

Trade-offs in High-Volume Primary Care Practice

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BACKGROUND. With today's emphasis on reducing costs and increasing efficiency, primary care physicians are under pressure to increase patient volume. This study was undertaken to (1) identify factors associated with differences in physician volume, and (2) test for differences in selected clinical outcomes and time use during patient visits.

METHODS. Research nurses directly observed consecutive patient visits during 2 separate days in the offices of 108 community family physicians. Data on the content of 3893 outpatient visits were collected using direct observation, patient and physician questionnaires, and medical record review. Physicians with high-, medium-, and low-volume practices were compared in the rates of preventive services delivery, patient satisfaction, and time use during patient visits as measured with the Davis Observation Code.

RESULTS. High-volume physicians had visits that were 30% shorter, scheduled one third fewer patients for well care, and were more likely to own their practice and to be male than were low-volume physicians. Time use during patient visits was remarkably similar for high- and low-volume physicians. However, after controlling for relevant patient characteristics, patients of high-volume physicians had lower up-to-date rates of preventive services and scored lower on measures of satisfaction and the doctor-patient relationship.

CONCLUSIONS. Physicians with high-volume practices are more efficient than those with low-volume practices in providing similar services in a shorter amount of time. This greater apparent efficiency may come at a cost of lower rates of preventive services delivery, lower patient satisfaction, and a less positive doctor-patient relationship. Health care plans and physicians setting productivity goals should consider the trade-offs inherent in high-volume practice.

KEY WORDS. Doctor-patient relationships; patient satisfaction; physician's practice characteristics; physicians, family. (*J Fam Pract* 1998; 46:397-402)

With the recent growth of managed care, primary care providers report greater pressure to increase the number of patients seen per hour.^{1,3} A recent study by the Commonwealth Fund⁴ found that two in five physicians reported a decline in time with patients and clinical autonomy in the past 3 years. In addition, a recent study found that primary care physicians who rush their patients through visits are more likely to be accused of malpractice than those who take more time and encourage patients to discuss their problems.⁴

As physician speed assumes greater importance as a method of evaluating physician performance, and as enrollment in managed care organizations grows, time allotted for the typical office visit will likely decrease further. Primary care physicians will need to maintain their effectiveness in this changing environment, especially in

terms of clinical outcomes and patient satisfaction.

This study had two purposes. The first was to describe differences in physician, patient, and visit characteristics between high-, medium-, and low-volume physicians. The second was to test the following hypotheses: Higher patient volume is associated with lower rates of preventive services delivery, lower patient satisfaction, poorer doctor-patient relationship, and altered use of time during patient visits.

METHODS

More detailed descriptions of the study methods have been reported elsewhere.^{5,6} Briefly, members of the Ohio Academy of Family Physicians practicing in north-east Ohio were invited to participate in a study of the content of family practice. Each participating physician providing outpatient care was visited by a team of two research nurses on 2 separate days of observation. Consecutive patients were enrolled if they gave verbal informed consent.

Patient volume was defined as the number of patients seen on a single day of observation, divided by the number of hours of patient care for that day, as observed by the research nurses. The physician's patient rate per hour was then categorized into low-, medium-, and high-volume patient groups by identifying

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the top and bottom quartile of physicians and by combining the two middle quartiles. A second measure of patient volume, the physician's report of the number of patients seen in a typical week divided by the number of patient hours per week, was used to corroborate the measure based on 2 days of observation.

The patient visit was coded by a research nurse using the Davis Observation Code (DOC).⁷ The DOC classifies each 15-second interval of observation into 20 clinically relevant behaviors. The DOC was also used to calculate the duration of the visit.

The level of patient satisfaction with characteristics of the physicians on the observed visit was measured by four physician-specific items ($\alpha=.90$) taken from the 9-item Visit Rating Form from the Medical Outcomes Study.⁸ The patients' functional health status was mea-

sured by a 5-item index modified⁵ from the 6-item General Health Survey ($\alpha=.81$).⁹ Physician satisfaction was assessed by a 6-item measure ($\alpha=.71$). The items of this index include satisfaction with inpatient and outpatient care, managing the practice, malpractice risks, leisure and family time, and feelings of control over the practice environment. A single-item measure of the complexity of the medical decision-making was assessed using a 4-point nurse rating scale, ranging from routine to high complexity.

The specific preventive services included for measure in this study are based on the US Preventive Services Task Force (USPSTF) guidelines of recommended services.¹⁰ Patient eligibility for specific services was determined using an age- and sex-specific algorithm based on the USPSTF guidelines. The degree to which

TABLE 1

Physician, Practice, Patient, and Visit Characteristics, by Patient Volume

Characteristics	Patient Volume			P*
	Low (n=26)	Medium (n=55)	High (n=27)	
Physician and Practice				
Ownership in practice, %	30	71	80	.001
Sex, % male	60	75	91	.04
Solo practice, %	17	31	35	.32
Managed care patients, % >40%+	40	55	54	.45
Years in current practice, mean	9.4	11.5	11.8	.50
Physician satisfaction scale, mean	3.3	3.3	3.2	.79
Complexity of visit, mean	2.3	2.3	2.3	.93
Mean age, years	43.4	43.3	43.6	.99
Patient				
Education, % > high school	44	45	35	.03
Patient health status, mean	3.7	3.8	3.6	.03
Marital status, % married	44	52	48	.11
Visits to practice in past year	4.0	4.2	4.3	.50
Race, % white	77	84	84	.52
Mean age, years	40.0	39.8	41.5	.73
Sex, % female	61	62	61	.82
Visit				
Mean length of visit, minutes	12.5	9.8	8.8	.001
Visits for well care, %†	13	13	9	.04
New patient visit, %	14	10	8	.08
Referral to nonphysician, %	2	2	5	.10
Patient raises emotional content, %	12	8	12	.11
Other family member's problem discussed, %	18	16	20	.20
Referral to other physician, %	11	8	7	.36
Drug prescribed during visit, %	60	62	64	.50
Number of problems addressed	1.9	1.8	1.8	.75

* Derived from F and χ^2 statistics.

† All visit characteristic percentages are mean percents.

patients were up to date on services for which they were eligible was calculated from the direct observation of the doctor-patient encounter for services delivered on the observed visit and the medical record review for services recorded as delivered in the appropriate time frame.¹¹ Preventive services summary scores were calculated for each individual in three categories: screening, health habits counseling, and immunization services.

All statistical analyses were conducted with the physician as the unit of analysis. For patient-level information, data on all patients seen by each physician were summarized and then represented by the mean for each physician. All analyses involved contrasts among the three physician volume groups. A one-way analysis of variance was used for continuous outcome measures, and chi-square statistics were used to compare categorical measures. Analysis of covariance was used to control for potentially confounding differences in patient characteristics. Statistical probabilities (*P* values) are presented without correction for multiple comparisons. Because many comparisons are made in these analyses, some *P* values <.05 would be expected because of chance, and can only be taken to suggest associations; *P* <.01 provides some evidence and *P* <.001 provides stronger evidence of association. With a sample size of 108 physicians, an effect size of 0.7 of a standard deviation (SD) difference in means or a 30% difference in rates can be detected across the three study groups with a power of .8 and α at .05. These differences represent a medium effect size.

RESULTS

Participating physicians (N=138) were demographically similar to active practicing members of the American Academy of Family Physicians¹² but differed in having a higher percentage of female and residency-trained physicians.⁵ For this study of physician volume, 30 faculty physicians in community residency training practices, demographically comparable to nonresidency physicians, were excluded, leaving a

TABLE 2

Time Use During Office Visit, by Patient Volume

Behavior Categories*	Patient Volume		
	Low (n=26)	Medium (n=55)	High (n=27)
History-taking	55.5 [†]	55.1	54.9
Planning treatment	28.6	31.7	33.8 [‡]
Physical examination	20.8	23.9	21.5
Health education	18.8	18.6	20.7
Provider evaluation feedback	12.9	13.8	13.5
Family information	10.3	9.5	9.9
Structuring the interaction	8.5	7.6	7.6
Nonmedical chatting	8.0	7.3	7.6
Patient questions	6.9	6.5	7.2
Preventive services delivery	3.3	3.0	2.6
Performing procedures	3.1	2.4	3.3
Nutrition advice	1.8	2.3	2.0
Exercise advice	1.5	1.6	1.4
Counseling	1.7	1.3	1.7
Smoking advice	1.5	1.4	1.3
Assessing patient health knowledge	1.3	1.3	1.0
Health promotion	1.2	1.1	1.3
Assessing compliance	0.8	1.2	1.4
Negotiation	1.2	1.0	1.2
Substance abuse advice	0.5	0.5	0.6

* Measured by the Davis Observation Code.

[†] All numbers presented as mean percent of intervals.

[‡] *P*<.01. After controlling for patient education and health status, *P*<.006.

sample of 108 physicians.

Eighty-nine percent of invited patients agreed to participate, representing 3893 patient encounters. The average number of patients seen per hour ranged from 1.1 to 8.0, with a mean of 3.48 (SD = 1.22). The bottom quartile had a mean of 2.1 patients per hour with a 95% confidence interval (CI) of 1.0 to 3.2. The middle two quartiles had a mean of 3.3 (95% CI, 2.6 - 4.1). The top quartile had a mean of 5.1 patients per hour (95% CI, 3.5 - 6.7). As the confidence intervals for the top and bottom patient volume quartiles are nonoverlapping, the two extreme groups can be considered distinctly different in terms of patient volume. The middle two quartiles were combined to form the intermediate group. The correlation between the physicians' estimate of patients seen per hour and the estimate derived from the observation days was 0.55, indicating good concordance.

A comparison of physician, practice, and patient characteristics in the high-, medium- and low-volume patient groups is shown in Table 1. High-vol-

TABLE 3

Eligible Preventive Services Delivered, by Patient Volume

Services Up to Date	Patient Volume			<i>P</i> *
	Low (n=26)	Medium (n=55)	High (n=27)	
Screening, % [†]	58	57	51	.006
Immunizations, %	23	25	17	.008
Health habits counseling, %	11	9	8	.030

* Derived from F statistics. After controlling for patient education and health status, the adjusted probabilities are: screening, *P* = .04; immunizations, *P* = .05; and counseling, *P* = .02.

[†] All percentages in table are mean percents.

ume physicians were significantly more likely to own their practices and they were more likely to be male than low-volume physicians. Other physician and practice

TABLE 4

Patient Satisfaction with Office Visit, by Patient Volume

Items*	Patient Volume			P‡
	Low (n=26)	Medium (n=55)	High (n=27)	
Satisfied with time spent with the doctor	4.39†	4.18	4.10	.002
Satisfied with personal manner of the doctor	4.72	4.54	4.57	.009
Satisfied with explanation of what was done	4.44	4.30	4.21	.013
Satisfied with technical skills of the doctor	4.58	4.45	4.39	.024
Total satisfaction with the visit §	4.55	4.38	4.31	.003

* Physician-specific items from the Medical Outcomes Study 9-item Visit Rating Form.

† Measured by a 5-item index modified from the 6-item General Health Survey, where 1=strongly disagree, 5=strongly agree.

‡ Probabilities derived from F statistics. After controlling for patient education and health status, the adjusted probability for total visit satisfaction is *P* < .008.

§ Total satisfaction with the visit is represented by the mean of the four items.

TABLE 5

Doctor-Patient Relationship Ratings, by Patient Volume

Items	Patient Volume			P†
	Low (n=26)	Medium (n=55)	High (n=27)	
This doctor always follows up on a problem I've had, either at the next visit or by phone	4.30*	4.08	3.95	.003
Sometimes this doctor does not listen to me	1.48	1.55	1.69	.006
This doctor always explains things to my satisfaction	4.50	4.35	4.31	.025
There were things that I wanted to bring up with the doctor today that I wasn't able to	1.51	1.71	1.74	.060

* Mean scores, where 1=strongly disagree and 5=strongly agree.

† Probabilities derived from F statistics. After controlling for patient education and health status, adjusted probabilities are: follow-up, *P* = .002; listen, *P* = .019; explains, *P* = .032; and bring up, *P* = .074.

characteristics did not differ significantly. High-, medium-, and low-volume physicians also saw demographically comparable patients with the exception that high-volume physicians tended to see less educated patients with lower patient-reported global health status.

The characteristics of the visit also did not differ among the three physician groups for the majority of characteristics assessed (Table 1). For example, the type of visit, number of problems addressed, and referral rates were comparable among the three groups. However, as expected, high-volume physicians had average visits that were 30% shorter than the low-volume physicians, and they scheduled about one third fewer patients for well care.

To assess trade-offs between high- and low-volume practice, three types of outcomes were assessed: time use during the visit, up-to-date preventive services delivery, and satisfaction with the visit. The effects of patient volume on time use during patient visits are presented in Table 2. Visits to high-, medium-, and low-volume physicians did not differ in the percentage of the visit spent on 19 of the 20 behavioral categories. The one exception was planning treatment, on which high-volume physicians spent a significantly higher percentage of their visit time. This association remained strong after controlling for patient education and health status.

The next outcome assessed was the rate of preventive services delivery. As shown in Table 3, high-volume physicians had significantly lower percentages of patients who were up to date on screening, counseling, and immunization services recommended by the US Preventive Services Task Force. Despite overall low rates of delivery, a dose-response trend is seen with lowering percentages of up-to-date patients with increasing physician volume. Slightly reduced trends remained statistically significant after controlling for patient education and health status.

Comparisons involving patient satisfaction are presented in Table 4. For each item and for the total satisfaction score, patients of high-volume physicians consistently rated their satisfaction with the visit lower than did patients of low-volume physicians, even after controlling for patient education and health status. Additional measures of the doctor-patient relationship are shown in Table 5. Patients of high-volume physicians perceived their visits to have less follow-up of patient problems, less attention to patient responses, and less ade-

quate explanations provided than patients of low-volume physicians.

DISCUSSION

In this study, high-volume physicians tended to be characterized by a higher proportion of men who completely or partially owned their practices. They saw more patients with lower levels of education and scheduled approximately one third fewer well care visits than low-volume physicians. Except for these selected differences, the vast majority of physician and patient characteristics examined were found to be similar between high- and low-volume physicians. However, the observation that female physicians tend to see a lower rate of patients per hour than their male counterparts is a replication of findings reported in the literature. Smith et al¹³ in a study of 56 physicians and 2520 patient visits found that variation in the number of patients seen per hour was largely accounted for by physician characteristics, rather than clinic or patient characteristics. Britt et al¹⁴ found major differences in the work pattern and patient mix of male and female general physicians that persisted even after multivariable adjustment for patient and visit characteristics.

The effects of physician volume on clinical outcomes and patient satisfaction may depend partially on the health care system and social context of the practices. For example, a study of British general practices¹⁵ found that practices that scheduled doctor visits every 10 minutes had fewer visits ending with a prescription, a lower proportion of patients returning for a follow-up visit, and a lower proportion of patients returning with a new illness episode than doctors who scheduled visits every 5 minutes. Our study found no such difference in the percentage of visits resulting in a prescription.

Clinical outcomes of high-volume physicians in our study included lower rates of up-to-date screening, counseling, and immunization services and lower levels of satisfaction with the visit. These associations remained statistically significant after controlling for differences in patient education and health status. The competing demands of practice often have been cited as an important reason for low rates of preventive services delivery.¹⁶ The high-volume physicians had even less time per encounter to address competing clinical demands and provide preventive services. Additionally, they scheduled fewer well care visits, which have been associated with increased preventive services delivery.^{17,18}

Surprisingly, the content of the patient encounters, based on the proportion of time spent in each of the 20 DOC activities, was largely unaffected by patient volume, although high-volume physicians devoted 30% less time per visit on the average. Apparently, the needs and expectations of physicians and patients require devotion of a certain proportion of the visit to a set of core activ-

ities, regardless of the average duration of the visit. Only planning treatment, defined as prescribing a medication, diagnostic, or treatment plan, was significantly associated with physician volume. With shorter visit times and a smaller percentage of well care visits, these busy physicians devoted a larger proportion of visit time to making sure that the treatment plan was understood and agreed upon by the patient. Our findings are in contrast with Roland et al,¹⁹ who found that shorter visits resulted in doctors spending less time explaining the patient's problem, explaining the proposed management, and less time discussing prevention and health education. Howie et al²⁰ found that shorter visits resulted in less attention given to psychosocial issues. Ridsdale et al^{21,22} observed that shorter visits resulted in a significant decrease in questions by the doctor, fewer explanation statements, and fewer statements about the problem by the patients. However, physical examinations and other measured aspects of the clinical encounter did not vary by time interval.

The interpretation of our study's findings should be considered in terms of its limitations. One potential concern was the degree to which the categorization of patient volume from 2 days of observation is representative of the physician's practice. That a measure of physician-reported volume corresponded well to the 2-day classification of volume provides evidence for the validity of the measure. An important implication in the interpretation of these findings concerns the likelihood that some physicians may self-select their practice volume; ie, choose to practice in a high-volume mode. The association of owning a practice with increased patient volume, supports this assertion. Thus, it is unknown whether low-volume physicians would perform in the same way as the high-volume physicians in this study if pressured into performing as high-volume physicians.

In today's health care environment patient satisfaction is an increasingly monitored clinical outcome.²³ Similar to our observational findings, Morrel et al²⁴ randomly scheduled patients at 5-, 7-, and 10-minute intervals and found that for scheduled 5-minute visits, doctors spent less time with patients, identified fewer problems, and the patients were less satisfied with the visit than for longer visits.

Our findings suggest that there are important trade-offs to practicing in a high-volume mode. High-volume physicians traditionally have had higher incomes in fee-for-service practice, and are becoming increasingly valued in production-oriented managed care settings.^{2,25,26} Our study shows that these high-volume physicians are not particularly different in terms of patient or visit characteristics, nor in how time is spent during the visit. This evidence suggests that high-volume physicians have adapted their approach to shorter visits by becoming more efficient; ie, they do the same tasks, but in a shorter amount of time than low-volume physicians. In hospi-

tal care, high-volume has been associated with improved clinical outcomes. For example, several studies have shown that the number of coronary artery bypass surgeries performed by individual surgeons^{27,29} or hospitals²⁰⁻³³ is inversely associated with patient mortality.

In our study, however, increased efficiency has been shown to be associated with lower delivery rates of preventive services, lower patient visit satisfaction, and lower scores on measures of the doctor-patient relationship. These trade-offs should be the subject of additional research involving the many natural experiments ongoing in our current health care system. Trade-offs between efficiency and effectiveness should also be considered by health care systems setting productivity goals for their primary care clinicians, and by clinicians who are able to choose their practice setting and patient volume.

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