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TIME-UTILIZATION OF A POPULATION OF GENERAL SURGEONS IN A PREPAID GROUP PRACTICE

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Abstract

A population of seven general surgeons in a prepaid group practice previously shown to have a mean operative work load of 9.2 HE per week were found to have a mean standardized seven day working week of 56.2 hours exclusive of evening activities. The surgeons also devoted a mean of 6.7 evening hours to professional activities for a total working week of 62.9 hours. Comparisons of the time utilization of this population of general surgeons with a population of previously studied community surgeons revealed that the prepaid group surgeons were able to maintain a surgical output more than double that of the community surgeons without having to devote twice as much time to professional activities. Economies in the utilization of surgical manpower in the prepaid group appear to stem from geographic and specialty restrictions on the scope of work of the surgeons, from a reduction of waiting time in the office, and from the utilization of paraprofessional personnel for operative assisting.

Introduction

The mean operative work load of a population of seven general surgeons in a prepaid group practice was found to be 9.2 hernia equivalents (HE) per week.[1*] This mean weekly work load approximated an informal consensus standard elaborated in a previous study for an active yet not overburdening surgical work load (10 HE/week) and was more than twice the mean work load found in a population of 19 general surgeons in suburban community practice in the New York metropolitan area (4.3 HE/week).[1,2] A time-motion study of this latter population of community surgeons revealed a mean total seven day working week, including evening activities, of 44.3 hours, of which 38.5 hours were devoted to professional activities.[3] This latter study also demonstrated a statistically significant relationship between the operative work loads of the individual surgeons and the time they devoted to surgical care. To investigate the allocation of professional time associated with a two-fold increase in operative work loads in the prepaid group setting, the time utilization of the seven general surgeons there was measured through both time-motion and self-reported time-log techniques and the results compared with those of the time-motion study of the community surgeons.

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* One hernia equivalent (HE) is defined as the amount of surgical work involved in the operative, pre-, and post-operative care of an adult patient undergoing a unilateral inguinal herniorrhaphy.[1,2]

Methods

Characteristics of the General Surgeons and Their Working Environment:

The characteristics of the seven general surgeons and the prepaid group practice have been previously described.[1] The surgeons ranged in age from 40 to 56; were all board certified; and, at the time of the study, delivered all the general surgery to the 158,000 subscribers of the prepaid plan. The general surgeon to population ratio in the prepaid group practice was 4.4/100,000, roughly one half that both of the U.S. as a whole at the time of the study (9.8/100,000) and of the suburban community previously studied (10.1/100,000).[4]

Their Working Schedule:

The seven general surgeons had a highly structured daily rotation to enable them to share the burdens of office work, operating, surgical assisting, and consultation as evenly as possible each week. The schedule functioned in such a way that each day of the 49 surgeon-day week was designated by a specific principal task and the task days were then allocated to each surgeon in numbers consistent with an even distribution of tasks. The days were divided into operating days, assisting days, office days, weekday consulting days, weekend consulting days and regular weekend days.

Operating days were days on which a surgeon performed primary elective surgery. No elective surgery was scheduled for a surgeon on a day other than one of his operating days. On an operating day, in addition to performing his elective surgery, a surgeon made rounds but had no scheduled office work. Each surgeon was assigned two operating days per week, for a total of 14 operating days in the 49 surgeon-day week.

The bulk of surgical assisting on these operating days was performed by operating room technicians trained within the prepaid group practice to specialize in surgical assisting. The skill of these technicians was highly valued by the general surgeons. It was felt, however, that assisting on complex cases as bypass grafts required the judgement and skills of a surgeon. Accordingly, one of the general surgeons was scheduled to assist his colleagues each Monday, Tuesday and Wednesday morning when all the general surgeons tried to schedule their more complex surgery. On such an assisting day, the assisting surgeon had a regular afternoon office work load. Thus, there were three assisting days per week.

Each surgeon was scheduled to be the general surgical consultant to the prepaid group practice one day per week. On a consult day, the surgeon was responsible for answering all requests for urgent general surgical consultation from any of the approximately 190 other physicians in the prepaid group practice. The bulk of this consultation was on hospitalized patients with occasional consults to the Emergency Department or to a physician in an outpatient setting. The consultant surgeon performed all surgery generated by these consults. The surgeons were assigned as consultants not only on weekdays but also on weekends. On a consult weekday, the surgeon made his usual rounds, had a light load of office patients scheduled for the morning and no scheduled work thereafter aside from attending to the consultation needs of the prepaid group. Consult weekend days differed from week days only in that there were no scheduled office visits on these days. Thus, there were five consult weekdays and two consult weekend days per week. On weekends,

when not assigned as consultant, it was not unusual for the surgeons to make rounds each day and to see a few office patients on Saturday morning. There were twelve such unassigned weekend days per week.

Any day during the week not allocated to one of the above categories was an office day. On an office day, a surgeon had scheduled office sessions in both the morning and the afternoon and made his usual rounds. He had no scheduled surgery, assisting or consulting. There were thirteen such office days per week. Table I lists the type of days by their frequency in and share of the 49 surgeon-day week.

Mechanisms of the Study:

Data were gathered on the time-utilization of the surgeons by both observed, time-motion and self-reported, time-log techniques. Resources allowed two and a half weeks for the time-motion analysis in the fall of a recent year. In view of the fact that thirteen week days were thus available for observation, it was decided to sample heavily from the most frequently occuring week days, i.e. six operating and six office days and to fill out the sample with one observation of the next most frequently occuring week day, a consulting day. Specific days for observation were selected randomly not repeating the same surgeon for the same type of day. After the sample of six operating and six office days was selected, the thirteenth available study day was expended in studying the consultant surgeon for that day.

Permission for participation in the study was obtained from each of the surgeons well in advance of the period of observation. Each surgeon was notified of his specific day for observation, however, only 24 hours before that observation was to begin. Each surgeon was met by the observer

TABLE I

TYPE OF DAY BY FREQUENCY IN AND SHARE OF
49 SURGEON-DAY WEEK

Type of Day	Frequency in 49 Surgeon-Day Week	Share of 49 Surgeon-Day Week
Operating day	14	.286
Office day	13	.265
Consult day	5	.102
Assisting day	3	.061
Weekend consult day	2	.041
Weekend day	12	.245
Total	49	1.00

(R.N.W.) at the very beginning of his professional day, queried as to the nature and duration of any professional activities during the previous evening, and then accompanied by the observer until the end of all scheduled professional activities on that day.

The observer recorded the individual activities of the surgeons to the nearest minute, utilizing pretested codes and forms, similar to those used in the previous time-motion study of the community surgeons. In addition, he recorded the location of each activity and its relevance to patient care. Activities involving patient care were defined as "direct" patient care if they were performed in the presence of a patient (e.g. performing a physical examination or a surgical procedure) and as "indirect" patient care if they were performed in the absence of a patient (e.g. writing orders or reviewing an X-ray.

Direct patient care activities were further classified as either surgical or non-surgical, depending on both their nature and the complaint of the patient involved. Surgical problems were broadly defined to include not only those that might be expected to lead to or be the result of an operation, e.g. evaluation of a hernia or post-operative wound care, but also diagnostic problems as abdominal pain that might, at some point, reasonably be expected to involve a surgeon, if only on a consulting basis. The treating of illnesses neither resulting from nor attendant to surgical therapy, as upper respiratory infections or skin disorders, was classified as non-surgical patient care. The activities involved in each patient encounter were recorded as were the characteristics of each patient seen. Each surgical patient was further classified by operative status: pre-operative, post-operative, operative, or non-operative.

In addition to recording these and the other professional activities of the surgeons, the observer also recorded time devoted to personal activities, including meals, during the working day. Both the observer and the surgeons were carefully instructed to refrain from any interaction during the course of this study. When such interaction occurred, it was recorded as observer time.

At the end of the first day of observation, each surgeon was given a structured log form to record his professional activities during both the daytime and evening hours for the next six consecutive days. To facilitate both the ease and the accuracy of this self-recording, the log forms requested information on time utilization in pre-defined broad categories as operating, office activities, and rounds in units of fifteen minutes. The degree of detail elicited in the time-motion portion of the study, e.g. direct vs. indirect patient care time on rounds, etc. was not requested here. Thus, through both time-motion techniques and the self-reported logs, data were collected on all the professional activities of the surgeons for a seven day week.

To validate the accuracy of the self-recorded data, evening activities and daytime activities were aggregated separately and the time reported for specific daytime activities compared with the time observed for the same activities on the observed days. On the basis of this validation, the data were pooled and a standardized seven day mean working week was calculated for this population of surgeons. The components of this mean working week were then analysed as were the data reflecting patient encounters. Total evening time at professional activities was also calculated and added to the mean standardized seven day week to yield a total seven day working week. The results were compared to those of the time-motion study of the general surgeons in community practice.[3]

Results

The six observed operating days ranged in length from 6.2 to 12.1 hours, with a mean of 9.4 hours and a coefficient of variation of 0.24. The six observed office days had a smaller range, 7.2 to 11.2 hours; a mean of 9.5 hours; and a coefficient of variation of 0.16. The one observed consult day lasted 9.2 hours. Though the amount of time spent in specific activities on office and operating days varied because of the difference in the major activity on the two types of days, time spent in activities which occurred regularly regardless of the type of day, such as rounds and meals, was, on the whole, remarkably similar on both types of days (Table II).

Six of the surgeons self-recorded their activities on all six of their designated days while the seventh surgeon recorded his activities on only one day, for a total of 37 self-recorded days. To test the validity of this self-recorded data, the self-recorded days were aggregated by type of day; evening activities were separated out; and, for office and operating days, the mean times reported for the entire day and for various activities during the day were compared with the mean times observed for these same activities on observed days. The results of this comparison are given in Table II.

For office days, the mean duration of the ten self-recorded days differed from the mean of the six observed days by only 14 minutes. For operating days, the difference in means was only 31 minutes. These differences, of two per cent and of six per cent of the observed days respectively, are not statistically significant. It is interesting

to note that, for each type of day, the mean self-reported day exceeded the observed. This observation is consistent with other comparisons of observed and self-reported physician working hours, though the differences noted here are less than those previously reported.[3]

A comparison of the duration of the individual activities on the self-reported days and on the observed days revealed that for all the major components of the working day, e.g. office activities, rounds, operating room time, administrative activities, and meals, not only was there no statistically significant difference between the mean times reported and the mean times observed but often these times differed only by a matter of minutes (Table II). On each type of day the activity most over-reported in the self-recorded data was rounds, for which, across both types of days, self-recorded time exceeded observed time by 22 per cent.

Table II aggregates in "other personal time" only that personal time that occurred at locations other than in the office or on rounds. Personal time observed at those locations is included in the appropriate categories. This category was the most under-reported of regularly occurring activities in that, for both types of days, observed time was three to four times that recorded. Although this category consists of only a small proportion of the working day, 3.8 and 6.7 per cent of observed operating and office days respectively, total personal time is of some interest insofar as we would like an estimate of net professional time on the job. Much of the difference between the observed and self-reported personal time is probably due to the fact that because the log forms requested information in units of fifteen minutes, much greater than the median duration of observed personal activities (3.5 minutes),

Table II

COMPARISON OF MEAN TIMES AT SPECIFIC ACTIVITIES FOR SELF-REPORTED AND OBSERVED OFFICE AND OPERATING DAYS

Activity	Mean time per observed office day (N=6) (hr.:min.)	Mean time per self-reported office day (N=10) (hr.:min.)	Ratio of mean time per day of self-reported to observed office day	Mean time per observed operating day (N=6) (hr.:min.)	Mean time per self-reported operating day (N=8) (hr.:min.)	Ratio of mean time per day of self-reported to observed operating day
Office:						
Direct patient care:	2:53			:07		
Indirect patient care:	1:52			:08		
Nonpatient care:						
Administration:	:18			:08		
Internal travel:	:05			:03		
Waiting:	:09			:01		
Personal:	:07			:06		
	5:24	5:20	.99	:32	:30	.94
Rounds:						
Direct patient care:	:53			:53		
Indirect patient care:	:40			:41		
Nonpatient care:						
Internal travel:	:16			:22		
Personal:	:05			:00		
	1:55	2:15	1.17	1:57	2:29	1.27
Operative Time:						
As primary surgeon:	:00			4:14		
As assisting surgeon:	:00			:00		
Ambulatory:	:00			:17		
Indirect patient care:	:00			:20		
Nonpatient Care:						
Waiting:	:00			:21		
Internal travel:	:00			:07		
	:00	:00	0.0	5:19	5:34	1.05
Other Administration:						
Hospital:	:14	:24		:01	:15	
Medical group:	:17	:00		:18	:00	
Insurance:	:00	:03		:00	:04	
	:31	:27	.87	:19	:19	1.00
Meals:	:28	:28	1.00	:30	:31	1.03
Other Personal Time:	:26	:09	.34	:15	:04	.27
Continuing Education:	:25	:18	.72	:00	:15	NA
Miscellaneous:	:20	:03	.15	:30	:11	.37
Mean day:	9:30	9:44	1.02	9:22	9:53	1.06

the surgeons did not report separately their briefer personal activities but included them in the most proximate professional activity. The similarity of the self-reported and the observed time in the office supports such an inclusion of personal time in reported professional activities. To account for this reporting of some personal time as professional time, an estimate of the upper limits of all personal time on the job is calculated below in discussing the standardized seven day working week.

With the validity of the self-reported data thus demonstrated, both the self-reported and the observed days were pooled by type of day and a composite mean for each type of day calculated. A mean standardized seven day working week for this population of general surgeons was then calculated by multiplying the composite mean for each type of day by the share of that type of day in the 49 day surgeon-week, thereby weighting the day by its relative frequency in the weekly schedule. The validity of this calculation of the mean standardized working week was substantiated by calculating a mean week from the weeks constructed from the six surgeons' six self-reported days plus their observed day. This calculation yielded a mean week differing from the mean standardized seven day working week by only 38 minutes, a difference of only 1%.

The mean standardized seven day working week, excluding evenings, was 56.2 hours (Table III). This working week was spent entirely in the hospital of the prepaid plan. Over 85 per cent of this mean week was spent either in office activities, on rounds or in the operating room. Other administrative activities (out-of-office) comprised five per cent of the week. If the small amount of additional administrative activity

TABLE III

COMPARISON OF THE DISTRIBUTION OF TIME IN MEAN WEEK BY TYPE OF ACTIVITY OF SEVEN GENERAL SURGEONS IN A PREPAID GROUP PRACTICE WITH 19 GENERAL SURGEONS IN COMMUNITY PRACTICE

Activity	(1) Mean time per activity per week for pre-paid group practice	Per cent of mean working week	(2) Mean time per activity per week for community practice	Per cent of mean working week	Ratio between (1) and (2)
Office:	14:50	26.3	11:38	32.4	1.28
Rounds:	17:56	31.9	3:49	10.6	4.70
Operative time:	14:25	25.6	8:17	23.1	1.74
As primary surgeon:	*12:54*	*22.9*	*6:15*	*17.4*	*2.06*
As assisting surgeon:	*1:31*	*2.7*	*2:02*	*5.7*	*.75*
Other Administration:	2:34	4.5	1:02	2.9	2.48
Other direct patient care:	:10	.3	1:19	3.4	.13
Other indirect patient care:	:52	1.5	1:12	3.3	.72
Meals:	2:44	4.9	1:28	4.8	1.86
Other Personal:	:57	1.7	1:59	5.5	.48
Continuing Education:	1:17	2.2	:21	1.0	3.57
External Travel:	:00	0.0	3:13	9.0	0.0
Miscellaneous:	:32	.9	1:38	4.6	.33
Mean Working Week:	56:13	100.0	35:55	100.0	1.57
Total Evening Activity:	6:43	....	8:33	....	.79
Total Working Week:	62:56	....	44:28	....	1.42
Personal and Meal Time:	5:30	....	5:50	....	.94
Total Professional Week:	57:26	....	38:38	....	1.49

observed in the surgeons' offices (Table II) were to occur regularly, all administrative activities would approximate 3.6 hours, six per cent of the mean week. Another three per cent of the week was devoted to a variety of miscellaneous activities, including continuing education.

As indicated above, the 57 minutes of "other personal time" aggregated in Table III entails a possible under-reporting of total personal time on the job. Support for this contention is found in the fact that a mean of 31.4 minutes of total personal time was observed on the thirteen days of observation while a mean of only 6.0 minutes was reported for similar types of self-reported days. In an attempt to correct for such under-reporting, it would appear reasonable to assume that the mean amount of personal time observed on the days of observation (31.4 minutes) could be a property common to all working days. Accordingly, since each week contains 5.3 working days (e.g. all days except unassigned weekend days), a total of 2.8 hours of personal time could be said to occur on the job in a working week. In addition, 2.7 hours a week on the job were devoted to meals. With the 5.5 hours devoted to these two activities subtracted from the 56.2 hours spent on the job, 50.7 hours, 90 per cent of the standardized week, could be said to be devoted to professional activities.

Data on evening activities were collected both from personal interviews with the surgeons on their days of observation and from the self-reported log forms. Information was gathered on 13 previous evenings through the interviews and on 37 evenings through the log forms. There was no systematic variation in the amount of evening activity by day of the week, with the exception that no professional activity was reported

for Saturdays. Friday and Sunday evenings contained professional activities comparable in duration to other evenings. Data on evening activities collected by both methods were aggregated and a mean evening and its components calculated (Table IV).*

The mean duration of professional activities in an evening was 57.6 minutes (Table IV). Sixty-one per cent of this time was devoted to reading journals and 21 per cent to administrative activities. The remaining 18 per cent of evening activities (10.5 minutes) consisted of direct and indirect patient care. The bulk of this time was spent seeing hospitalized patients or operating on them. All the time in these two categories stemmed from two evenings' activity by the surgeon assigned as consultant for that day. The median time devoted to each activity in the evenings was zero minutes, indicating that on at least half of the studied evenings, each of the activities did not occur.

Were seven evenings per week of such activity to have occurred in the prepaid group practice, a total of 6.7 evening hours per week would have been devoted to professional activities. Adding this professional evening time to the mean standardized seven day working week results in a total working week of 62.9 hours. Deleting personal and meal time on the job from this total week leaves a mean total professional week for this population of general surgeons of 57.4 hours.

Comparison of the mean standardized seven day working week with that observed for the community surgeons previously studied reveals

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*Even though all reported Saturday evenings (N=6) contained no professional activities, we have based our calculation of the mean evening time on a seven day week.

TABLE IV

COMPARISON OF THE DISTRIBUTION OF
MEAN REPORTED PROFESSIONAL TIME IN EVENINGS BY TYPE OF ACTIVITY
FOR SEVEN GENERAL SURGEONS IN PREPAID GROUP PRACTICE
AND 19 GENERAL SURGEONS IN COMMUNITY PRACTICE

	Mean Reported Time for Prepaid Group Practice (min.)	Per Cent of Mean Evening	Mean Reported Time for Community Practice (min.)	Per Cent of Mean Evening
Reading Journals:	35.1	60.6	21.0	24.6
Seeing hospitalized patients:	5.4	9.4	15.7	18.4
Emergency room patient care:	0	0	11.1	13.0
Operating and assisting:	3.0	5.2	8.9	10.4
Other patient care:	0	0	3.9	4.6
Communicating with:				
Patients and families:	.3	.5	7.2	8.4
Hospital staff and colleagues:	1.8	3.1	10.4	12.2
Administration:	12.0	20.8	7.4	8.7
Mean Evening Time:	57.6	100.0	85.5	100.0

some interesting contrasts (Table III).[3*] Most noticeable is the fact that the mean standardized working week of the general surgeons in the prepaid group practice exceeded that of the community surgeons by twenty hours, a difference of 57 per cent.

The surgeons in the prepaid group practice spent 28 per cent more time in office activities, 74 per cent more time in operative activities and 370 per cent more time on rounds. This latter finding is due in part to the fact that not only did the surgeons in the prepaid group see more individual patients per day on rounds than the surgeons in the community, 8.0 vs. 5.0, consistent with their higher operative work loads, but, in addition to making morning rounds, they also made afternoon rounds on almost half their patients. In the community, however, the surgeons almost exclusively made only morning rounds. Thus, the surgeons in the prepaid group averaged 11.9 patient visits per day on rounds as compared to 5.0 such patient visits per day in the community. Not only did the surgeons in the prepaid group average more rounds patient visits per day in the community, but they also spent more time per patient visit. The prepaid group surgeons averaged 4.5 minutes per patient visit on rounds as opposed to 3.6 minutes per similar patient visit in the community, a statistically significant difference. As a result, the surgeons in the prepaid group practice averaged a total of 6.6 minutes per individual patient seen on rounds over the course of a day, 74 per cent longer than the rounds time per individual patient

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*The mean observed working week reported for the community surgeons in the previous study was based on observations of a six day week. This mean has been augmented to reflect a seven day week by the addition of 85.5 minutes, consistent with the allowance made for Sunday activities in the previous study.[3]

per day for the community surgeons (3.7 minutes). In each setting, the proportion of pre-, post- and nonoperative patients seen on rounds was comparable. The mean HE value of post-operative patients seen on rounds in the group was 1.69 HE, eight per cent greater than the mean HE value of post-operative rounds patients in the community, 1.59 HE. The comparability of HE values of post-operative rounds patients is interesting in view of the previously reported finding that the mean HE value per inpatient operation for the prepaid surgeons was about 25 per cent greater than that in the community, 1.21 HE vs. 0.95 HE.[1] The finding of higher mean HE values for rounds patients than for all inpatient operations in both settings is consistent with the positive relationship between length of stay and HE previously demonstrated.[2] Since patients with more complex procedures have longer hospital stays, the proportion of such patients seen on rounds per day will be greater than their proportion in the total operative patient population. The above noted increased time both per rounds patient per day and per rounds patient visit in the prepaid group take on added interest in terms of the comparison of time per office patient visit in the two settings to be discussed below.

Although the overall amount of operative time in the prepaid setting was 74 per cent greater than in the community, the amount of time devoted to primary surgery, including ambulatory surgery, in the prepaid group was 106 per cent greater than the amount of time devoted to such primary surgery in the community.* The magnitude of the ratio of the mean time devoted to primary surgery in the two settings, 2.06,

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*These reported operative times include all operative support activities as dressing, scrubbing, etc.

is almost equal to the ratio of the mean HE/week in the two settings, 2.14. Thus, the surgeons in the prepaid group doubled their operative output by doubling their primary operative time.

Though performing over twice as much primary surgery per week, the surgeons in the prepaid group spent 25 per cent less time assisting each other per week than the surgeons in community practice. In fact, only 10 per cent of their total operative time was spent assisting as compared with 25 per cent in the community. This trade off of assisting time for primary operative time was accomplished through the use of operating room technicians as surgical assistants. This practice could represent an efficiency in the delivery of general surgical services in this prepaid group practice. Our previous study of the operative work loads in the prepaid group demonstrated that 24 per cent of the operations were performed on an ambulatory basis. Twenty-one per cent of the operations observed in the course of the present study were performed on an ambulatory basis.[1]

The surgeons in the prepaid group were devoting over twice as much time to administrative duties outside the office as the general surgeons in community practice, 2.5 hours vs. 1.0 hours. Direct observation of the duration of office administrative activities in each setting suggests that the prepaid group surgeons spent a comparable amount of office time in this activity as the community surgeons, 1.1 vs. 1.3 hours. Thus, the overall mean time for administration in the prepaid group was 56 per cent higher than in the community. This finding is consistent with that in the previous study of a positive relationship between a surgeon's operative work load and the time he devoted to administrative work.

A major qualitative and quantitative difference between the mean working weeks in the two settings is the absence of a number of activities in the weeks of prepaid group surgeons which appear in the weeks of the community surgeons. Most salient of these is 3.2 hours of "external travel" in the week of the community surgeons. This external travel in the community practice was, for the most part, consumed during the working day in driving from hospital to hospital, from hospital to office and on the few house calls and other ambulatory care activities in which the community surgeons engaged. Over the course of a 48-week working year, this time devoted to external travel would consume over 4 working weeks. This travel did not occur within the practices of the prepaid group surgeons as: (1) their offices were located within the hospital in which they practiced and (2) the scope of their practice was limited to patients either hospitalized in or presenting for ambulatory care to that facility. Associated with the 3.2 hours of external travel in the week of the community surgeons was an additional 1.3 hours of "other direct patient care" that was delivered in a variety of non-hospital and non-office locations. Much of this care was not surgical in nature. These travel and external patient care activities accounted for almost 13 per cent of the working week of the community surgeons. The lack of occurence of these activities in the weeks of the prepaid group surgeons would appear to represent additional economies in the use of time in the delivery of general surgical services in the prepaid group.

An additional economy in the use of time in the prepaid group emerges from an inspection of the relative amount of observed office time spent waiting for patients in the two settings. In the community,

the surgeons averaged almost two hours a week in this activity.[3] In the prepaid group, however, the surgeons approximated less than 25 minutes in that activity, thereby saving an hour and a half of otherwise dead and non-productive time per man per week.

The total amount of personal and meal time on the job was roughly comparable in the two settings, 5.5 hours vs. 5.8 hours.* Thus, it would appear that the prepaid group surgeons not only worked longer hours, but within those hours devoted proportionately greater amounts of time to professional activities. There was also no teaching activity in the weeks of the prepaid group surgeons, while one of the community surgeons spent an afternoon per week teaching in a hospital out of the community.

The 1.3 hours of continuing education in the mean week of the prepaid group surgeons consisted of a weekly conference. Such conferences were scheduled in the community hospitals but none appeared in the data gathered in the time-motion study. The 21 minutes of continuing education in the community during the seven day working week, exclusive of evenings, consisted of journal reading on Sunday. In the evenings, the surgeons in the prepaid group devoted almost two thirds more time per mean evening to journal reading than did surgeons in the community and averaged 4.1 hours per week of that activity as opposed to 2.5 hours in the latter setting.

The prepaid group surgeons, however, spent 21 per cent less time overall in evening activities than the surgeons in the community practice

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*Included for both settings are personal and meal time in the office and on rounds and, in the community, personal time at other, out-of-hospital settings, none of which is disaggregated in Table III. .

(Table IV). The most pronounced difference in evening activities between the two settings concerned patient care activities, in which the community surgeons spent almost six times as much time. Some of this decreased patient care time in the evenings of the prepaid group surgeons may be due to the fact that in that prepaid setting, emergency room coverage was handled by full-time emergency room physicians, while in the community, the surgeons were responsible for all emergency care of their patients. For the prepaid surgeons, the duration of the total seven day working week and the total professional week exceeded that of the community surgeons by 42 per cent and 49 per cent respectively (Table III).

On the 13 days of observation, the surgeons in the prepaid group saw 112 patients in their offices (Table V). All but two of these patients (98.2 per cent) were judged to be presenting with a surgical problem. This proportion of surgical patients is higher than that presenting to the offices of the general surgeons in community practice. There, 77 per cent of the presenting patients were judged to be presenting with a surgical problem. The surgeons in the prepaid group spent almost 50 per cent more time per pre-operative patient visit as per post-operative patient visit and the greatest amount of time per nonoperative visit. In each of the two settings, the proportion of surgical office patients who were post-operative was exactly the same (56 per cent) and the proportion of pre-operative and nonoperative also virtually identical

TABLE V

COMPARISON OF TIME PER OFFICE PATIENT VISIT
OF SEVEN GENERAL SURGEONS
IN A PREPAID GROUP PRACTICE WITH
19 GENERAL SURGEONS IN COMMUNITY PRACTICE

	Prepaid Surgeons			Community Surgeons		
	Number of Patients	Mean Time Per Patient Visit (min.)	Per Cent of Category	Number of Patients	Mean Time Per Patient Visit (min.)	Per Cent of Category
All Office Patients	112	9.7	100	173	7.5	100
Non-surgical	2	7.0	1.8	39	7.4	22.5
Surgical	110	9.8	98.2	134	7.5	17.5
Pre-operative	14	12.7	12.7	14	12.4	10.4
Post-operative	62	7.7	56.4	75	5.8	55.9
Non-operative	34	12.9	30.9	45	9.0	33.6

(13 per cent vs. 10 per cent and 31 per cent vs. 34 per cent, respectively).* The surgeons in the prepaid group averaged 9.7 minutes per office patient visit, 29 per cent longer than the mean office patient visit in the community, 7.5 minutes, a statistically significant difference. Thus, for both rounds and office visits in the aggregate, and for every type of patient except pre-operative office visits, general surgeons in the prepaid group spent substantially more time per patient visit than the surgeons in the community. This increased time per patient visit is an interesting finding in view of the frequently encountered contention that patient care in prepaid group practice is often impersonal.[5] It would be interesting to know whether the increased time per rounds and office patient visits in the prepaid group practice was associated with either shorter hospital stays or a shorter period of post-operative surgical care than in the community. Further analysis of office patient visits by source of referral, nature of disposition, etc., between and within the two settings, is underway. Preliminary results suggest differences in the sources and dispositions of office visits between the two settings and raise interesting questions concerning the validity of the use of the concept of a homogeneous "office visit" as an output measure in health services research.

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*The actual time one community surgeon spent in one office session with 18 patients was not observed. While all 18 of these patients were judged to be surgical in nature, neither the individual time with them nor their source of referral was determined. Accordingly, these patients are not included in the comparisons made in this study. Data on community patient visits are based on 173 observed patient visits.

Discussion

The surgeons in the prepaid group practice were able to maintain a mean operative work load twice that of the community surgeons previously studied without having to spend twice as much time on the job. They were able to achieve this economy in the delivery of surgical services through: (1) both geographic and specialty restrictions in the scope of their work to minimize utilization of professional time both in less productive activities as travel and in the care of non-surgical patients, (2) reduction of otherwise dead "waiting time" in their offices and (3) the utilization of paraprofessional personnel for selected operative assisting.

The lack of external travel in the activities of the prepaid group surgeons freed up, relative to the community surgeons, 3.2 hours per week for the care of patients in the prepaid plan's hospital. The importance of this observation is underscored by the finding in the previous study that the amount of time spent by the community surgeons in external travel increased with the size of their operative work loads.[3] The geographical unity of the activities of the surgeons in the prepaid group engendered an additional benefit insofar as it enabled the surgeons there to more easily make afternoon rounds on their patients since they were still in the hospital following their afternoon office hours.

In the community, the surgeons practiced at three to four hospitals and had their offices spread throughout the suburban area at locations often some distance from the hospitals. This dispersion was probably,

in part, the result of an attempt by individual surgeons to attract patients from local areas within the larger community. As such, its purpose was to save the prospective patient travel time and inconvenience and, hence, to lower the total cost of a visit to the patient. Similarly, the decision to hospitalize a patient at one of the several hospitals available to a surgeon may have been in response to patient preferences for a particular hospital or for a particular scheduling of elective surgery (as queues of varying length existed at all hospitals in the community at the time of the study). This type of surgeon behavior, designed to attract patients at the expense of the most technically efficient use of a surgeon's time, is not unexpected in a community where the supply of surgeons' services is relatively plentiful. Thus, the geographical dispersion of the various tasks performed by individual surgeons may have been a rational response to the nature of the market for surgical services in their community and therein an effort to increase their individual work loads. This hypothesis is supported by previously reported findings within the community of significant, positive relationships between a surgeon's operative work load and both the number of his hospital affiliations and amount of time he devoted to external travel.[3]

The tendency of the prepaid group surgeons to restrict their practices to surgical care is evidenced by the fact that less than two per cent of the patients seen in their offices were judged to be non-surgical in nature as opposed to the fact that 23 per cent of office patients seen in the community were judged to be non-surgical. Some of this difference in the proportion of non-surgical patients in the two practice settings is due to the referral systems operating in each setting. In the

prepaid group, the proportion of patients referred for their first visit by another physician was larger, and the proportion of patients self-referred smaller than in the community. Though the proportion of non-surgical patients among self-referred patients was comparable in the two settings (40 vs. 38 per cent), the proportion of self-referred patients overall in the community was twice as great as in the prepaid group and the proportion of non-surgical patients entering the surgeons' practices was twice as great. The two self-referred non-surgical patients seen by the surgeons in the prepaid group were referred to other physicians for follow up care. Evidence of a tendency for non-surgical patients, once entered into the patient load of one of the community surgeons, to stay in that load, however, is found in the fact that 24 of the 39 non-surgical office patients observed in the study (62 per cent) were scheduled by the community surgeons for return appointments. This selectivity in the treatment of patients in the group enables the surgeons in the prepaid group to utilize more efficiently their surgical skills and therein to free up time for the care of more surgical patients. This practice also delegates the care of non-surgical patients in the prepaid group to those physicians trained to do so.

The reduction of office waiting time in the prepaid group would appear to be a result of scheduling efficiencies resulting from a larger patient load. A similar reduction in office waiting time in the community was found to be associated with increased operative work loads.[3]

The utilization of operating room technicians in the prepaid group to assist on most cases would appear to represent an important

economy in the utilization of surgical manpower. The surgeons in the prepaid group spent one half hour less time per week assisting than the surgeons in the community. If they assisted at the same rate as in the community relative to the size of their primary work loads, however, they would have devoted more than two and one half additional hours per man per week to this activity. It should be noted that the operating room technicians first assisted on only those cases judged not to need the assistance of a surgeon. When such cases arose, a surgeon was available to assist on them. Further studies are currently underway on the overall utilization of these operating room technicians within the prepaid group. Were such substitution to be implemented on a broad scale, it could represent an important economy in the utilization of surgical manpower.[6]

An additional source of efficiency in the delivery of surgical services in the prepaid group might possibly be the highly structured, daily working schedule of the general surgeons. Not only does this schedule allow an orderly allocation of the talents of the population of surgeons to the variety of surgical responsibilities facing the prepaid group, but also, by consistently scheduling coverage for emergency work during the day, on nights, and on weekends, it introduces an element of regularity into the work pattern of the surgeons possibly enabling them to shoulder a long working week in full knowledge that free evening and weekend time can regularly be counted on. This element of regularity, evidenced by the fact that the surgeons in the prepaid group spent less than twenty per cent of the time that the community surgeons spent in evening patient care activities may be an important fringe benefit helping

to explain why the prepaid group surgeons are willing to work a total professional week 49 per cent longer than the community surgeons.

Anecdotal evidence from each setting suggests that mean earnings in each setting were comparable. In view of working weeks 49 per cent longer in the prepaid group practice than in the community, the question arises as to why the general surgeons continue to work in that environment. The findings of increased journal reading in the evening, increased afternoon rounds, and longer rounds patient visits and longer office patient visits, both in the presence of already increased working weeks and in the absence of a renumeration system that rewards increased work loads, suggest a fairly highly motivated group of surgeons in this prepaid group practice and an environment in which peer pressure may be an important motivating factor. In addition, the surgeon-to-population ratio within the prepaid plan essentially guarantees the surgeon a full and varied operative work load.[1] Such work loads would appear to entail a degree of professional satisfaction often implied to be lacking in the "bread and butter" surgery of some community practices.

Aside from the possibility that the prepaid group surgeons might desire longer work weeks per se, the group must offer adequate inducements to keep itself staffed. One such inducement might be greater certainty of annual income. The wide dispersion of surgical work loads in the community and the formula for setting salaries in the group would imply that there is much greater variability in the incomes of the fee-for-service community surgeons. Choice of the prepaid setting may thus reflect risk adverse behavior, particularly as a surgeon choosing community practice has no guarantee that he will be able to earn the

mean income by working the mean numbers of hours. These speculations are reminiscent of those of Reinhardt that supposed efficiencies in prepaid group practice may be as much a function of the type of physician attracted to those settings as of any particular organizational aspect.[7]

It should be noted that none of the economies in the use of time and resources noted in this prepaid group are a function of a prepaid setting per se. Indeed, it does not seem unreasonable that such economies might be found in any group or fee-for-service setting facing a similar demand for surgery. We have previously hypothesized that the surgeon-to-population ratio facing a population of surgeons might be the most important determinant of the size of their work loads.[1] In this prepaid group practice, the surgeon-to-population ratio was one half that in the community and the mean operative work load was double that of the community. Thus, the economies in the use of time noted in this paper might in fact be viewed as attempts by the surgeons in the prepaid group to produce a doubled surgical work load necessitated by a halving of the surgeon-to-population ratio without having to double their overall time input. As also noted in the previous paper, the general surgeon-to-population ratio in this prepaid practice was low compared to other prepaid groups.[1,4] This observation should serve to contraindicate generalizations of the findings of this study per se to other prepaid group practices.

Additional findings of some interest in this study are the increased times per patient visit on both rounds and in the office as compared to the community. Thus, within their working weeks, not only were the surgeons in the prepaid group spending more time on the job and seeing

more patients but they were also spending more time per patient visit than the surgeons in the community. These findings warrant further investigation. For the moment, however, they stand in contrast to the findings of Mechanic who, in studying visit times for primary care practicioners in prepaid and fee-for-service settings by questionnaire, suggests that increased patient work loads for these physicians in prepaid group settings are characterized by decreased times per patient visit and assembly line amenities.[5]

References

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