

HMO Performance: The Recent Evidence

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Health maintenance organizations (HMOs) are being promoted as a strategy to modify the U.S. health care delivery system toward more economical patterns, encouraging preventive and ambulatory rather than costly hospital services. Evidence of HMO performance has accumulated over the years, much of it reviewed in 1969. Since then, additional evidence suggests that the "prepaid group practice" (PGP) model of HMO continues to yield lower hospital use, relatively more ambulatory and preventive service, and lower overall costs (counting both premiums and out-of-pocket expenditures) than conventional open-market fee-for-service patterns. Economies of scale in group practice per se are still not proved, but some evidence supports this theoretical hypothesis. New data point to reduced disability from the PGP model of HMO, as well as to more favorable consumer attitudes (based mainly on the economic advantages, in spite of certain impersonalities of clinics) than exist toward conventionally insured solo practice. The medical care foundation (free choice of private practitioners with fee payments) model of HMO has yielded some evidence of economies in physician's care, but none in hospital use. HMOs entail hazards of underservicing and distorted risk-selection, but with appropriate public monitoring they constitute an approach to health planning, stressing local initiative, competition, and incentives to self-regulation.

Introduction

In a "health strategy" message of February, 1971, the President gave new prominence to an idea which had been evolving in the United States for half a century or more. Basically, the idea involves the assumption of responsibility for the health of a population by an organized entity, in consideration of a fixed, prepaid amount of money. Incentives to increase medical earnings through maximizing services are theoretically replaced by incentives to maximize earnings by prudent use of costly services. Initially a contentious deviance from the conventional open-market, fee-for-service concept of medical care, the idea gradually gained social acceptance in the 1950s and 1960s, as experience demonstrated that it could

yield medical care of good quality at lower than prevailing average costs. By the 1970s, the spiraling of medical costs had become so alarming that a conservative federal administration decided to push the idea and to give it a glamorous new label: the "Health Maintenance Organization," or HMO.

Clearcut evidence of the effects of HMOs has not been abundant but it has gradually mounted. Avedis Donabedian (1969) published a comprehensive evaluation of the principal model of HMO—that based on group practice organization—and since that time additional evaluative evidence has accumulated. Most of this evidence compares the prepaid group practice (PGP) model with other patterns of health care delivery, but some of it concerns the model of the "medical care foundations," in which the key principles of HMOs are implemented under a pattern of physician's service offered through individual rather than group practices. This paper will review this recent evidence and offer interpretations of its meaning, with respect to social policy decisions on HMO strategy.

The definition of HMO applied here is an organization which:

- (a) makes a contract with consumers (or employers on their behalf) to assure the delivery of stated health services of measurable quality;
- (b) has an enrolled population;
- (c) offers a stated broad range of personal health service benefits, including at least physician services and hospital care;
- (d) is paid on an advance capitation basis.

Regarding element (c) in this definition, the investigations reviewed here have been applied to HMOs with rather widely varying scopes of benefits, not all of which offer protection for *all* physician and hospital services used or needed by a population. At this point, however, we believe there are lessons to be learned from study of some HMOs which may not fit perfectly under an ideal definition.

Since 1969, there have been published a number of other general review papers which examine the whole question of HMOs and their consequences: for health, economy, and other values. In offering this review we have naturally made use of these papers, in particular those by Herbert Klarman (1971), John Glasgow (1972),

Merwyn Greenlick (1972), and Ira Greenberg and Michael Rodburg (1971) in the *Harvard Law Review*. We shall, of course, in addition review the main findings of several other studies reported separately.

The recent material has not only provided additional empirical evidence but has also extended and deepened our understanding of the various dimensions along which analysis must proceed if we are to infer, from the accumulated evidence, generalizations useful for social policy decisions.

Previous studies

Research on comparative performance under alternative forms of organization of medical care delivery had been going on with ever increasing frequency since the issuance of the final report of the Committee on the Costs of Medical Care (1932). Particular interest centered around the performance of prepaid group practice (PGP) as compared with other modalities for delivery of care. In attempting to design research which would provide information about these effects, the investigators were faced with evaluating a phenomenon whose input consisted of a number of different and perhaps separable factors and whose output similarly consisted of a number of separately identifiable elements.

On the *input side* have been included the factors of (a) prepayment by the subscriber, (b) practice in a group setting, (c) paying the physician by salary, and, in some cases, (d) owning or at least controlling the operation of the associated hospitals. Although each of these components was often present in the operation of a PGP, not all of them existed in "pure" form in every PGP studied. The degree to which each of these factors was present varied among the PGPs studied; attributing an appropriate aliquot part of the observed effect to these several input factors was often the aim of later research, using ever more refined designs.

Similarly, on the *output side*, the criteria to be applied in judging the effects produced by the PGP, as compared with alternative practice modalities, were increasingly broken down by researchers into more particular elements, such as patient satisfaction, effects on hospital use, and the like.

As the number of such studies proliferated, publications reporting their results began to be interspersed periodically with re-

view articles summarizing and analyzing the current state of the findings on various facets of the question. In attempting to draw generalization about the performance of PGP from the published results, the several reviewers formulated various typologies for analysis.

The earlier reviews did not discuss in great detail the various components of PGP (noted above), in general considering all such organizations to be members of one generic group. These earlier evaluation articles each focused on some particular aspect of the performance results of PGP, as compared with alternative forms of organization of practice. Klarman's initial review (1963) addressed itself to the effects of the PGP and other practice modalities upon hospital utilization; Weinerman (1964) dealt mainly with patients' perception of the medical care provided in prepaid group practice.

Donabedian's 1969 review constituted a landmark in its attempt to analyze the research results according to a broad series of criteria, considering the entire spectrum as the necessary basis for evaluating medical care system performance. He grouped these criteria, and the parameters for measuring them, as follows:

1. Patient satisfaction:
 - frequency with which consumers choose PGP, when this choice is available
 - expressed opinions of subscribers
 - frequency of out-of-plan use by PGP members
2. Opinions of participating physicians:
 - concerning conditions of medical practice
 - concerning the nature and behavior of subscribers
3. Health service utilization rates:
 - from hospital and insurance records
 - from survey questionnaires to subscribers
4. Costs to patients:
 - premiums paid (from insurance records and surveys)
 - out-of-plan expenditures from surveys
5. Economic productivity:
 - theoretical analysis of expectations
 - economic analysis of empirical data

6. Quality of medical care:
 - influence of pattern on ways of using medical services (through survey questionnaires)
 - qualifications of physicians and hospitals used (from records and surveys)
 - physician performance (from direct observation and "audits" of medical records)
7. Ultimate health outcomes:
 - mortality rates on matched samples

Format of the present study

While this Donabedian analysis, in its multifaceted approach to PGP performance, was the most comprehensive up to 1969, it was based entirely on the author's study of previous individual investigations which he had identified and considered relevant. Indeed, Donabedian specifically states that his "review was made without reference to Klarman's 1963 and Weinerman's 1964 reviews . . ." referred to earlier in this paper.

The present review will consider the evidence on HMO performance that has been newly accumulated since the Donabedian paper, along with material that he did not include, especially from the Klarman (1963) and the Weinerman (1964) papers. In the light of present-day perspectives on HMOs, our analysis will be classified along somewhat different evaluative categories, as follows:

1. Subscriber composition
2. Participation of physicians
3. Utilization rates
4. Quality assessments
5. Costs and productivity
6. Health status outcomes
7. Patient attitudes

With respect to each of these features, we will attempt to report empirical findings under both the PGP and the "medical care foundation" (MCF) models of HMO. Finally, we will offer a few in-

terpretive comments about the apparent need for surveillance of HMOs, the implications for comprehensive health planning, and the indications for further required research.

Subscriber Composition

The performance of HMOs will naturally be influenced by the composition of their memberships. Rates of utilization, costs, health status outcomes, and other measures for evaluation are inevitably influenced by the demographic composition of HMO members, their pre-existing medical conditions, and related factors.

A. T. Moustafa et al. (1971) reported on the characteristics of persons choosing among a series of five health insurance plans, two of which represented the PGP model (Kaiser-Permanente Health Plan or Ross-Loos Medical Group Plan). They found that married persons with children, in contrast to single persons, were more likely to choose the more comprehensive HMO-type plans, but that, otherwise, educational or income levels showed no significant relationship to plan choice. When, for some reason, persons changed their plan affiliation (at an annual open-enrollment period), those in comprehensive benefit plans—whether HMO-type or commercial insurance with wide benefits—were most likely to shift to another plan of comprehensive benefit scope.

The social acceptance of the idea of group medical practice, in contrast to the traditional pattern of individual practice, was investigated over several years in three cities (Detroit, Cleveland, and Cincinnati) by C. A. Metzner et al. (1972). A substantial majority of persons surveyed expressed preference for the idea of getting their care through group practice arrangements, even though many had no actual experience with such arrangements. The preference tended to prevail for all demographic breakdowns but was somewhat stronger in persons of higher educational and middle income levels. While this study did not explore *prepaid* group practice, the findings would seem to have implications for the HMO model as well.

Virtually all the investigations cited in the review by E. R. Weinerman (1964) were included by Donabedian (1969), and we shall not repeat them here. However, Weinerman's own analytic contribution is worth noting. He drew these inferences on the initial

choices, among different patterns of delivery, made by subscribers to health insurance plans (Weinerman, 1964: 882):

The fee-for-service plans still attract a majority of workers in a dual choice situation, especially when their benefits are broad in scope. The advantages of initial enrollment have been indicated. Certainly, the organizational effort preceding the election date is of enormous impact. . . . The group practice method is still new and unfamiliar to most patients and to most doctors. . . . The comparative advantages of group practice health plan benefits are often complex and difficult for the average worker to decipher. Most significant is the repeated observation that enrollees respond primarily to the prospect of comprehensive benefits, and seem less concerned with the alternative of group versus solo practice.

It would seem to follow that greater familiarity with the PGP pattern is likely to increase the tendency of persons to like it, in spite of some of the impersonal "public clinic" connotations of *large* group practices.

In 1973, there were reported, for the first time, the actual characteristics of random samples of *total memberships* enrolled in various types of insurance organization, including HMO models. Studying health insurance plans in southern California in 1968, Roemer et al. (1973) found that significantly higher proportions of persons with generally greater risk of sickness were members of PGP organizations than were in commercial insurance or provider-sponsored (Blue Cross and Blue Shield) plans. This was reflected by slightly higher proportions of plan members aged 41 years and over, substantially higher proportions of families with a history of one or more chronic illnesses (60.6 percent in PGP plans, in contrast to 46.6 percent and 37.4 percent in the two open-market plan-types), and somewhat greater proportions of persons scoring high on a "symptom sensitivity" test. They also found a slightly greater proportion of foreign-born and nonwhite persons in the HMO-type plans, although the average family incomes in those plans, paradoxically, was slightly higher (\$11,309 compared with \$10,987 and \$10,398 in the other two plan-types).

These studies suggest that any advantages that may be found for HMO-type plans, in terms of lower costs or better health status outcomes (as reflected in the pre-1969 research reports), cannot be

attributed to their containing a smaller membership of high-risk persons, but would seem to be associated with the opposite.

With respect to the medical care foundation model of HMO, we have found, unfortunately, no documentation on the nature of its subscriber composition. We can only point out that the MCFs operate predominantly in relatively small counties of low urbanization. Moreover, as Richard H. Egdahl (1973) notes, a major share of member composition in many foundations has been derived from Medicare and Medicaid beneficiaries in recent years.

Participation of Physicians

The performance of HMOs is bound to be influenced by the qualifications of physicians as well as of other personnel entering this pattern of health service. It is also likely to be influenced by the satisfaction of professional personnel with their general conditions of work (including earnings) in this setting.

Prepaid group practice

Careful investigation of the qualifications of doctors in PGP (compared with others) has not been made, except for what may be inferred from the espoused policies of PGP organizations. The policies of large HMO models, like the Health Insurance Plan of Greater New York (HIP) and the Kaiser-Permanente Plan, are believed to result in careful selection of properly qualified specialists for all positions requiring specialty status (Greenberg and Rodburg, 1971). Insofar as general practitioners are selected for primary care, qualifications under the new specialty board in family medicine are encouraged. Similarly rigorous criteria for appointment, however, evidently do not apply to all HMOs, such as some of the new ones with small group practice units organized mainly to serve Medicaid beneficiaries in California (Nelson, 1973).

Empirical studies have recently been made regarding the satisfaction of physicians with the conditions of work in PGP. The earlier literature on group medical practice gave the impression that, with or without prepayment, difficulties and dissatisfactions were rampant (Dickinson and Bradley, 1952). D. M. Du Bois (1970) studied in 1966 a small series of private group practices that failed and disintegrated, comparing them with a series of private group

practices that grew and prospered; he concluded that organizational failure was mainly associated with "policies in conflict with the professional role"—in a word, commercialization. Other relevant factors were a hostile professional environment and poor administrative management.

Based on a national survey in 1970 of private multispecialty medical group practices, Laurence D. Prybil (1971) found that the annual turnover rate—a long-used index of job dissatisfaction—was less than 5 percent. The respondents were from institutional members of the American Association of Medical Clinics ($N = 237$), a series that might admittedly be expected to have especially high stability. Even this low rate of turnover, however, seemed to be declining; it involved physicians mainly under 45 years of age, and most of those who left went to other positions in organized settings rather than into solo practice. Low turnover was also confirmed by the study of Austin Ross (1969), who found problems of remuneration in group practices to be the major cause of departure. David Mechanic (1972) in a recent national survey also found high rates of satisfaction in group practice—95 percent were either "very" or "fairly" satisfied (over 50 percent were "very satisfied")—with no differences evident in comparison to satisfaction with solo practice. Of course, one may infer that only those physicians who like the concept enter group practice in the first place.

Focusing more specifically on *prepaid* group practice, Mechanic found these doctors most satisfied of all subgroups with opportunities for professional contacts, total time of work required, and leisure opportunities; they were least satisfied with respect to time available per patient, income level, office facilities, and community status. Nevertheless, in aggregate "general satisfaction with one's practice," the PGP physicians reported "very satisfied" in 52 percent of the cases, which was precisely the same percentage as reported by fee-for-service solo practitioners. A turnover study in the Northern California Kaiser-Permanente PGP over the period 1966–1970 by Wallace H. Cook (1971), reported under 10 percent departures per year for employed doctors and less than 2 percent for Permanente Group partners.

Considering the socially marginal character of prepaid group practice in American medical culture, the remarkable point would seem to be how little dissatisfaction is evident among physicians who have "bucked the tide" and engaged in this pattern of work.

One can readily speculate that, with the steady growth of open-market private group practice (now up to about 20 percent of clinical physicians, according to the AMA Survey reported in 1972) and the general national promotion of the HMO idea, participation in PGP will become regarded as less and less "deviant," will attract more doctors, and will become associated with greater stability.

Medical care foundations

In regard to the medical care foundation HMO pattern, participation of physicians is, of course, open to all members of local medical societies. Except for young physicians-in-training, doctors in full-time research, education, or administration, and some physicians in full-time salaried hospital employment, one may assume that local medical societies (not necessarily the American Medical Association or the black physicians' National Medical Association) contain in their memberships virtually all private clinical practitioners in their areas. In the Physicians' Association of Clackamas County, Oregon, for example, it is reported (Bechtol, 1972) that all but two members of the County Medical Association participate in the foundation. Such widespread participation, of course, implies wide free choice for patients, but says nothing about the specialty or other technical qualifications of the physicians, beyond the licensure and "ethical" requirements for medical society membership.

Studies of the San Joaquin County Foundation for Medical Care by the UCLA School of Public Health cast some light on the participation of these physicians in the care of Medicaid beneficiaries. One study (Gartside and Proctor, 1970) found a higher proportion (85 percent versus 78 percent) of all physicians and particularly of certain qualified specialists (strikingly so in pediatrics and obstetrics) from the foundation area to be serving Medicaid patients than in a closely matched comparison county (Ventura) without a medical foundation. Another UCLA study (Roemer and Gartside, 1973) found that, in the performance of surgical operations, the work was more often done by properly qualified surgeons in the San Joaquin Foundation area than in the comparison county. These findings would suggest that, in the nonmetropolitan type of county where medical foundations have tended to develop, they exert a positive influence on the qualifications of doctors serving the poor; similar disciplinary influence might possibly apply to the care of all patients in foundation-type HMOs.

Utilization Rates

The data on differential utilization rates for health services under HMOs, compared with other medical care arrangements, have continued to accumulate. One of the principal advantages long claimed for the HMO model, of course, has been its association with relatively lower use of expensive hospital days, resulting in substantial cost savings. Before reviewing the recently produced data on this (and other) utilization features, we should consider some of the earlier interpretations of them not included in the benchmark Donabedian paper of 1969.

Hospital utilization

The Klarman review (1963) was one of the earlier assessments of the general influence of health insurance on hospital utilization. Some of his interpretations, not reported in the Donabedian review (1969), should be cited. Drawing upon the studies of Osler Peterson in the United States and of G. Forsythe and R. Logan in Great Britain, Klarman noted that the concern of the 1930s about underutilization of hospitals shifted, in the 1960s, to concern about overutilization. Which concern is "correct," he notes, cannot be determined, since no objective standards for "proper" utilization exist. This implies that lower hospital utilization rates cannot appropriately be used as evidence of good performance without reference to what type of utilization is being reduced—"necessary" or "excess." Donabedian (1969) attempted to address this question by pointing to studies which analyzed certain aspects of hospital utilization between different practice modalities, in particular the diagnostic composition of this differential. Although the final verdict is far from being rendered, the prevailing pattern in the various studies of admission rates for the Health Insurance Plan of New York (HIP), as compared with other types of practice organization in New York City, was substantially lower in precisely those diagnostic categories most often suspected to comprise unnecessary admissions—tonsillectomies and upper respiratory infections.

There are two additional analytic points covered by Klarman (1963) which were either omitted or skimmed over by Donabedian. One concerns the early findings of 1940–1946 that Blue Cross-insured persons had higher hospital admission rates and lower average lengths of stay than did the general United States popu-

lation. The other was the finding that, although HIP subscribers experienced lower hospitalization rates than persons under Blue Shield–Blue Cross, they showed the same rates as persons who used a union self-insured plan for ambulatory care. In the latter comparison, both the HIP subscribers and the self-insured union members used a self-insured hospital plan, leading to a hypothesis that control, specifically, of hospital use is a deciding factor. This is an important point, since it represents an attempt at identifying which structural variables in PGP affected which output results.

M. I. Roemer and M. Shain (1959) had reviewed the available evidence up to that time on hospital utilization under insurance. They conceptualized the determinants both of rates of hospital admission and hospital days in an area as derived from three sets of influences operative under conditions of economic support through insurance:

1. Patient determinants:
 - incidence and prevalence of illness
 - attitudes towards illness
 - cost of medical care to the patient
 - marital status
 - housing and social level
2. Hospital determinants:
 - supply of beds
 - efficiency of bed utilization
 - mechanisms of hospital remuneration
 - availability of alternative bed facilities
 - outpatient services
3. Physician determinants:
 - supply of physicians
 - method of medical remuneration
 - nature of community medical practice
 - medical policies in the hospital
 - level of medical alertness
 - medical teaching needs

Roemer and Shain speculated that, while all these factors must theoretically exert an influence under the cost-easing operation of in-

surance (and there was support from empirical data for the influence of most of these factors), the most pragmatically effective mechanism of *control* was probably through constraints on the supply of hospital beds, that is, the bed-population ratio in an area. As we shall see, the subsequent findings on hospital utilization under the HMO models have continued to point to the bed supply as an important explanatory variable. The enactment of "certificate of need" laws on hospital construction in some 20 states, moreover, seems to reflect a growing consensus on the importance of the influence of bed supply on bed demand, with obvious implications for community costs (American Hospital Association, 1972).

Subsequent to the Donabedian review, additional publications dealing with hospital utilization levels of HMOs continued to accumulate. These consisted both of additional reports of empirical results and newer evaluative and analytic works.

Another Klarman paper (1970) concentrates its analysis upon "expected savings in health services expenditures" from the PGP pattern, thus again exploring the general criterion of his 1963 paper. Reviewing again the HIP studies summarized in the Donabedian review, Klarman clarifies certain aspects of the unavoidable confounding of the many causative (independent or input) variables in those studies that resulted from the special circumstances of the HIP structure and the New York City location. Included in these variables are group practice organization; prepayment by the subscriber; capitation payments to the 30-odd medical groups, accompanied by the diverse methods of payment by the groups to the physicians; the use of part-time as well as full-time physicians; the unique nature of the New York municipal hospital system; and the limited access which HIP physicians had to community hospital beds. From these studies, as well as others involving Kaiser-Permanente, Klarman concludes that the evidence indicates that limiting physicians' access to hospital beds has been an important factor in keeping the utilization of hospitals low under the PGP pattern.

Hill and Veney (1970) offer new empirical evidence from a Kansas Blue Cross-Blue Shield experiment on insured outpatient benefits. This experiment confirmed earlier evidence supporting the proposition that increased ambulatory insurance benefits per se for patients lead to no reduction in hospital use and, in fact, result in at least a temporary increase of such use. These findings, Klarman

argues, effectively rule out the availability of ambulatory care benefits as an explanatory cause for the reduced hospital utilization generally experienced by PGP organizations.

Besides limiting access to beds, Klarman notes that the salary or capitation forms of paying the physician may reasonably be expected to contribute to decreased hospital utilization on theoretical economic grounds. He cites the work of Monsma (1970), who showed that fee-for-service physicians derive a marginal increment in earnings for the performance of additional service (surgery, for example) while capitation payments (and salary) do not offer such an increment. This theory fits the findings noted in Donabedian's review that the excess hospitalization of the fee-for-service arrangement over that of PGP care modalities is centered in surgical diagnoses, particularly in tonsillectomies, cholecystectomies, "female surgery," and appendectomies. It is also supported by Bunker's findings (1970) that surgery rates are much lower in England (where there are relatively fewer surgeons, most of whom are on salary) than in the United States.

Klarman's most recent review (1971) broadened the field surveyed from PGP to the generalized HMO concept. Thus, besides reporting on some additional research and giving further analysis of PGP experience, he considered the data on medical care foundations reported in the literature and analyzed the factors in the MCF form of organization which might affect performance. Dealing with savings on hospital utilization under PGP, Klarman has summarized some of these results in the following generalizations: (1) It has been widely held, based on the implications of two HIP studies conducted in the 1950s, that there is a saving of about 20 percent in patient days and admission rates under PGP plans, compared to other health insurance plans; and (2) These results have been "subsequently reinforced in several ways."

Most of the "reinforcing" studies discussed by Klarman were cited and described by Donabedian in 1969, but there have since been additional ones. Moreover, Shapiro (1971) estimated a 25 percent lower rate of hospital utilization for HIP compared with other matched subscribers.

The Social Security Administration (1971) reported that per capita medical *expenditures* for hospital use were, respectively, 18 percent and 11 percent lower in northern and in southern California for Kaiser-Permanente, compared with care under other aus-

pices. While these differentials are for expenditures rather than for use, it is probably safe to assume that they reflect patient-days utilized as well as possible differences in per diem costs. In any case, Klarman discusses this finding under his "utilization" category. A surprising datum in this same report is that HIP per capita Medicare expenditures did not differ from those for care under other auspices. Klarman speculates that this may be due to unreported utilization by the over-65 age group in the New York City municipal hospital system. He also notes that the differential in hospital utilization between HIP subscribers and other persons, reported in the past, was always quite small in the over-65 age group. If the zero difference currently reported by the Social Security Administration (SSA) is not due to an easing of HIP physician accessibility to beds, then the possibility exists that the difference in under-65 hospital utilization has been considerably greater than 20 percent.

A newly issued and more complete report by George St. J. Perrott (1971), describing the experience of the Federal Employee Health Program for the years 1961 through 1968, focuses mainly on hospital utilization among 8,000,000 federal employees insured under different types of plans throughout the country. Over these years, the rates for both hospital admissions and aggregate patient-days in the prepaid group practice plans have consistently remained the lowest, compared with the open-market "Blue" or commercial indemnity plans. These variations have prevailed for each age-sex level examined separately; they are especially striking for elective surgical admissions (such as tonsillectomy, appendectomy, and gynecological surgery).

Klarman (1971:29) notes, as a conclusion of his overall studies, that increasingly he has "come to single out the control exercised through bed supply" as a potent determinant of hospital use in the observed experience of PGP models, compared with that of other modes of health care organization.

"Foundations" and hospital use

Turning to the medical care foundation form of HMO, Klarman in his 1971 review notes that savings from reduced hospital utilization should not be expected from this form of organization on both theoretical and empirical grounds, although thus far evidence for the latter is slim. Since the prevailing method of payment to the physi-

cian under the MCF type of HMO is fee-for-service, there remains the incentive for the physician of higher income for additional services, according to Monsma's type of analysis. While the MCF type of HMO does not alter the method of paying the physician, it does broaden the ambulatory service benefits available to the subscriber. Empirical results have failed to indicate that such a broadening lowers hospital utilization rates. In addition to the Kansas findings of the Hill and Veney study (1970), Klarman also reminds us of the Avnet study (1967) for Group Health Insurance (GHI) in New York and of the reported results from extended out-of-hospital Blue Shield benefits offered in Maryland and described by Kelly (1965). All of these substantiated the theoretical expectations of no decrease (and, indeed, an increase) in hospital utilization when "physician services are broadened in a solo practice fee-for-service setting." In the Saskatchewan setting, Roemer (1958) had reported the same finding—increased hospital use associated with prepaid comprehensive doctor's care, compared with no insurance for ambulatory care—as far back as the late 1950s.

In recent years, further data on hospital utilization continued to be reported. Another study of government employees (state, rather than federal) insured under different types of health plan was reported from California (Medical Advisory Council to the California Public Employees Retirement System, 1971). Hospital utilization findings in this PERS (Public Employees Retirement System) study corresponded generally with those found for federal employees, with aggregate days per 1,000 per year being much lower than PGP plans. Unlike the federal study, the California one also reported utilization under the medical care foundation plans, which are relatively numerous in this state. Interestingly, the utilization rates for both hospital days and ambulatory doctor visits were *higher* under the foundation-type plans than for any of the other plan-types. The experience applied to a 12-month period in 1962–1963.

Still another comparison of hospital utilization under the PGP type of HMO with other types of health insurance plan in California is given by Roemer et al. (1973). This study examined the experience of random samples of the total memberships of the three main types of plan, selecting two examples of each type. In contrast to some others, this study found the differential for hospital admission rates to be relatively small, but, because of a very short length

of hospital stay under the PGP plans, the differential in aggregate hospital days was great—526 days per 1,000 per year in the PGP plans, compared to 864 and 1,109 days in the commercial and provider-sponsored plans, respectively. In this investigation, out-of-plan hospital use (determined through study of a subsample) was found to involve 7.2 percent of the admissions, many of them for maternity care (short-stay cases). These cases, unlike those in the earlier Densen studies of HIP experience, however, are included within the group practice hospitalization rates reported above.

Roemer et al. (1973) also analyzed hospital utilization according to several demographic breakdowns. It became evident that the low use rate (in days per 1,000 per year) of the group practice or HMO-type plans was largely referable to the experience of families with dependents and families of other than Protestant faith. With respect to social class (as measured by educational attainment and occupation), hospital day rates in all plan-types were consistently higher in the lower-class group, but the markedly lower rate under the HMO-type plans prevailed for both social classes. The same was true of families with and without a history of chronic illness—much greater hospital use in the “chronically ill” families, but markedly fewer days in the HMO-type plans for both types of families.

Interpretations of hospital experience

The total complex of causes contributing to the lower use rates of hospital days in the PGP type of HMO remains a matter for discussion and research. As noted earlier, the absence of fee incentives, especially for elective surgical operations, has been credited by much of the data (and theoretically justified by Monsma). Easier financial (if not geographic) accessibility to ambulatory care under these plans has also been considered causative, but both the findings of the California PERS study (Medical Advisory Council, 1971) and the numerous studies of ambulatory care insurance for private doctor's care in Kansas, Saskatchewan, Maryland, and elsewhere, reported above, would not seem to support this contention. The constraint exercised by a limited hospital bed–population ratio, however, in the PGP plans would seem to be clear. The less-than-average supply of hospital beds in the Kaiser-Permanente Health Plan (below 2.0 per 1,000 members) obviously places an upper

limit on the number of hospital days of care that can be provided. Striking evidence of this influence of bed supply is furnished by the differentials noted earlier in this paper on hospital expenditures for Medicare beneficiaries in the Kaiser-Permanente Health Plan in 1971, compared with other California Medicare beneficiaries; on the other hand, in HIP of New York, where the Medicare members use ordinary community hospitals, their hospital use expenditures were just the same as those of non-HIP Medicare beneficiaries (Social Security Administration, 1971). The degree to which this latter finding is due to the "opening up" of HIP physician accessibility to community hospital beds in New York, or to the other factors which Klarman postulates, cannot be determined on the basis of available data.

The point is that PGP doctors can evidently "live with" a constrained bed supply; they adjust by being prudent on hospital admissions, doing the maximum diagnostic workups on an outpatient basis, and keeping patients hospitalized for relatively short stays. Whether this results in better or poorer health for the patient is a serious question yet to be answered (refer to the section on Health Outcomes). That it results in cost savings (refer to the section on Costs and Productivity) is beyond doubt.

Aside from the PERS study reviewed above, meaningful data on hospitalization under the medical care foundation model of HMO are sparse. The Physicians' Association of Clackamas County, Oregon (Haley, 1971), reported that for 1969-1970 the average length of stay of Clackamas County patients at one Portland hospital was 5.18 days, compared to 6.82 days for patients from metropolitan Portland. No other data about the characteristics of these patients or the rate of admissions are given; since Clackamas County is essentially suburban to Portland and since its population characteristics doubtless differ from those of the central city, it is difficult to interpret these figures.

A still unpublished study of the Clackamas County Foundation by the UCLA Survey Research Center (Berkanovic, 1973) gives other data on hospital utilization under this pattern. Based on 1971 experience of Medicaid beneficiaries enrolled in the Clackamas County foundation, the preliminary findings suggest a *higher* hospital utilization rate (by a factor of 1.5 to 2.0), in days per 1,000 persons covered per year compared with a Medicaid population in a neighboring county using open-market patterns without a foundation.

Ambulatory care utilization

Donabedian (1969) noted that the sparsely reported data on ambulatory care utilization tended to indicate that, in general, such utilization increased under plans which insured for out-of-hospital benefits. The increase, however, was no different under PGP than under fee-for-service private practice. Also, there seemed to be no evidence of flagrant or obvious overutilization of ambulatory services.

Klarman (1971) attempted to assess the import of various published reports on physician-population ratios, in an effort to arrive at generalizations about respective ambulatory care utilization rates in PGP and in other delivery forms. Physician-population ratios presumably give indirect evidence of patient-doctor contact rates—if productivity levels are assumed constant. Based on the reported evidence of physician-population ratios, Klarman noted the often contradictory results of published studies, beginning as far back as 1940. In some cases the savings, in terms of per capita expenditures for physician care, were found to be greater than the proportionately lower physician-population ratio, presumably because of lower rates of reimbursement of physicians in PGP plans.

The actual rate of physician visits per capita is estimated by Klarman to be 4.50 per year for Kaiser-Permanente, compared to 4.42 for the general California population, after adjustment for out-of-plan utilization as well as for telephone and other nonphysician contacts reported as visits in the California-wide data. These estimates are based on the report of the National Advisory Commission on Health Manpower (1967) and on the Columbia University survey of three plan-types in 1962. The greater number of visits and the generally lower physician-population ratio in Kaiser-Permanente implies a higher level of production for the latter's physicians, but Klarman believes the Manpower Commission's report overstates the general California physician-population ratio. Data (Social Security Administration, 1971) on ambulatory care from the Medicare program could be used without the dubious intervention of "adjustments," except that only expenditures, not medical visits, are reported. Per capita expenditures for physician's care were 7 percent less for Kaiser-Permanente, Northern California, the same as other sources for Southern California, and 35 percent higher for HIP, as reported by SSA in 1971. Expenditures may, indeed, reflect utilization differences, but the relationship can be confound-

ed by different levels of earnings and different productivity rates of physicians. Thus, the picture presented by Klarman (1971) provides very little information on differentials in utilization rates for ambulatory services between PGP and other forms of medical care delivery.

The Roemer et al. study (1973) does provide some comparative data on ambulatory services. Basically, the findings showed much lesser differentials among the plan-types than for hospital days; the PGP-type plans had doctor-contacts at the rate of 3,324 per 1,000 persons per year, compared with 3,108 in the commercial and 3,984 in the "Blue" plans. A revealing categorization in which these relationships, however, did not prevail was by educational level of the family head. Among persons with college education, ambulatory care use was higher under the PGP plans than under either of the other two plan-types. It would appear that better educated and probably more sophisticated persons are able to make greater use of ambulatory care in the relatively complex framework of the large prepaid group practice plans found in California; this is less true under conventional conditions of private medical practice.

Another study in California (Kovner et al., 1969) examined the effect of family income on ambulatory care utilization under two HMO patterns: both the prepaid group practice (the Ross-Loos Medical Clinic Plan) and the medical care foundation (San Joaquin County) patterns. The study found that, in both these HMO patterns, the effect of income was virtually nil—eliminating the usual correlation between poverty and low utilization of outpatient services.

It has been shown both theoretically and empirically that merely extending insured ambulatory service benefits will not reduce hospital utilization under fee-for-service practice; the same economic theory indicates that there is reason to believe that paying the physician either by capitation or salary should lead to decreased hospital utilization. If one adds to this the influence of substantial ambulatory diagnostic and treatment facilities found in a group practice setting, as well as a restriction on available beds, one may expect a *relatively* higher level of ambulatory, compared with hospital, utilization under the PGP type of HMO.

A revealing demonstration of these dynamics is given in the ratios between doctor visits and hospital days reported by Roemer et al. (1973) in the three plan-types. These were as follows:

Plan-type	Doctor visits per 1000/year (a)	Hospital days per 1000/year (b)	Ratio (a):(b)
Commercial	3,104	864	3.6
"Blues"	3,984	1,109	3.6
Group practice	3,324	526	6.3

It is apparent that the PGP-type plan gives almost double the *relative* emphasis on ambulatory, compared with hospital bed service, as does either of the open-market plan-types.

Further evidence of the influence of the PGP model of HMO on the ratio between ambulatory and hospital services came from the Columbia (Maryland) Plan in 1969–1970. Malcolm Peterson (1971) reported that physicians' office visits were occurring at a rate of about 8.0 per person per year (of which 40 percent were for well-person care), compared with 4.6 nationally; hospital days, by contrast, were at a rate of 335 per 1,000 per year, compared with about 1,100 days nationally. Although these rough figures were not adjusted for age, socioeconomic status, etc., they are still striking.

Quality Assessments

Regarding the persistently difficult question of quality evaluations, an excellent review of all the methodologies was produced by Robert H. Brook (1972) as a doctoral dissertation at the Johns Hopkins School of Hygiene. Although the evaluation of HMOs, in comparison with other patterns of medical care, figures only tangentially in this work, Brook concludes that both "process" and "outcome" measures should ideally be used in combination. Among outcome measures, he advocates greater application of the so-called "tracer" technique, in which the incidence of morbid sequelae of specified pathological conditions (e.g., middle ear infection leading to deafness or hypertension leading to stroke) is traced under varying sub-systems of medical care.

In the last several years, investigators do not seem to have devoted much effort to quality assessments of HMOs based simply on "structure" or the input of resources (personnel, equipment, etc.). The unitary medical record and the greater convenience of inter-

specialty consultations were emphasized as structural avenues to quality care in the *Harvard Law Review* paper by Greenberg and Rodburg (1971), but these factors in the PGP model have not been subjected to quantified comparisons with ordinary medical practice. Williamson (1971) has demonstrated the discrepancies between "input" measures of the qualifications of doctors, and "output" measures of the quality of their work, pointing further to the importance of using process and outcome measures in combination as a basis for quality evaluation.

With regard to "process" evaluations, the recent years also do not seem to have produced medical audit studies comparing HMO services with traditional patterns of medical care delivery. The belief continues to be widely held, nevertheless, that peer review—whether on a day-to-day basis or on the post-hoc basis of claims surveillance in medical foundation plans—helps to assure the quality of the doctor's work. Yet Weinerman (1969), commenting on group practice (whether prepaid or not) noted: "Group conferences, medical audits, and informal office consultations . . . are common in the descriptive literature but infrequent in daily practice."

The Roemer et al. study in California (1973), from its examination of samples of actual medical records in doctors' offices or clinics, developed a "rationality index" as an approach to quality evaluation. This index was based on such documentable criteria as completeness of the medical history, extent of physical examination, frequency of consultations, and other elements of service. With the use of "factor analysis" technique, the value of this index for the HMO model plans turned out to be 0.527, compared with 0.515 in the "Blue" plans and 0.503 in the commercial plans. The fallacies of medical record analysis as a reflection of the actual medical care process have long been recognized, yet there is no reason to expect less complete records in private medical offices than in prepaid group clinics, and it is the comparative values that the above indices reflect. In fact, one might suspect that in private offices, where fees are paid for each unit of service, records would be more nearly complete than in prepaid clinics where the doctors are on salary; if so, the differentials on "rationality" indicated above may understate the relative performance level under the HMO pattern.

Another dimension of the quality of medical care is often considered to be the degree to which preventive services are provided

and used. Under HMOs, there has long been discussion of the effect of incentives to preventive service, aside from the influence of early, rather than late, attention to overt symptoms. Roemer et al. (1973) have produced some of the first hard data on this question through the examination of medical records (and hospital records) under the PGP versus open-market patterns. Indicators of prevention, identifiable in patient charts, were such items as "checkup" examinations of adults, well-child examinations, vaginal cytology tests, routine rectal examinations, chest x-rays, serological tests for syphilis, and immunizations. Summating these, by "factor analysis," a "preventive service index" was derived for the three types of health plan. It was computed as 0.452 in the HMO-type plan, compared to 0.404 in the "Blue" and 0.384 in the commercial insurance plans.

Another reflection of prevention in HMOs is given in data reported by Lester Breslow (1972), derived from 1965 studies in Alameda County, California. In the sample of the "Human Population Laboratory" in that county, those persons who were insured under the Kaiser-Permanente Health Plan had a "health maintenance examination" within the past year more frequently than those covered by open-market plans; the comparisons were, respectively, 58 percent versus 43-46 percent for men and 63 percent versus 49-57 percent for women.

A study of schoolchildren in whom physical defects had been detected was reported by Cauffman and Roemer (1967), with information on utilization under the different types of health insurance plans that covered the various children's families. They found that any type of health insurance coverage, compared with noninsurance, was more likely to be associated with treatment of the child's defect, but that children in families covered by PGP health insurance plans were more likely to have received a general "check-up" examination than children in families covered by open-market plans.

Costs and Productivity

The economic dimension of HMOs, compared with other modes of medical care delivery, must distinguish between the overall expenditures by the patient or the community, on the one hand, and the "costs of production" or the productivity of the subsystem, on the

other, whether or not any productive efficiencies are "passed along" to the consumer in the form of lower prices. Each of these questions will be considered separately.

Expenditures by the consumer

With regard to expenditures by consumers or costs to patients, the Roemer et al. California study (1973) produced data on the PGP model of HMO, as compared with conventional patterns. It analyzed annual expenditures by family units for physician and hospital services in terms of (a) insurance premiums (whether or not paid partly or wholly by employers) and (b) out-of-pocket expenditures. The basic findings for families of all sizes in the three plan-types were as follows:

Plan-type	Average premium	Out-of-pocket expenditures	Total costs
Commercial	\$208	\$156	\$364
"Blues"	257	190	447
Group practice	271	52	323

Thus, it is evident that the average family premiums of the PGP-type plans are higher, but that the out-of-pocket expenditures for medical and hospital services are so much lower than in the other two plan-types that the aggregate costs are the lowest among the three types of plan. When family size is held constant, the same general findings prevail. There are, however, different relationships by other demographic breakdowns. In families of three to four members defined as "lower income" (under \$11,000 per year), the lowest aggregate expenditures occur in the commercial plans; they are \$391 in the latter plans, compared with \$417 in the PGP-type plans. These findings may reflect the lower illness risk composition in the enrollment of commercial plans (reported earlier) as well as the lower available family incomes (even in the "under \$11,000" category), also reported earlier.

For the medical care foundation model of HMO, the available data are, again, confined largely to the experience of Medicaid beneficiaries on the California scene. In a comparison (Gartside,

1971) of the four-county area covered by the San Joaquin County foundation with a similar county lacking a foundation, the monthly costs per eligible person averaged \$5.81 for physician services in the MCF area and \$6.66 in the comparison traditional area; the state-wide average, adjusted for the mix of Medicaid categories, was \$7.33. The overall average costs for all types of health service were actually higher in the MCF than in the comparison area (\$10.43 versus \$10.13), although this was due almost entirely to a higher expenditure for nursing-home services in the San Joaquin area.

The MCF of Clackamas County, Oregon (Haley, 1971), reported that "generally costs in Clackamas County are 23 percent under the cost of service outside the county," but clear data in support of this statement have not been issued.

Production efficiencies

In considering the crucial question of production efficiencies under the HMO model, studies on economies of scale within prepaid group practice have figured prominently. Herbert Klarman, (1970; 1971) goes into this subject at some length. He notes at the outset that empirical results represent experience drawn entirely from fee-for-service practice since "little, if anything, has been published on variation in productivity among medical groups in the same prepayment plan" (Klarman, 1971:30). By implication at least, he minimizes the dangers of extrapolating conclusions, reached on the basis of findings from the fee-for-service group practice milieu, to the PGP model, asserting that the caveats of Roemer and Du Bois (1969) about the noncomparabilities of the two practice media "pertain to who gets the benefits of any savings, but do not appear to bear on the issue of variation in physician productivity by the size of the medical firm" (Klarman, 1971:30). Although this particular point is well taken, it would still seem that such extrapolation should be made with extreme caution.

First, much of the fee-for-service practice data have been obtained in single-specialty settings, and PGP is typically carried on in a multi-specialty setting. Second, in view of the important influence on other performance criteria believed to be associated with different methods of paying physicians, one would hesitate to assume that there is no impact on productivity just because one cannot at present

make a clearcut case for it. After all, until Monsma's work (1970) articulated the issue, there was no commonly accepted theoretical explanation for the method of physician payment influencing HIP versus non-HIP hospitalization differentials in New York City. It may very well be, for example, that the management option of "pacing" physician visits, by control over the appointment system when the physician is on salary, can be more strongly asserted in large PGPs than in smaller ones. It may also be that substitution of lower-paid personnel for part of the physician's time is more feasible in the PGP model.

Many of the research findings cited by Klarman appeared in Donabedian (1969), but Klarman noted some additional works and further refined the economic analysis. The major studies again concern the work of Boan (1966), Bailey (1968), and Yett (1967). The study by Yankauer et al. (1970) is new. Klarman notes that theoretical considerations have led economists to expect returns to scale in medical care output on a priori grounds, and that Boan's and Yett's work seems to support this hypothesis. Bailey (1968), however, draws opposite conclusions. His findings (focused on specialists in internal medicine) lead him to infer that physicians in larger group practices earn more because of the profits earned on a proportionately higher rate of ancillary services performed in their establishments. The output, in terms of clinical visits per physician per unit time, was found to hold constant with increasing size of medical group. Bailey interpreted this to mean that the proportionately greater use of ancillary services by the larger groups of internists apparently did not represent a substitution of the time of allied health personnel for that of physicians, but could be viewed as merely incremental services delivered by larger groups.

Yankauer et al. (1970) reported a similar finding based on a nationwide survey of pediatric practices. This study also found the number of physician visits per unit time to be virtually constant with increase of size of the group practice. Delegation of tasks by the physician was generally in the administrative, technical, and clerical functions, but not in patient care functions. Where the latter type of delegation was found to occur, it was in response to relative local shortages of pediatricians, rather than in relation to the size of the medical group.

Klarman notes that the conflicting interpretations placed on

these findings cannot be resolved by further analysis of existing data, but require additional research on medical care production, designed to answer the open questions. For the present, he concludes (1971:31) that "economies of scale have not yet been demonstrated empirically."

It should be noted that arguments which postulate a possibly greater willingness to delegate patient care tasks to ancillary personnel are related to the circumstances found more widely under large PGP conditions. These include the feasibility of close supervision of such tasks by the physician, a relative lack of concern by him that his income position may be eroded, and, in the case of large, self-sufficient PGPs, lessened fear of retaliation by competitors. Moreover, it is difficult to see why one could expect any increase in productivity, as measured solely by physician visits, under conditions which closely prescribe the tasks reserved for physician performance. In particular, in a PGP situation the number of visits to be handled by a physician per hour would largely be determined by the scheduling mechanism, and could resemble the moving assembly line in industry.

It is also necessary to note that defining physician productivity solely in terms of office visits, in fee-for-service private practice, can be illusory. Since, in the American scheme of things, physicians typically prescribe treatment for the same patient in the office and in the hospital, it is not unreasonable to postulate that solo practitioners and small private groups run up physician visit "scores" by hospitalizing freely. In that case, as Roemer and Shain (1959) have pointed out, the private physician can ostensibly increase his efficiency of practice by hospitalizing patients, passing along the heavy diagnostic work to the hospital and the expense to insurance plans. The larger, better equipped group practices may reasonably be expected to handle more of these cases in the office—spending more time with the patients, doing more tests, and hospitalizing less. Bailey's (1968) data tends to support this hypothesis, at least for solo as compared with group practice.

The important missing data in Bailey's study are the total utilization by and cost to the patients per year, per illness, etc. Lacking a defined subscriber population, these data are virtually impossible of meaningful interpretation. (If one wished to dramatize the deficiencies of these data, one could argue that all the data on visits to

a particular physician might pertain to two or three patients with chronic illness making repeated visits, with astronomical cost to themselves or their insurance carriers.)

Boan (1966) stated the conclusions from his research in Canada straightforwardly. He found that physicians in group practice, compared to solo practice, had higher ratios of allied health personnel per physician, lower costs per physician for such personnel, and lower costs of investment per physician. However, these results are not strictly proof of economies of scale, since only the dichotomy between solo and group practice is examined. Furthermore, the applicability of nationwide Canadian results to the United States scene remains open to question. Direct inferences on returns to scale can be made only if one assumes that Boan's conclusions follow from observation on two discrete points along the size-of-firm scale—solo and larger than solo—and if one is further willing to assume that his upward slope of the returns-to-scale line would hold if the group practices were categorized along an increasing size scale.

Yett (1967) measured total tax-deductible expenses per physician as related to output (of computed patient visits) per physician, and found definite economies of scale. The result would suggest that practices in which the physicians were more productive, in terms of visits produced, exhibited a smaller overhead cost per physician visit. It would seem that a cost function analysis of this type does not directly address the question of economies of scale in terms of larger versus smaller group practices, and, a fortiori, does not shed light on what one might expect in an HMO situation. Furthermore, it does not directly address the problem of physician output as a function of size of practice (measured by number of physicians involved), which was Bailey's concern.

However, subsequent work by Reinhardt and Yett (1972), at the University of Southern California has produced insight on this crucial subject. The published work concentrates on fitting production functions to national data reported to the magazine *Medical Economics* (MEDEC). These investigators are now tackling the question of the output of physicians (measured in patient visits per physician per week and, separately, by annual gross patient billings per physician) as a function of inputs. The latter consist of the services of medical auxiliary personnel, cost of plant and medical equipment, medical supplies used up in the conduct of practice, and the amount of physician's time (hours per week) occupied "strictly

on practice-related activities." Physicians' visits are totaled over three sites: office, home, and hospital. The Reinhardt-Yett study defined "returns to scale" as the relative increase in number of visits per physician associated with the same percentage increase applied to all input factors.

Without reference to mode of practice, their results were that the output (visits per week) of the individual physician showed the expected increasing returns to scale, if inputs were to be increased in relatively small private practices. Comparing solo practices to single-specialty group practices, they found that the latter produce "between 4 and 13 percent more patient visits than do solo practitioners at any given level of factor input." The report cautions that these results may be flawed because of the lack of data on total medical group output, instead of output of individual physicians. So little data were available on mixed-specialty groups that they decided to exclude all multi-specialty group data from the group-solo comparisons in this study. Furthermore, the preponderance of the single-specialty groups studied was very small, consisting of three to six physicians.

Included among the USC (1972) findings were these points: (a) "Solo practitioners tend to work fewer hours and employ fewer aides per physician than do their colleagues in groups or partnerships"; (b) quite apart from the longer hours worked, group practice physicians produced more visits per hour than those in solo practice—4.5 percent more for general practitioners, 6.2 percent for pediatricians, 13.8 percent for obstetricians-gynecologists, and 4.0 percent more for internists; (c) up to about four or five aides per physician, the total number of patient visits per week per physician increases with additional aides; and (d) adding more physician time as an input will increase patient units by a greater factor than an increase of proportionate size in any other input.

Another USC study by Kimbell and Lorant (c. 1970) used the responses to the Seventh Periodic Survey of Physicians by the American Medical Association as its data for analyzing production functions of solo physicians, and the data of the AMA's Survey of Medical Groups for analyzing group practice relationships. Economies of scale were measured in terms of *office* visits as a function of the inputs: physician time, number of allied personnel employed, and number of examining rooms (representing capital investment). Among their findings on solo practice were these: (a) an increase in

physician time increases the number of office visits by a greater factor than an identical percentage increase of any of the other inputs—in fact, more than the increase in allied personnel and capital (examining rooms) combined (a given percentage increase in allied personnel will have a greater effect on office visits than the same percentage increase in examining rooms, although increases in the latter will also increase the output); (b) physicians who charge higher initial fees have a lower output of office visits; and (c) the total R^2 (the proportion of the total variation due to the “explanatory” variables) is only 0.13, so that other factors not in the analysis explain much more of the production than those included.

Regarding group practices, Kimbell and Lorant found that: (a) the most important factor in increasing office (as well as total) patient visits by far is still physician time input; (b) there are decreasing returns to scale in office visits (and total visits) for an increasing size of output (i.e., an increase of about 10 percent in input factors will increase output by only about 8 percent, although, for gross revenues, the return to scale is almost constant, tending to agree with Bailey’s findings); and (c) practices using an incentive plan for income distribution “had 10 percent greater apparent efficiency” than practices applying completely equal sharing or salaries. “Efficiency” was measured by the degree to which the group practices produce above or below the output predicted by the model. The R^2 achieved by this analysis of group practices was about 0.80, so that the explanation of output by the input variables was much better than for solo physicians.

Another recently reported study on medical care productivity is that of Newhouse (1973). This paper addresses the question of costs per physician visit in different practice patterns, and a principal determinant was found to be whether or not the practice shared income equally or divided it among the members of the practice in proportion to the number of visits each doctor produced. It followed that solo, fee-for-service practice was found to yield the lowest overhead costs per visit, since this form of organization represents the most direct relationship between the income received by the physician and the visits produced by him. The sample studied comprised 20 practices, varying from 11 solo practices to two 5-physician groups, and three outpatient clinics of hospitals. Newhouse states “there is the obvious qualification that the sample is extremely

small," and much of the paper is devoted to showing that equal income-sharing should theoretically lead to increased unit costs per visit.

Effects of size

In concluding this section on the literature dealing with economies of scale, a number of points must be noted. In using production functions in private fee-for-service practice, investigators have often considered patient visits as the key output measure. It would seem to be a questionable assumption, however, that more visits per hour are uniformly desirable. Clearly, the desirable number depends on patient care considerations, and flatly to equate an increasing number of visits per hour with greater efficiency cannot be excused by appealing to the assumption of "other things being equal." Studies of productivity which do not include some simultaneous observations on the content or quality of care are of doubtful usefulness at best, and may even be misleading.

Similar considerations hold in studying *economies of scale* in private fee-for-service practice. Assuming that physicians will keep unit (per visit) overhead costs down, if their income is directly tied to the net earnings of the visits they produce, might also imply that doctors would do almost anything they can "get away with" to maximize their net incomes. In a period of physician shortage, and in consideration of legal restrictions on competition entering the field, it would again seem to be questionable whether this type of motivation is widely operative.

Finally, with the preceding two points in mind, it might be germane to restate Klarman's 1972 summary on the research to date in the following manner: General economic theory, as outlined by Boan, Fein, and others, indicates that group practice should be more efficient than solo practice, all other things being equal, in terms of productivity. Monsma's theoretic formulation indicates that *prepaid* practice is expected to be more efficient than fee-for-service practice, in terms of avoidance of unnecessary utilization of expensive procedures. Research to date has not effectively proven these reasonable hypotheses false. In any event, the entire question of production efficiencies touches only one aspect of the HMO concept; other aspects of incentives to economy, when a fixed an-

nual premium is paid for a broad scope of services, will be considered in the following sections.

Health Outcomes

PGP and health outcomes

The ultimate measure of HMO performance, as suggested earlier, is how healthy these organizations keep their members, compared with other patterns of medical care delivery. The sparsity of data on this crucial question, up to 1969, was evident in the review by Donabedian. It had been largely confined to the experience of the Health Insurance Plan of Greater New York and focused on mortality in the very young and the very old.

Since then, some little additional outcome data have been produced on this key question, but not always with conclusive results. A study by William I. Barton (1972), though based on a nationwide mortality study in 1964–1966, provides the first such nationwide data on infant mortality in relation to health insurance coverage. After adjustment for race, region, parental education, and live-birth order, the mothers with some health insurance coverage had significantly lower infant mortality rates than those not insured; when adjustment was made for family income, the infant mortality rate was still slightly lower for the insured childbirth cases (23.3 per 1,000 live births compared with 24.5), but the difference was not statistically significant. This study, unfortunately, does not come to grips with the HMO question. In fact, it was found, paradoxically, that mothers with more comprehensive health insurance coverage actually had *higher* infant mortality rates than those with more limited coverage; the author, however, speculates that this unexpected finding reflected characteristics of the mothers, rather than being attributable to the extent of insurance protection. He postulates that women with more complete insurance coverage were probably higher-risk mothers in the first place—in other words, a previous pregnancy complication had induced them to secure broader insurance protection.

The first American report applying sickness absenteeism as an outcome measure for comparing prepaid group practice with other patterns appeared in 1971. Robert L. Robertson (1971) studied work loss in 1966–1967 among schoolteachers covered under a

PGP-type of HMO, compared with teachers covered under a "Blue" plan. Although in this, as in other comparative studies, the effects of self-selection could not be completely eliminated (since membership in either type of insurance plan is the individual's own decision), the findings suggests a slightly lower rate of "work-loss from sickness or injury" for both men and women teachers covered by the HMO-type plan. The size of the differences varied with age level, and the greatest different characterized younger females. The overall age-standardized mean days of work loss were 3.88 days per year in the HMO-type plan for males compared with 4.01 days in the "Blue" plan; the parallel figures for females were 5.93 days compared to 6.41 days.

"Foundations" and health outcomes

With respect to the medical care foundation pattern of HMO, an as yet unpublished study from the UCLA School of Public Health (Newport and Roemer, 1973) examined perinatal mortality among mothers covered by Medicaid through the San Joaquin Foundation for Medical Care, compared with a closely matched county (Ventura) lacking a foundation and using traditional methods. Newport and Roemer found that, excluding county hospital births which are not influenced by MCF procedures, the perinatal death rates were lower in the foundation area for "white Anglo" childbirths, but higher for childbirths in black and Spanish-surname families. When ethnically standardized for the mix of these groups in the state-wide Medicaid population, the perinatal death rates in the foundation and matched comparison areas were virtually identical: 29.6 deaths per 1,000 total births in the former group and 30.1 in the latter. More interesting, perhaps, was the finding that in a third area, admittedly not matched to the foundation county, but lacking a foundation and having a strong county health department (with an active maternal and child health program), the perinatal death rate was *half* of that in either of the study counties, at 15.5 deaths per 1,000 births.

While these were the only recent health outcome studies with a direct bearing on evaluation of HMO performance, other investigations have been providing new approaches to the use of adjusted mortality data for evaluating the performance of complex organizations. Moses and Mosteller (1968) revealed large differences in the death rates for specified surgical operations made in large teach-

ing hospitals throughout the country, even after adjustments for various patient characteristics. Roemer et al. (1968) developed a formula by which crude hospital death rates could be adjusted for average case-severity, so that adjusted death rates could serve as a basis for evaluating the overall quality of hospital performance. These methodologic studies may provide clues for evaluation of HMO performance on the basis of mortality outcomes.

Patient Attitudes

While more substantial data on health status outcomes is awaited, some idea of the quality of service in a medical care program may be validly inferred from the attitudes expressed by consumers or patients. Although consumer attitudes may be influenced by many factors in health service delivery unrelated to technical excellence, it is reasonable to consider that the speed and degree with which the service helps a person to recover from illness or to maintain his health is an important determinant of attitudes. This becomes more plausible as patients become better educated about health care requirements.

Since the Donabedian review, additional studies have reported relatively high degrees of satisfaction with health services associated with HMO patterns. The favorable population attitudes toward group practice in general, even when experience with such clinics was lacking, were noted earlier from the study by Metzner et al. (1972). Weirnerman's paper (1964) on patient attitudes toward prepaid group practice plans showed a high degree of overall satisfaction in spite of many complaints about the impersonality of the doctor-patient relationship in a "clinic setting." His general summary of numerous studies up to 1964 is worth quoting (Weirnerman, 1964:886):

In general, the various investigations of attitudes of group health members suggest much appreciation for the technical standards of group health care, but less satisfaction with the doctor-patient relationship itself. In one way or another patients report disappointment with the degree of personal interest shown by the doctor and with the availability of his services when requested. Much more rarely is there criticism of the quality or the economics of group health care.

The dynamics of a sort of psychological trade-off—that is, tolerance of unsatisfactory doctor-patient relationships in return for judgment of good technical service and a “good buy” financially—in patient acceptance of the PGP pattern are reflected in the findings of Roemer et al. (reported in 1973, although based on a 1968 investigation). This study solicited the attitudes of health plan members along two dimensions: satisfaction with financial protection and with medical care received. Regarding financial protection, the preference for the PGP pattern, compared with open market plans, was overwhelming, prevailing in all types of family (large and small), in all religious categories, in all social classes, in families of either high or low geographic mobility, and whether or not the family had a history of chronic illness.

With respect to satisfaction of plan members with “the medical care received,” the positive attributes of the PGP plans were not so impressive, although the occurrence of frank dissatisfaction was substantially *lower* in those plans, compared with private medical practice patterns. Definite dissatisfaction was reported by 8.6 percent of PGP plan families, compared to 17.4 and 20.3 percent in the commercial and “Blue” plan-types.

When these responses are analyzed by social groupings, some interesting differentials become evident. The low level of frank dissatisfaction with the PGP-type patterns, compared with the others, prevails in all social subgroups. For certain subgroups, however, the HMO-type plans also show the highest level of “very satisfied” members: these include (a) single-person family units (compared with larger units), (b) Protestants (compared with other faiths), (c) families with no history of chronic illness (compared with sicklier families), (d) adult men alone (compared with adult women), and (e) geographically mobile families (compared with relatively stable ones).

Similar general findings were reported by Greenlick (1972) regarding the Kaiser-Permanente Health Plan in Portland, Oregon. While his respondents indicated substantial general satisfaction with the plan, that satisfaction was most often attributed to the financial advantages (“reasonable premiums” for the benefits offered) and to the actual care received after the doctor was reached, but over 50 percent of the respondents complained about the time it took before they got an appointment—in other words, access to the doctor.

Another study of patient satisfaction (Leyhe and Procter,

1971) was focused on Medicaid recipients enrolled in a PGP plan in California, compared with other such persons getting care through traditional private doctor mechanisms. The investigators in that study concluded (Leyhe and Procter, 1971:II) that:

No appreciable differences were found between responses of . . . [the PGP] enrollees and of those who used individual practitioners. . . . Medi-Cal enrollees of this private group practice apparently appraised their medical care as equivalent in almost all respects to that received from individual practitioners. This private (prepaid) group practice was not seen by the majority of the enrollees as having the objectionable features often attributed to public clinics.

Of the 51 questions used in this patient attitude survey, only four yielded significant differences between PGP and non-PGP respondents. In three of these questions, OAS (old-age security) Medicaid patients expressed the familiar objection that they had difficulty reaching a physician by telephone, could not see the same physician continuously, and did not get house call service. In the remaining question of these four, the *non-PGP* sample of AFDC (aid to families with dependent children) clients complained that they had difficulty obtaining ambulatory care because of problems with transportation—a service the PGP plan provided for its members.

One other conclusion of this study worth citing is that “. . . it became evident that patient education pertaining to the current source of care is extremely important.” Since about 20 percent of the respondents reported that they had had no identifiable source for medical care before being accepted into the Medicaid program, this conclusion seems to suggest that a pattern of delivery with a clearly identified, physically accessible source for primary care is likely to be more successful in reaching previously underserved populations with medical service.

Meaning of attitudes

Several comments are in order about patient attitudes toward prepaid group practice, typically associated with HMOs, as compared with traditional patterns. First, the policy of “dual” or “multiple choice” among plan types, always followed by the Kaiser-Permanente Plan and increasingly followed by other HMO-type plans,

helps to assure that only persons willing to accept the "clinic pattern" of service will join such plans in the first place. Second, on the other hand, the clinic pattern clearly departs from traditional custom and experience among self-supporting families, and it is small wonder if the inevitable impersonalities, especially if the clinic is a large one, cause irritations or, at least, require psychological adjustment. Third, it must be realized that some of the dissatisfactions with PGP patterns are basically a result of the insufficient numbers of doctors in those programs—a situation which, in turn, relates to nationwide shortages; in light of the high incomes attainable in private practice, the PGP plans have understandably had difficulties in recruiting qualified physicians to fill all their posts.

Finally, it must be recognized that managerial problems are far from solved in most large-scale medical care organizations, whether for ambulatory or for inpatient service. The hospital literature is full of reports about the "insensitivities" of patient care in large hospitals, whether or not prepayment is in the picture. There are obviously improvements needed in the efficiency of managing patient flow in organized medical care systems. In a sense, the most remarkable fact is the increasing degree of satisfaction that seems to be characterizing clinic services in spite of their departure from traditional patterns.

In regard to patient attitudes toward the medical care foundation pattern of HMO, compared with conventional private practice, there is little reason to expect much difference since conventional patterns of medical care are indeed applied by the foundations. The California PERS study (Medical Advisory Council, 1971) did, however, solicit three levels of satisfaction ("satisfied", "not entirely satisfied", or "dissatisfied") toward different aspects of the four plan-types used by these state government employees. The responses showed overwhelmingly high "satisfaction" in all plan-types across the three dimensions: plan administration, doctor's care, and hospitalization.

The differences were all very small, by these measures; but for the foundation plans, compared with the PGP model of HMOs, satisfaction levels appeared to be slightly higher for doctor's and hospital care, and slightly lower for plan administration. It is doubtful if these figures have any statistical significance. More important, they are bound to be strongly influenced by the general social

settings, since, in California, the medical foundations operate in the smaller and more rural counties, while the PGP plans are largely concentrated in metropolitan counties.

Out-of-plan use

A reflection of patient attitudes toward the PGP pattern of HMO is bound to be given by the extent of out-of-plan use. Since the Donabedian review, the new data seem to suggest that this use is somewhat lower than reported in the earlier studies. Greenlick's report (1972) on the Portland branch of the Kaiser-Permanente Plan found that about 10 percent of persons had some out-of-plan use during the previous 12 months, but since this might have ranged from little to much service for these persons, he estimates that it would amount to under 10 percent of the total services.

Roemer et al. (1973) analyzed out-of-plan use separately for ambulatory doctor and hospital services. They found, through examination of medical records, that 12 percent of the ambulatory doctor contacts of PGP plan members during one year occurred with private doctors outside the plan; for hospitalizations, the out-of-plan admissions were 7.2 percent of the total. The relative lowness of these figures suggests that, in spite of some dissatisfactions, a decision of PGP plan members to seek care elsewhere (and pay privately—which may not be such a hardship, when premiums have been paid by employers, as is commonly true) is made relatively rarely. Moreover, even these low figures may be an overstatement, since the questionnaire used did not distinguish between outside care sought because of dissatisfaction (impatience for an appointment or the like) and such care sought in an emergency occurring outside the plan's geographic area—a type of care financially covered by "out-of-area" indemnity benefits.

In the previous section, it was noted that out-of-pocket outlays for doctor's and hospital services by PGP plan members were strikingly low, even though these figures included certain small in-plan copayments that are levied on certain membership groups in the HMO-type plans of the RHH study (Roemer et al., 1973). The general extent of out-of-plan use in PGP plans, by various measures of services or expenditures, would seem to be lower than in the earlier studies summarized by Donabedian (1969). It would seem reasonable to conclude that, as people have become more accustomed to the PGP model of medical care, they have been more inclined to

stay with it, in spite of some difficulties; perhaps over the years there has also been improved efficiency in PGP operations. There still remain, nevertheless, obvious problems to solve in the sphere of plan-patient relationships within the HMO model.

HMOs and Planning

The whole HMO strategy has important implications for planning. In a sense, it shifts planning responsibilities from central governmental authorities to local voluntary bodies, within certain ground rules. It says that for a fixed monetary sum, the HMO must keep its customers happy, or at least sufficiently satisfied to stay with that HMO and not to leave it for the open market or to join another one. Within the constraints of money and membership expectations, the HMO would have wide leeway to provide health services in a variety of ways. The evidence so far suggests that, given a promotional boost by government "seed" grants, the potentials of HMOs, based on the PGP model, to provide good health service at relatively lower costs than the traditional open-market private medicine model are substantial. Reasonable interpretation, however, of the evaluative data on HMO performance, summarized above, requires certain "caveats."

Nearly all of the studies on effects, whether based on structure, process, or outcome, have been made on relatively large, stable, and well-established HMO models. It is altogether possible—and some of the recent California experience mentioned (Nelson, 1973) underscores the hazards—that some HMOs, especially the newer ones, may yield a very different performance record. As the American Public Health Association (1971) pointed out in an official policy statement, there are two principal hazards in the HMO concept: inequitable "risk" selection among enrollees and poor-quality care through underservicing.

Safeguards against both of these hazards are feasible through a process of public surveillance. Regarding risk selection or, more accurately, membership composition, standards with respect to age, sex, socioeconomic status, and past illness history could be set and applied to the actual enrollees of each HMO. Recurrent "open enrollment periods" are another device to help assure that every HMO is serving its fair share of high- and low-risk persons. Without such procedures, one or another HMO could offer competitive-

ly wider benefits or particularly low premiums simply by excluding or reducing its load of high-risk members.

Regarding the hazard of underservicing or other strategies for cutting HMO costs at the expense of quality, the surveillance procedures are more difficult and complex. There seems to be an increasing consensus that monitoring would be required along all principal channels of evaluation: input, process, and health outcomes. In January, 1972, a conference was sponsored by InterStudy and headed by Paul M. Ellwood (1973), who has done so much to promote the HMO concept, in order to grapple specifically with the problems of quality assurance under HMOs. The report of this conference suggests that the main emphasis was on the importance of developing sharpened measures of "clinical outcomes," as essential tools of a "Health Outcomes Commission" (in government) to promote quality assurance.

The general question of quality assurance has, of course, acquired greater national importance as collective financing of medical care (both through government and voluntary insurance) has increased—quite aside from the issue of HMOs. In January of 1973, still another major national conference was held on this question (U.S. Department of Health, Education, and Welfare, 1973), again stressing the importance of developing reliable measurements of both medical care process and outcome. The enactment of P.L. 92-603, the 1972 amendments to Medicare and Medicaid, adds further impetus to the need for quality criteria, with the new legal requirement of "professional standard review organizations" (PSROs) to blanket the nation. More research on formulating readily applicable measurements of both medical care process and outcome is obviously needed.

With several bills pending in the U.S. Congress for promotion of HMOs, including versions backed by both major political parties, it is a fair guess that the future holds expansion of HMO patterns of both major types—the PGP and the medical care foundation models. In the light of both continuously rising health care costs and the agreed-upon persistent need for comprehensive health planning (one item in the 1973-1974 Presidential budget contemplated for expansion, in contrast to the cutbacks in so many other sectors of the health field), one may reasonably look upon the HMO strategy as a peculiarly American approach to planning, in which responsibilities are delegated to numerous local mini-systems, in con-

trast to the usual European strategy of centralized controls. The private sector, through HMO development, would be vested with responsibilities and incentives to regulate itself and to meet the health needs of the population. As we have seen from the accumulated evidence, there is much reason to have confidence in the soundness of this strategy. Yet, as we have also seen, when and if HMOs become more a "mainstream" than a "vanguard" phenomenon, there will be enormous needs for continuing vigilance to protect the interests of consumers both inside and outside of health maintenance organizations.

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