating did not vary with the length of

Table 4

Significant Relationships Between Quality-of-learning Scores and Specific Activities*

Activity	*Students* r^2**	*Preceptors* r^2**
Total teaching time student spent with preceptor	.24	.05
Frequency with which preceptor raised family issues	.09	
Number of patients that student saw independently	.04	.11
Number of times preceptor observed case presentation	.04	
Time student spent waiting for preceptor	.03	
Whether preceptor suggested further reading	.01	

* Results of multivariate analyses
** r^2 signifies the percentage of variation in quality of learning that is attributable to the variable.

Table 5

Relationship Between Preceptor Workload and Students' and Preceptors' Perceived Quality-of-learning Score

	r	P *Value*
Productivity of preceptor (# of patients seen/hour) by student's quality-of-learning score	.01	.91
Productivity of preceptor (# of patients seen/hour) by preceptor's quality-of-learning score	.11	.30
Amount of overtime worked by preceptor by student's quality-of-learning score	-.07	.59
Amount of overtime worked by preceptor by preceptor's quality-of-learning score	.11	.19

* eg, productivity and overtime

time that preceptors worked beyond the end of the session. In terms of the relationship between preceptor productivity and specific activities, there was no relationship between the former and the number of times histories or physical exams were observed. However, there was a significant correlation between clinician productivity and the number of patients seen independently by the student (r=.39), the number of cases the students presented (r=.36), and the number of times students were observed writing notes (r=.36).

Discussion

Our results demonstrate that students precepted in our urban CHCs were fairly autonomous, were observed infrequently performing histories and physical examinations, and managed with 30 minutes or less of direct teaching time per session. This lack of direct observation of the student illustrates a weakness in ambulatory teaching—clinical scheduling is driven by the health centers' needs and prevents preceptors from spending much time with students. The students' main interactions with preceptors appeared to have been around specific case presentations (2.4 observed per session), and note writing (1.7 observed per session). These activities are likely surrogates for direct teaching.

High correlations found among provider productivity, the number of patients seen independently by students, and the number of cases they present, suggest that as preceptor productivity increases, students see more patients independently.

In this model, precepting specific cases allows preceptors to receive information about their patients, monitor students' progress, and give feedback at the same time. Students benefit from the autonomous interaction with the patient, an activity reported by other authors[3-6] to enhance learning.

Our results also demonstrated no measurable decrease in the productivity of preceptors or increase in the length of sessions associated with teaching third-year students. Several previous studies have shown a change in productivity or revenue in private practice but not in settings that already had lower productivity than private practice offices. This study shows clinicians in CHCs seeing 2.8 patients per hour, approaching but somewhat lower than the productivity of 3.3 patients per hour found by Vinson for typical private family physicians.[11] Our participants maintained this level of productivity whether or not teaching students.

Students rated overall quality of learning significantly higher than preceptors and disagreed somewhat on which elements contributed most to learning. From the regression analysis, it appears that preceptors may be overvaluing autonomy, believing that this is ultimately what students want most. On the other hand, students in our study placed the highest value on the total amount of time spent with the preceptor and discussing family issues, another element that engages them directly with the preceptor.

Our study had several limitations. First, we had a low response rate from our preceptors. This may reflect an overall high level of stress among our preceptors, or preceptors who did respond may have been more dedicated or more effective teachers. Nevertheless, we did not find significant differences in the group of respondents and nonrespondents with two exceptions—fewer family physicians responded to the survey, and respondents had more scheduled clinical

time than nonrespondents. It is likely that responding to the surveys is related primarily to more time spent in the health center and to the involvement of site coordinators who assisted with collection at some sites but not at others.

In addition, data on productivity, length of the work day, and the frequency of specific elements of the ambulatory education experience were based on self-report rather than on direct observation. The clinicians' report of time worked is not verifiable with our methodology and may not reflect the full effect of precepting. For example, clinicians may develop strategies to cope with the demands of teaching, including coming in to the office earlier, deferring non-direct patient care responsibilities, or altering the content and/or length of patient encounters. Thus, future research should use observation to fully describe the nature of precepting in this setting. The survey itself may have prompted students and teachers to report desirable behaviors. However, the rare reporting of observed history-taking or physical exams, which presumably would be considered desirable, suggests that this is not the case. The rating of quality of learning is, of course, an entirely subjective score reflecting students' and preceptors' perceptions about the educational experience being provided. We made no effort to measure actual effectiveness or content. Finally, because this project was conducted in CHCs, it may not be generalizable to other settings.

Conclusions

Our findings suggest that, despite the pressures on preceptors to see more patients, preceptors in this setting develop strategies for clinical teaching that are patient driven. Increasing productivity does not necessarily detract from the quality of learning for students in this setting and may actually enhance it, in part the result of increased autonomy. For the student, the value of time spent with the preceptor around specific clinical cases and the modeling of the biopsychosocial model, as demonstrated by raising family issues during the clinical encounter, cannot be overemphasized. Students with diverse interests, many of whom will enter fields other than primary care, nevertheless respond positively to their interaction with clinical role models in this setting.

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References

1. Schauffer H, Wolin J. Community health clinics under the managed competition: navigating uncharted waters. J Health Polit Policy Law 1996;21:461-88.
2. Perkoff GT. Teaching clinical medicine in the ambulatory setting: an idea whose time is come. N Engl J Med 1986;314:27-31.
3. Gravdal J, Glasser M. The integration of the student into ambulatory primary care: a decade of experience. Fam Med 1987;19(6):457-62.
4. Gjerde CJ, Xakellis GC, Levy BT. Skills actively performed during a family medicine community-based preceptorship. Fam Med 1997;29(1):21-6.
5. MacDonald PJ, Bass MJ. Characteristics of highly rated family practice preceptors. J Med Educ 1983;58:882-93.
6. Irby DM, Ramsey PG, Gillmore GM, Schaad D. Characteristics of effective clinical teachers of ambulatory medicine. Acad Med 1991;66(1):54-5.
7. Garg M, Boero J, Christiansen R, Booher C. Primary care teaching physicians' losses of productivity and revenue at three ambulatory care centers. Acad Med 1991;66:348-53.
8. Pawlson L, Watkins R, Donaldson M. The cost of medical student instruction in the practice setting. J Fam Pract 1980;10:847-52.
9. Pawlson L, Schroeder S, Donaldson M. Medical student instructional costs in a primary care clerkship. J Med Educ 1979;54:551-5.
10. Kirz H, Larsen C. Costs and benefits of medical student training to a health maintenance organization. JAMA 1986;256:734-9.
11. Vinson D, Paden C, Devera-Sales A. Impact of medical student teaching on family physicians' use of time. J Fam Pract 1996;42:243-9.
12. Vinson D, Paden C. The effect of teaching medical students on private practitioners' workloads. Acad Med 1994;69:237-8.
13. Kearl G, Mainous A. Physicians' productivity and teaching responsibilities. Acad Med 1993;68:166-7.