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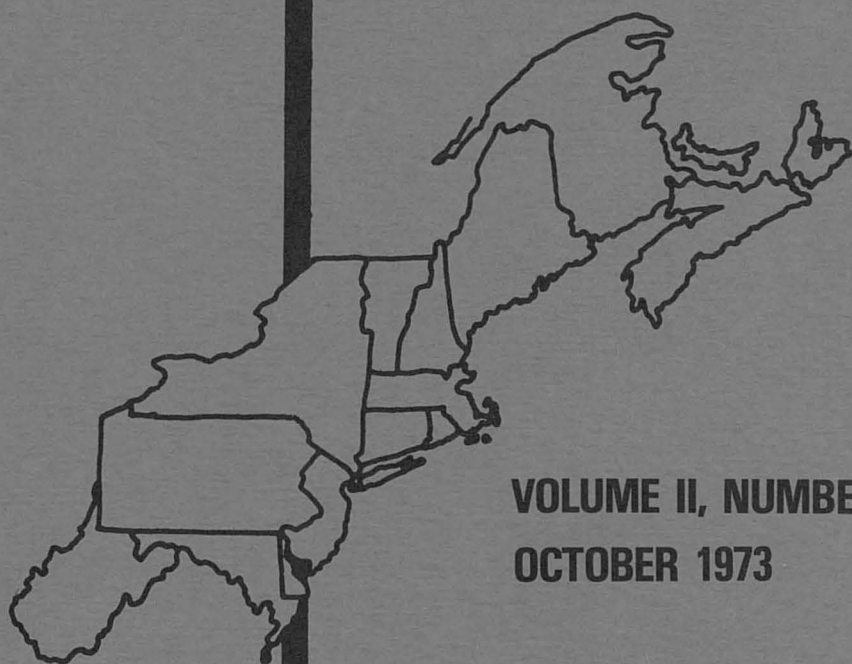
COMPARATIVE PRODUCTIVITY AMONG DIFFERENT
SIZED PHYSICIAN PRACTICES IN RURAL WASHINGTON[1]/

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Introduction

Students of our nation's medical care system generally express particular concern over the availability or lack of availability of physician services in rural areas. This concern is not without statistical foundation. In 1969 the nation's most urbanized counties (5,000,000 inhabitants or more) had approximately five times as many actively-practicing private physicians per 100,000 population as did the most rural counties (less than 10,000 inhabitants) [1]. In view of this situation a number of measures designed to increase the rural supply of physician services are being proposed. In general, these measures can be categorized into (1) those designed to increase the size of the resource base used in producing physician services and (2) those designed to reorganize the existant resource base in hopes of increasing resource productivity.

Group or multi-physician practice is a frequently mentioned approach falling into the latter category. Although specific definitions of this practice arrangement vary, the basic concept involves a consolidation of physician manpower and supportive resources into larger sized "firms" vis-à-vis the more traditional single doctor or solo practice arrangement. This paper presents research findings that deal with the potential of group practice for increasing physician productivity and the supply of physician services in rural areas.

Theoretical and Methodological Framework

The hypothesized economic benefits of group practice are rooted in the economic principle of increasing returns to size. This principle has reference to the situation where output increases proportionately

more than an increase in resource usage when all inputs are allowed to vary simultaneously. The theoretical reasons for expecting this relationship to hold over some range of output are because larger sized units of production generally have greater possibilities (1) for the division and specialization of labor and (2) for overcoming indivisibilities in the use of "lumpy" inputs. Despite these compelling arguments some scholars question the applicability of this theoretical model to the production of physician services. Bailey, for example, argues that the standardization of medical education, the peer pressure for conformity in the medical profession, and the presence of malpractice laws limit variation in production techniques regardless of the number of doctors practicing together [2]. He also argues that solo practitioners circumvent the problem of "lumpy" inputs in producing ancillary services (e.g., laboratory and X-ray services) by securing these services from hospitals and laboratories who specialize in their production.

In hopes of shedding additional light on the nature and extent of changes in physician productivity among practice sizes, a study of rural physicians practicing in the state of Washington was undertaken. Forty-one doctors represented by 17 sample practices were selected for study. Five of these practices were solo practices and the remaining 12 were evenly divided among two, three, and four-man groups. The selection criteria required that these practices be (1) located in rural communities of 10,000 population or less, (2) located within 15 miles of a hospital, and (3) staffed only by general practitioners (GPs). Necessary data were gathered by personally interviewing each of the 41 doctors in the sample.

Perhaps the most difficult aspect of studying physician productivity is defining output. In this study a unit of physician output was defined as an office visit (a patient treated by the physician in his office setting). Physician's average physical productivity (APP) was defined as the number of office visits (OVs) per hour of physician input. Although the OV is a commonly used measure of output it is not without limitations. A major problem of using this measure is that OVs are not homogeneous. For example, a neurosurgeon's OV is hardly comparable to that of a GP. Nor is there homogeneity among OVs for any given type of doctor. GPs, for example, see patients for reasons ranging from innoculation to marital counseling to broken limbs. Hence, if the number of patients treated for each type of medical need relative to all patients treated varies greatly among doctors, the use of the OV will be unreliable in making productivity comparisons. One of the reasons for requiring all of the practices in the study to be staffed only by GPs and to serve similar population bases -- namely those living in rural areas -- was to minimize these problems of comparability.

Research Findings

The average doctor spent 46.7 weeks per year and 61.2 hours per week in routine professional activities (Table 1). Among the four practice sizes both of these measures of input were highest for solo practitioners and lowest for doctors in two-man groups. One possible explanation for these differences may be variations in the size of the population base served. Although not shown in tabular form, solo practitioners were located in towns and counties with the smallest average number of doctors per 100,000 population while the two-man groups were located in towns and counties with the largest average physician to population ratio. This larger number of people presumably served by the solo practitioners likely extended the amount of time they devoted to their routine professional activities.

Physicians in four-man groups produced an average of 7,383 OVs per year and 152 OVs per work week. These figures were greater than for doctors in any of the other three sizes of practice. Although the number of OVs per week and per year is an important consideration it does not adequately consider the question of physician's APP as previously defined. This inadequacy arises because the number of hours of physician input per week and per year exhibits substantial variation among the four different sizes of practice. In order to account for these variations the following two measures of APP were constructed:

$$1. \quad APP_1 = \frac{\text{number of OVs per week}}{\text{number of physician hours in office per week}}$$

$$2. \quad APP_2 = \frac{\text{number of OVs per week}}{\text{number of physician hours in direct patient care in office per week}}$$

With the exception of two-man groups, APP_1 and APP_2 increased as the number of doctors practicing together increased. More specifically, APP_1 and APP_2 were 13 percent and 23 percent higher, respectively, for doctors in four-man groups than for solo practitioners. The deviation of doctors in two-man groups from the trend toward greater APP_1 and APP_2 as the number of physicians practicing together increased may be partially caused by the smaller population base served by doctors in two-man groups. More specifically, these physicians may have been able to perform their office work at a more leisurely pace.

While APP_1 and APP_2 were greater for doctors in three-man groups than for solo practitioners, the latter produced more OVs per week and per year than did the former. The reason for this was that the average solo practitioner worked more weeks per year, spent more hours per week in his office, and spent more office hours in direct patient care activities than did physicians in three-man groups. This example of the lack of a clear-cut relationship between physician's yearly output and APP when making interpractice comparisons raises a fundamental issue. If the physician's incentive in entering group practice is to increase hourly productivity so he can have more leisure and more time for

Measures of Input, Output and Productivity	All Physicians	Solo Practi- tioners	Physicians in 2-man Groups	Physicians in 3-man Groups	Physicians in 4-man Groups
Average number of weeks per year spent:	$(N=39)^{[a]}$	(N=5)	(N=8)	(N=11)	(N=15)
In routine activities	46.7	47.9	45.5	46.1	47.4
In major professional meetings, conventions, etc.	2.0	1.2	2.1	2.7	1.7
On vacation	3.3	2.9	4.4	3.2	2.9
Average number of hours of routine work week spent in:	(N=41)	(N=5)	(N=8)	(N=12)	(N=16)
Physician's office	36.1	37.5	35.4	35.3	36.5
Hospital and nursing home (excluding travel time)	18.0	20.1	14.0	16.4	20.5
Patient's homes (including travel time)	1.1	.8	1.3	1.1	1.1
Physician's home	6.0	8.9	5.0	7.2	4.7
Total	61.2	67.3	55.7	60.0	62.8
Average number of office visits (OVs) per physician:	$(N=39)^{[a]}$	(N=5)	(N=8)	(N=11)	(N=15)
Per year	6,328	6,464	5,023	5,774	7,383
Per week	(N=41)	(N=5)	(N=8)	(N=12)	(N=16)
	135	136	111	130	152
Per physician hour in office (APP_1)	3.87	3.69	3.18	4.02	4.16
Per physician hour in direct patient care in office (APP_2)$^{[b]}$	5.55	4.96	4.62	5.66	6.11

[a] Two doctors joining practices during 1970 are excluded.

[b] Five of the doctors in three-man groups were unable to estimate the amount of time spent in direct patient care. The percentage of total office hours spent by the remaining 36 doctors on direct patient care was used to estimate this variable for these five doctors.

continuing education, does society benefit if this results in less out-
put per year? If the criterion of maximum output per unit of physician
input is chosen, the greater hourly productivity is preferable. If on
the other hand, this increased hourly productivity comes at the expense
of less annual output, it can be argued that the potential of group
practice for alleviating a scarcity of physician services is not being
realized. Of course, this need not be an "either-or" situation. In
this study the doctors in the four-man practices produced more OVs per
year than the solo practitioner despite having worked fewer hours per
year. In addition, the factor of quality must be considered. It may
be that quality of care is enhanced by fatigue-reducing leisure time
and by time spent at major professional meetings and conventions. In
this regard it is clear from Table 1 that the group practitioners did
have more time available for leisure activities and also spent more
time at professional meetings and conventions than did their counter-
parts in solo practice.

The production process for physician services is very labor
intensive.[2] This labor intensity suggests that the generally greater
APP of group practitioners may be partially due to a greater division
and specialization of labor in the group practices. In order to gain
insights into this possibility physicians were asked to allocate their
weekly work schedules by type of task performed. Results are presented
in Table 2.

One noteworthy observation is that solo practitioners spent 7.4
office hours per week in administrative and clerical tasks -- an amount
of time greater than that for doctors in any of the other sizes of
practice. Moreover, if it is assumed that the administrative and
clerical tasks done in the physician's home are related to his office
workload, the solo practitioner appears to be further burdened by these
tasks.[3] This evidence suggests that in the group practices a greater
opportunity for the division and specialization of labor does exist
causing nonphysician labor to be substituted for physician labor in
the performance of administrative and clerical tasks. In the case of
time spent on laboratory and X-ray tasks this type of substitution is
not suggested by the data. The apparent inconsistency in substituting
nonphysician labor for the doctor's labor in the case of administrative
and clerical tasks but not in the case of laboratory and X-ray services

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[2] The average physician in this study allocated $13,942 or approxi-
mately 47 percent of his total annual expenses to the payment of
office and paramedical personnel.

[3] The greater amount of time spent by solo practitioners in their
homes on administrative and clerical tasks will cause APP_1 to over-
state the actual productivity of the solo practitioner in his office
setting.

Table 2
Allocation of Time per Week by Place of Work and Task, 1970

Place of Work by Task	All Physicians	Solo Practi- tioners	Physicians in 2-man Groups	Physicians in 3-man Groups	Physicians in 4-man Groups
Average number of hours spent in office in:	(N=36)[a]	(N=5)	(N=8)	(N=7)	(N=16)
Direct patient care	25.6	27.8	26.3	22.3	26.0
Lab. and X-ray tasks	1.6	.8	2.0	1.9	1.7
Admin. and clerical tasks	5.5	7.4	4.4	4.3	6.0
Consult. with other physicians	1.1	.1	.9	1.5	1.3
Routine reading and study	1.3	1.4	1.8	.1	1.5
Average number of hours spent in physician's home in:	(N=39)[b]	(N=5)	(N=8)	(N=10)	(N=16)
Direct patient care[c]	1.6	1.1	1.6	2.7	1.1
Admin. and clerical tasks	.9	3.7	.9	.8	.2
Routine reading and study	3.5	4.1	2.5	4.1	3.4

[a] Five doctors were unable to allocate hours in office among tasks.

[b] Two doctors were unable to allocate hours in their homes among tasks.

[c] Primarily phone calls related to patient care.

can be rationalized. This rationalization is based upon the tendency
for the range of ancillary services to be broader in group than in solo
practice (Table 3). The type of labor needed to produce ancillary ser-
vices must be more specialized (e.g., laboratory and X-ray technicians)
than the type of labor needed to perform administrative and clerical
tasks. To the extent the practice has not yet become large enough to
provide an optimal amount of this specialized personnel, the doctor
himself must provide some of this labor input.

As would be expected, solo practitioners spent virtually no time
in their offices in consultation with other doctors. On the other
hand, group practitioners made considerable use of the consultative
capacity of their colleagues. The fact that doctors in group practice
spent more hours per week in consultation tends to decrease APP_1 for
group practitioners relative to solo practitioners, ceteris paribus.
However, as with time spent in laboratory and X-ray tasks it can be
hypothesized that the time spent in consultation may actually increase
APP_1 and APP_2 if it permits faster diagnoses.[4/]

Summary and Implications

In recent years a number of proposals designed to increase the
supply of physician services have been advanced. Many analysts,
relying on the notion of increasing returns to size, have stressed
the important contribution group practice may make toward increasing
physician productivity and the supply of physician services.

The primary objective of this research effort was to empirically
measure changes in physician's APP (output per hour of physician input)
as the number of doctors practicing together was altered. With the
exception of doctors in two-man groups there appeared to be a tendency
for APP per physician to increase as the number of doctors practicing
together increased. A portion of this increase appeared to be caused
by a greater division and specialization of labor in the group prac-
tices which relieved these doctors of administrative and clerical
tasks. An interesting and perplexing finding was the lack of consist-
ency between APP and weekly and annual output when making interpractice
comparisons. Solo practitioners, for example, had a lower APP than
doctors in three-man groups but had a greater weekly and annual output
simply because they devoted more hours to their practices. The impor-
tance of this consideration is that an increase in physician's APP will
not necessarily increase the total quantity of physician services
supplied. Of course, increased emphasis on group practice in rural

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[4/] If it is true that some of the physician's time spent in laboratory
and X-ray tasks and in consultation with other doctors substitutes
for physician time spent in direct consultation with patients then
APP_2 should be reconstructed to include some of the physician's time
spent in these two tasks.

Table 3
Percentage of Practices Capable of Performing Selected Services[a] by Size of Practice, 1970

Services	All Practices (N=17)	Solo Practices (N=5)	2-man Groups (N=4)	3-man Groups (N=4)	4-man Groups (N=4)
Minor surgery	100	100	100	100	100
Repairing fractures	88	60	100	100	100
Physical therapy	70	100	50	25	100
X-ray	71	40	75	75	100
Electrocardiogram	59	20	75	50	100
Selected laboratory services[b]	51	43	58	38	67

[a] Practice was considered capable of performing a service even if service was offered on a limited basis.

[b] Laboratory services considered were urinalysis, hematology, blood chemistry, cardiopulmonary, pulmonary function, and microbiology.

areas may attract additional doctors into these areas. This would likely increase the total quantity of physician services supplied even if APP and weekly and annual output per doctor were not greater for the group practitioner than for the solo practitioner. The reason why group practice may attract additional doctors into rural areas is because it generally provides the doctor with a broader base of supportive resources, more time for leisure and continuing education, and a built-in system of professional rapport. The antitheses of these factors are frequently deterrents for doctors who would otherwise practice in rural areas. Additional research is needed to determine if the effects of the previously mentioned amenities of group practice are sufficiently strong to increase the number of doctors practicing in rural areas.

Future research needs also include the exploration of a broader surface of the production function than was done in this study. Four-man groups are large-scale "firms" only to the extent the public and the medical profession are generally accustomed to the concept of solo practice. However, when compared to other businesses and services a group of 50 or 100 doctors would not appear overwhelming. Of course, in sparsely populated rural areas such a scale of practice would present tremendous transportation problems. Research that simultaneously optimizes both production and transportation costs is sorely needed.

Although additional research in the area of health and medical care is badly needed it will invariably be difficult and frustrating. Nevertheless, the economist can make a valuable contribution in this difficult area of inquiry.

References

[1] Haug, J. N. and G. A. Roback, Distribution of Physicians, Hospitals, and Hospital Beds in the U. S., 1969, Vol. 1, Chicago: American Medical Association, 1970.

[2] Bailey, Richard M., "Economies of Scale in Medical Practice," in Empirical Studies in Health Economics, ed. Herbert E. Klarman, Baltimore: John Hopkins Press, 1970, p. 255-273.