THE USE OF PRENATAL CYTOGENETIC DIAGNOSIS: A COMPARISON OF RATES IN PREPAID GROUP PRACTICES AND THE GENERAL POPULATION

By

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ABSTRACT

In order to determine whether the reduction in services associated with prepaid group practice is indiscriminate or limited to medically "discretionary" services, the utilization rates for prenatal cytogenetic diagnosis, a medically "non-discretionary" service for women aged 35 and older, were compared in prepaid group practices and the geographically corresponding populations-at-large in four settings. The utilization rates by members of the prepaid group practices were equal to rates calculated for the geographically corresponding populations-at-large in two settings and 2.3 times greater in the other settings. Whatever factors may be responsible for the reduction of "discretionary" services delivered to members of prepaid group practices need not interfere with the delivery of "non-discretionary" services necessary for the practice of high quality medicine.

RESUME

Afin de déterminer si la réduction des services liés à la médecine de groupe payée d'avance d'opère sans distinction ou est limitée aux services laissés à la discrétion du médecin, on a procédé à une comparaison des taux d'utilisation du diagnostic cytogénique prénatal, service d'application restreinte destiné aux femmes de 35 ans et plus. Cette étude a porté sur une clientèle de cabinets de groupe payés d'avance, et sur des échantillons démographiques reflétant l'ensemble de la population et lui correspondant géographiquement; quatre cadres ont ainsi été examinés. Les taux d'utilisation enregistrés pour les membres des cabinets de groupe payés d'avance se sont révélés égaux aux taux calculés pour les populations correspondantes sur le plan géographique dan deux cadres et 2.3 fois supérieurs dans les autres cadres. Quels que soient les facteurs responsables de la réduction des services "discrétionnaires" fournis aux clients des cabinets de groupe payés d'avance, ceux-ci ne doivent pas entraver l'administration de services limités indispensables à l'exercice d'une médecine de haute qualité.

PREFACE

This thesis provides both a methodologic and substantive contribution to knowledge in the field of health care research. It explores an unanswered question in the literature concerning the utilization of medical services in prepaid group practices. While reductions in the relative use of many services have been well documented, the determination of appropriateness has been elusive.

This study employs a tracer methodology to explore both the extent and appropriateness of differences in utilization between prepaid group practice populations and geographically corresponding populations-at-large.

In contradistinction to the previous literature, this study examines the use of a non-discretionary preventive procedure. The methods for obtaining reliable data are presented, and empirical evidence is presented to support the hypothesis that the incentives and control mechanisms inherent to prepaid capitation practices do not result in a reduction in the delivery of medically non-discretionary services.

This study could not have been completed without the cooperation of a great number of individuals. I

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CHAPTER I

INTRODUCTION

The provision of high quality health care requires the effective use of technology. Economic realities require efficiency. Quality and cost thus emerge interdependent; efforts to control costs must be tempered by measures to ensure quality. It is of both theoretical and practical importance, then, to consider the effects of various cost-containment incentives upon technology diffusion and utilization. This issue is of particular significance in evaluating alternative systems of health care delivery, specifically prepaid group practices. In these settings the distinction between positive incentives for cost-containment and negative disincentives against technology utilization may be blurred. As a consequence, the comparative reductions in hospitalization rates,[1-8] specific surgical procedures, and employment of costly diagnostic technologies associated with prepaid group practices may be viewed either as more appropriate utilization of resources or as inappropriate underutilization.[9-10] The question addressed in this study is whether the cost-containment incentives and provider controls intrinsic to prepaid capitation practices result in an indiscriminate reduction in technology

utilization, or, rather, in the reduced utilization of medically discretionary services.

This question was explored using a tracer methodology. The tracer concept was introduced to the field of quality assessment by Kessner and Kalk.[11] The basic assumption underlying the method is the generalizability of the tracer experience, that is, relationships observed between variables of concern and the tracer should reflect more general relationships. Prenatal cytogenetic diagnosis was chosen as a tracer for this study because it represents a cost and labor intensive technology. Moreover, amniocentesis for the prenatal detection of chromosomal abnormalities has been determined to be safe, accurate, and reliable by large collaborative studies in both the United States and Canada.[12-13] Cost-benefit analyses of the procedure for the detection of Down's Syndrome and neural tube defects are uniformly favorable.[14-16] As such, the use of midtrimester amniocentesis has been advocated in pregnancies at high risk for detectable disorders;[17] more specifically, it has been endorsed for use in pregnant women aged 35 and older who have a markedly increased risk of giving birth to a child with Down's Syndrome.[18] It thus represents a medically non-discretionary service, one not subject to questions of medical judgement, for a defined segment of the population, yet one which has been demonstrated to be

significantly underutilized.

Because the application of this technology is non-discretionary, considerations of appropriateness may be applied to the evaluation of utilization rates; in this instance, the process of care may be equated with outcome.

CHAPTER II

REVIEW OF THE LITERATURE

The advent of prepaid group practice met with great controversy in a health field long dominated by solo practitioners operating within a fee-for-service reimbursement system in the United States. Research efforts have principally consisted of comparisons of populations receiving medical care within the more traditional framework with those covered by prepaid group practices. These comparative evaluations of patient and physician satisfaction, health care costs and productivity, utilization of medical services, and organizational effects upon quality of care have been used to generate and support policy decisions concerning alternative systems of health care delivery.

Despite a remarkable consistency in much of the data generated from these comparative studies, much controversy has persisted with respect to their interpetation. The problem is one of unraveling a mutiplicity of potentially confounding input and output variables in order to determine causal relationships among the variables of interest. Several excellent reviews of the literature[19-23] have attempted to systematically analyze the available data in order to establish a useful

framework for their interpretation.

The issues of utilization and quality of care in prepaid group practice are central to this study. This discussion will consequently be limited to those investigations and reviews which have provided data directly pertaining to those issues.

Hospital Utilization

The seminal studies of comparative hospitalization experiences between populations covered by traditional and alternative systems of health care delivery were reviewed by Donabedian.[19] He concluded that a combination of physician incentives and professional controls in prepaid group practice resulted in decreased hospitalization rates for prepaid group practice enrollees. The following is a discussion of the studies upon which his conclusion is based as well as a summary of the subsequent literature in the field.

An early study conducted by the Committee of the Special Research Project in the Health Insurance Plan of Greater New York[24] (HIP) consisted of a household survey administered to samples drawn from the HIP enrollees and from the population-at-large in New York City. The data obtained indicated slightly higher hospital admission rates for the HIP enrollees. However, these data were found to be inconsistent with hospitalization statistics maintained by the New York City hospitals, and were subsequently determined

to be unreliable as a consequence of sampling and response biases inherent in the survey methodology employed.

A subsequent study by Densen, Balamuth, and Shapiro[1] compared the hospitalization experience of two populations insured by Blue Cross for hospital costs, but differing in medical care coverage. One group received comprehensive inpatient and ambulatory care on a prepaid capitation basis in the group practice structure of HIP while the other group was covered for inhospital care on a fee-for-service reimbursement basis by Blue Shield. Hospital admission rates for the HIP group were found to be substantially lower than those for the Blue Shield group (77.4 admissions per 1000 population for HIP as compared to 95.8 admissions per 1000 population for Blue Shield). Length of stay was found to be essentially the same for both populations, and the total number of hospital days per 100 population per year was 58.8 for HIP and 68.8 for Blue Shield. These relationships persisted when the populations were matched for age, sex, and employment groups. When differences were analyzed by diagnostic categories, hospitalizations for acute respiratory infections were found to be more frequent in the Blue Shield population, and the tonsillectomy rate for that group was double that for HIP.

While the study concluded that the HIP population was less likely to be hospitalized than the corresponding Blue Shield population, no clear cause could be determined for the

differences noted. The two populations investigated and their respective medical coverage differed in many respects. No equivalency in the health status of the two populations could be ascertained, nor could socioeconomic comparability be established. Medical coverage for the two populations differed with respect to the range of services provided, and particularly the availability of ambulatory services. The systems differed with respect to the organization of medical practice (group versus solo), the method of physician reimbursement (capitation versus fee-for-service), and organizational controls upon individual physician practice habits. Finally differences existed in the accessibility of hospital beds to physicians serving the two populations. Differences in total admission rates and in admission rates by diagnostic category might thus reflect true differences in the populations or, rather, differences in the practice characteristics and utilization habits of physicians serving the two populations.

Two independent studies[2,3] were subsequently undertaken to compare the utilization experiences of HIP enrollees with those of the population covered by Group Health Insurance (GHI). Membership in these plans was offered to employee groups in a "dual choice" situation. The selection of health care plan was thus prerogative of the individual consumer. The plans were comparable in terms of the range of services provided including ambulatory care coverage, but

differed with respect to the organization of medical practice as well as the method of physician reimbursement. GHI members receive their medical care from private physicians, usually in solo practice, who are reimbursed on a fee-for-service basis. The patterns of hospital utilization observed in these studies were corroborative, differences in hospitalization rates being consistent with those noted in the previous study. The number of admissions was substantially lower for the HIP population while the duration of stay was similar. Because the range of medical services available to the two populations was comparable, that variable, alone, seems an unlikely determinant of the noted differences in hospitalization. Hetherington, Hopkins, and Roemer[4] further observed in their review that the use of ambulatory services by the HIP population was less than that reported by the GHI membership in the Anderson and Sheatsley study.[2] They conclude that the use of ambulatory services is not a critical factor in determining hospital utilization. This view is supported by Klarman[21] who cites a personal communication as evidence. Subsequent studies by Roemer[25] and Hill and Veney[26] are corroborative.

Another study by Densen, Shapiro, Jonas, et al[27] compared the hospitalization experience of two populations of members of the same labor union. In this case, the options available in the dual choice stuation were enrollment in HIP or membership in a union sponsored plan providing

fee-for-service medical coverage as well as hospitalization insurance. Unlike the previous studies, no differences in hospitalization rates were demonstrated. It was noted that the union plan provided patient and physician education emphasizing conservative use of costly medical services. It was thus plausible to suggest that some element of control might be critical in affecting utilization. Alternatively, it was suggested that the results might be due to a lack of comparability between the two pooulations inasmuch as differences in socioeconomic status or ethnic origin might affect the initial choice of plan and subsequent utilization of services.

A study conducted by the Columbia University School of Public Health[28] compared hospital utilization by union members covered by three different health insurance plans in different regions of the United States. The plans represented included Blue Cross - Blue Shield, a commercial type "major medical" insurance, and Kaiser, a prepaid group practice. No difference in the hospitalization experience of the three populations was observed, although there was a greater use of ambulatory services by the Kaiser enrollees. Unfortunately, the analysis of these data is complicated by the geographic disparity between the study populations. The absence of controls for regional differences in hospitalization rates obscures the role of organizational factors upon utilization.

A subsequent study cited by Donabedian[19] compared hospital utilization by California state employees covered by several different health insurance plans. Geographic differences between the study populations are noted to be minor, and hospital utilization was observed to be lowest in Kaiser as compared to a cash indemnity plan and Blue Cross - Blue Shield.

Similar results were obtained in a study conducted by Hetherington, Hopkins, and Roemer.[4] The medical care utilization of persons enrolled in three types of health insurance plans operating in the metropolitan Los Angeles area were compared with respect to utilization of services, quality of services, consumer expenses, and consumer satisfaction. The study included commercial insurance plans, hospital and physician sponsored plans, and prepaid group practices. Two representatives, one large and one small, of each type of plan were included. Hospital utilization was found to be lowest for enrollees of the group practices, particularly in the larger of the two. It was noted that lower education was associated with lower admission rates in that practice, and the hypothesis was set forth that the lower hospitalization rates were in part due to a "bureaucratic effect" limiting the accessibilty of services to high-need, low-demand subscribers. It was further suggested that the lower rates might be the result of a limited supply of hospital beds.

The notion of supply affecting demand is supported by

Somers[29] who notes that utilization analyses are used to provide a perspective for planning future services. Stevens[30] similarly notes that the hospital bed capacity for prepaid group practices is well below the national average. This view is also consistent with the findings of the early HIP studies[1,3] in light of the relative inaccessibility of hospital beds to HIP physicians at the time those studies were conducted.

Wersinger, Roghmann, Gavett, et al[5] compared the hospitalization experience in three different organizational types of prepaid practices sponsored by Blue Cross and Blue Shield in the Rochester area. These practices each provided essentially the same range of medical services, and each had equal access to hospital beds; they differed with respect to organizational structure and the degree of risk assumed for the benefit package offered to subscribers. The first prepaid model in the study was an independent practice association comprised of individual practitioners who were reimbursed for their services by Blue Shield on a fee-for-service basis. A peer review system existed to monitor the use of ambulatory services. There was no formal control on hospital utilization, and physicians shared no financial risk in the cost of caring for their patients. The second model in the study was a multispecialty group practice with full financial risk for its benefit package. Hospital utilization and the use of costly medical services were closely monitored by a

formal professional review mechanism. The third prepaid plan was a system of neighborhood health centers which assumed financial risk only for the provision of medical services within those centers. While this plan assumed no financial risk for hospitalization costs or out-of-plan referrals, a formal review mechanism existed to control the use of such services. Utilization rates for these three plans were compared to Blue Cross rates observed the year prior to the inception of the prepaid plans. Hospital utilization for the population enrolled in the independent practice association was found to be similar to that of Blue Cross. Substantially lower rates were observed for members of the prepaid group practice. The relatively low enrollment of the neighborhood health center plan limited the value of the data obtained from that group. The noted differences in hospitalization rates were hypothesized to be the result of differences in utilization control mechanisms and degree of risk sharing among plans. It was noted, however, that factors of self-selection could bias the data.

The impact of prepayment, per se, upon the utilization of ambulatory and inpatient services was studied by Broida, Lerner, Lohrenz, et al.[32] The option for prepaid coverage was made available to a portion of the population served by an existing fee-for-service multispecialty group practice. The data revealed an increased utilization of both ambulatory and inpatient services in the prepaid

population as compared to those who continued to receive care on a fee-for-service basis. It was also noted that the prepaid group had been heavier users of ambulatory services prior to the institution of prepayment. It was suggested, therefore, that self-selection may be an important confounding factor in evaluating the differences in utilization. Furtehrmore, it was noted that most physicians in the group were unaware of the payment status of their patients, and continued to be remunerated on a salary basis. Thus, unlike the typical prepaid group practice situation, few incentives existed to minimize hospital utilization.

A study of the utilization of health services by the 8,000,000 employees eligible for the Federal Employees Health Benefits Program was undertaken by Perrott.[6] Hospitalization rates in prepaid health plans, particularly of the group practice type, were substantially lower than those for Blue Cross - Blue Shield and private indemnity plans. These differences were noted to be largely due to lower surgical rates in prepaid group practices, particularly involving procedures such as tonsillectomies, hysterectomies, and appendectomies which may be considered medically discretionary subject to a physician's judgment. The study was not controlled for sociodemographic differences in the various populations studied nor was out-of-plan use considered.

The subsequent Federal Employees Health Benefits

Program Utilization Study,[7] however, confirmed Perrott's findings after correcting for sociodemographic differences in the study populations. The noted differences in disease specific admission rates persisted with fewer prepaid group practice admissions for menstrual disorders, respiratory infections, and tonsillectomies.

These differences in admission rates by diagnostic categories are remarkably consistent in a number of the studies reviewed.[1,3,6,7,28] A recent study conducted by Steinberg and Schroeder[31] similarly found a decreased use of endoscopy in a prepaid group practice population as compared to the fee-for-service population in California.

Luft,[23] however, notes in his review that surgical admissions in prepaid group practices constitute approximately the same percentage of total admissions as in comparison populations. He concludes that differences in hospitalization rates are not due solely to a differential reduction in surgical procedures in prepaid group practices. He further notes that a comparison of rates for specific surgical procedures reveals a substantially lower rate only for tonsillectomies. Comparative rates for other "discretionary" procedures such as hysterectomies, herniorrhaphies, cholecystectomies, and hemorrhoidectomies were more variable. He suggests, consequently, that the reduction in surgical rates associated with prepaid group practices may not be limited to "discretionary" procedures.

A study by LoGerfo, Efird, Diehr, et al[10] supports this view. Criteria for judging the appropriateness of surgical procedures were used to evaluate the indications for surgery in two populations in the Seattle area. One group was covered by a prepaid group practice, and the other by an independent practice association. Even after eliminating those surgical procedures not meeting the predetermined appropriateness criteria, differences in surgical rates between the groups persisted with fewer tonsillectomies and hysterectomies performed in the group practice. The validity of the criteria used to determine appropriateness must, of course, be further investigated.

Out-of-Plan Use

The use of out-of-plan services by members of prepaid group practices has frequently been cited as a potential variable contributing to differences in utilization rates between prepaid group practice and fee-for-service populations. Much of the early literature indicated that such out-of-plan use was quite substantial.[19] A study conducted by the Special Research Project in the Health Insurance Plan of Greater New York[24] demonstrated a use of out-of-plan physicians ranging from 17 to 35 per cent depending upon specialty. Similar findings were reported in a study by Freidson;[33] 21 per cent of surgical procedures upon HIP patients were performed by non-HIP physicians, and 29 per cent of patients stated that they occasionally consulted

private physicians. Later studies, however, have yielded quite different results. Metherington, Hopkins, and Roemer[4] noted out-of-plan use in only 8 per cent of ambulatory visits and 7 per cent of hospitalizations for group practice members. In his review, Roemer[22] cites a study by Greenlick which reports an out-of-plan use by only 10 per cent of Kaiser - Portland subscribers. Gaus Cooper, and Hirschman[8] note out-of-plan use by less than 1 per cent of Medicaid enrollees in health maintenance organizations. This particularly low rate may be explained by the financial inaccessibility of private care to that population.

In summary, the data do suggest a progressive decrease in out-of-plan use for prepaid group practices. Roemer[22] suggests that this may be due to increased efficiency in group practices as well as increased acceptance and satisfaction by group practice members. At present it appears unlikely that out-of-plan use would appreciably alter comparative utilization rates.

Ambulatory Care Utilization

Although the evidence is contradictory, the provision of ambulatory services on a prepaid basis appears, in general, to result in a concomitant rise in the use of those services. This pattern was observed in several of the studies reviewed,[4,24,28,32] although others[2,8] were inconsistent. In a review of 15 studies, Luft[23] noted a generally increased utilization of ambulatory services in prepaid practices

(4.41 physician visits per year by group practice members as compared to 4.19 for comparison populations with more traditional coverage). He observed that this increased utilization was even more striking in independent practice associations (5.11 visits versus 4.32) where physicians are reimbursed on a fee-for-service basis.

As previously noted, the use of ambulatory services has not been associated with decreased hospital utilization.[4,21,25,26] Economies achieved by prepaid group practices do not appear to be the result of a differential utilization of ambulatory services.

Summary

The factors responsible for the observed differences in utilization rates between prepaid group practice and fee-for-service populations are manifold.

Populations enrolled in prepaid group practices have been noted to differ from those receiving care within the more traditional health care system wit respect to socio-demographic characteristics,[24] perceived health status,[19] and prior use of health services.[32] These differences probably result from a self-selection process, particularly in the dual choice situation. When given the option for prepaid coverage, it is likely that the population attracted by a comprehensive benefit package will differ in some systematic fashion from another population which rejects the group setting.

Physician reimbursement in the form of capitation should, in theory, provide incentives to minimize the utilization of expensive services. Empirical evidence bears this out.[4,5,8]

Supply has been noted to have a great impact upon the use of services.[1,4,19,29] Similarly, the effect of specific provider oriented controls upon utilization appears to be an important factor in determining rate differences.[5,27,34]

In the final analysis, the most important issue is the appropriateness of differences in utilization. The quality of care must not be permitted to suffer in order to achieve cost savings through lower utilization. Luft[23] states the problem well.

> The case in favor of HMO's would be substantially strengthened if it could be shown not only that they reduce utilization of expensive services but also that reduction comes in categories thought to be medically unnecessary. Unfortunately, the data are inconclusive on this point and provide at least as much support for the hypothesis that admission rates in HMO's are lower for both "discretionary" and "nondiscretionary" hospital treatment.[23](p1342)

Quality of Care

The issue of quality of care is basic to questions of utilization and cost. Brook[25] suggests that the justification for advancing the prepaid group practice model must be based upon the efficient delivery of high quality care rather than upon financial advantage.

The determination of quality, however, has proved elusive. Many variables may intervene between the process of care and outcome, thus obscuring the relationship. Nevertheless, several studies have attempted to compare populations with respect to identifiable indicators of health status in order to determine the possible effects of the organization and process of care upon ultimate health outcomes.

A study by Shapiro, Weiner, and Densen[36,37] compared prematurity and perinatal mortality rates in the HIP population and the general population of New York City. Similar comparisons were made between the HIP enrollees and that segment of the New York City population under the care of private physicians. The results were uniformly favorable to the HIP population; age-adjusted rates for both prematurity and perinatal mortality were substantially lower in the HIP population than in the general population. A similar relationship

was observed in the comparison of HIP patients with private New York City patients, although the differences were smaller. Rates in all groups were higher for nonwhites than for whites, although differences were smaller in the HIP population.

Several explanations were proposed to account for the differences observed. It was noted that HIP patients were more likely to receive prenatal care at an earlier stage of pregnancy than women in the general population, although this difference was not marked in the comparison between HIP and private New York City patients. There is a suggestion, however, that some financial barriers to care may be reduced as a consequence of the prepayment plan.

Differences in socioeconomic status and ethnic origin are known to be critical determinants of the use of prenatal services. Although serious efforts were made to control for these variables in a subsequent analysis,[37] the reliability of socioeconomic measures is limited.

A subsequent study by Shapiro, Williams, Yerby, et al[38] compared the use of medical services by two populations of Old Age Assistance recipients, one receiving care from HIP and the other from the New York City welfare system. While no changes were observed in

the number of physician visits or hospitalizations in the two groups, there was a decrease in the number of patients in the HIP group who received no services. There was also a shift from home visits to ambulatory visits in the HIP group. Mortality rates remained the same for both groups during the first study year, but a markedly lower rate was observed in the HIP group subsequently. In summarizing these studies, Donabedian notes:

> (They) describe circumstances in which life itself is shown to be related to the precise way in which the provision of medical care is organized. Should these findings prove to be more generally true, their implications would be shattering.[19](p 24)

Several attempts have been made to evaluate quality of care by comparing the use of preventive services such as periodic health examinations and immunizations[4,8,24] in prepaid group practice and in the general population. Results have been contradictory, and may, in part, be explained by difficulty in obtaining reliable data and the discretionary nature of the preventive measures which were considered.

In contradistinction to the previous literature, this study examines the use of a non-discretionary preventive procedure. The methods for obtaining reliable data are presented, and empirical evidence is presented

to support the hypothesis that the incentives and control mechanisms inherent to prepaid capitation practices do not result in a reduction in the delivery of medically non-discretionary services.

CHAPTER III

STUDY METHODS

The study was conducted in four geographic settings, each selected for the presence of a large and well established prepaid group practice as well as the availability of required information.

The group practices included in the study were the Health Insurance Plan of Greater New York (HIP), the Group Health Cooperative of Puget Sound, the Kaiser Foundation Health Plan of Oregon, and the Kaiser Foundation Health Plan - Southern California Permanente Medical Group.* Each group provided data concerning the number of amniocenteses performed annually for the purpose of cytogenetic studies as well as the annual number of live births to its member population.

Comparative data were obtained for the geographically corresponding populations-at-large from cytogenetics laboratories as well as appropriate public and private agencies. The two sets of data for each setting were matched as closely as possible with respect to time and geography.

Because a number of different data sources were used in the study, variations exist in the specific criteria applied to data for inclusion in rate determinations. Similarly, some variation exists in the methods employed in

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*See Appendix I for brief descriptions of plans

calculating rates. In all cases, however, such variations exist only between settings; the comparative sets of data obtained within each setting were treated identically.

Rates were then calculated for the number of eligible women who underwent prenatal cytogenetic diagnosis in each prepaid group practice and geographically corresponding population-at-large. In New York City, Washington, and Oregon, data were limited to women aged 35 and older, and rates were calculated by dividing the number of women aged 35 and older who underwent prenatal cytogenetic diagnosis by the number of live births to women in that age group. In California, an age distributin was not available for the women who underwent prenatal cytogenetic diagnosis. Therefore, a correction factor was applied in calculating the utilization rates. One per cent of the total number of live births to women in the study population (the figure used by the Maternal and Infant Section of the California State Department of Health Services to estimate the incidence of genetic disorders in the general population) was added to the number of live births to women aged 35 and older as an estimate of the total number of women eligible for prenatal diagnosis. The total number of women who underwent midtrimester amniocentesis for prenatal cytogenetic diagnosis was then divided by the corrected denominator to obtain utilization rates for the population-at-large in Southern California. The same methods were employed in

calculating the comparative rates for the Kaiser Foundation Health Plan - Southern California Permanente Medical Group.

In all areas, the group practice members are included in the populations-at-large.

In New York City, the utilization of prenatal diagnostic services by city residents has been monitored in preparation for the organization of a citywide prenatal diagnosis project.[39] Data were collected from all university, hospital, and commercial laboratories performing cytogenetic studies in the metropolitan area. A complete count was thus obtained for the number of New York City residents aged 35 and older who underwent midtrimester amniocentesis for the purpose of cytogenetic studies in 1976 and the first six months of 1977. Data for the calendar year 1977 were

> obtained by extrapolation from the data of the first six months of 1977, following communication with the directors of each of the laboratories about their case load during the second six months. The data include an estimated 250 women who had their laboratory studies done in a New Jersey commercial laboratory but who were New York City residents. These data comprise only women with a specimen of amniotic fluid sent to a laboratory, i.e., they do not include women with dry taps and no repeats, nor women who had genetic counselling but no amniocentesis.[40]

The number of live births in New York City to women aged 35 and older was obtained from the New York City Department of Health, Bureau of Vital Statistics.

Data concerning the use of prenatal diagnostic services by members of the Health Insurance Plan of Greater

New York in 1977 were compiled from "special services" records. Amniotic fluid cytogenetic studies were performed by outside laboratories; consequently, payment records provided an accurate count of the cytogenetic studies performed for plan members. Only studies performed for women aged 35 and older who were members of HIP medical groups within New York City were included; repeat cytogenetic studies on the same patient were not included. The number of live births was obtained from data compiled by each of the HIP medical groups. Only women aged 35 and older at the time of delivery who were members of HIP medical groups within New York City were included.

In Washington, the annual numbers of state residents who underwent prenatal cytogenetic diagnosis during the years 1975, 1976, and 1977 were obtained directly from the cytogenetics laboratories at the University of Washington and the University of Oregon, the only laboratories doing cytogenetic studies in the northwestern United States. A negligible number of studies (<20) were sent to laboratories in California, and are not included in the tabulation. Only studies done for Washington residents aged 35 and older were included. The annual numbers of live births in Washington to women aged 35 and older were obtained from the Washington Department of Health Services, Vital Records Section.

The annual numbers of members of the Group Health

Cooperative of Puget Sound who underwent midtrimester amniocentesis for the purpose of cytogenetic studies during 1975, 1976, and 1977 were compiled from billing invoices received from the outside laboratory (at the University of Washington) where the studies were performed. Only those studies done for members aged 35 and older were included. The annual numbers of live births to Group Health members aged 35 and older were obtained from hospitalization data compiled by the Professional Activities Study for the Group Health Hospital where all Group Health maternity patients are admitted.

The numbers of state residents who underwent prenatal cytogenetic diagnosis in Oregon in 1976 and 1977 were obtained from the cytogenetics laboratory at the University of Oregon where it is estimated that 98 to 99 per cent of all amniotic fluid cytogenetic studies are performed for residents of that state. A negligible number of studies may be sent to laboratories in California; none were performed at the University of Washington. Live birth data obtained from the state department of vital statistics were supplied by the Genetics Department at the University of Oregon.

Data concerning prenatal cytogenetic diagnosis were compiled specifically for research purposes at the Kaiser Foundation Health Plan of Oregon. Birth data were routinely collected, and maternal age at the time of delivery was manually tabulated from birth records.

The Maternal and Infant Section of the California Department of Health Services collects data from all laboratories performing cytogenetics studies in that state. Birth data are also collected by the departemnt. Data are collected separately for each county, permitting a precise geographic match for the membership of the Kaiser - Southern California plan. The counties corresponding to the Southern California Permanente Medical Group, and included in calculating the rates for the general population in Southern California were Los Angeles, San Diego, San Bernadino, Orange, Riverside and Ventura.

The number of prenatal cytogenetic studies performed for members of the Kaiser Foundation Health Plan of Southern California was obtained from billing records for outside laboratory services. Birth data were routinely collected by the plan.

CHAPTER IV

RESULTS

The membership of the four prepaid group practices included in this study numbers 2,675,000, and accounts for 36% of the total membership of prepaid group practices in the United States based on the 1978 statistics provided by the Group Health Association of America. The comparison populations comprise 12% of the general population of the United States.

The utilization rate for midtrimester cytogenetic diagnosis members of prepaid group practices is equal to or greater than that of the geographically corresponding populations-at-large in each of the four settings (Figure 1, Table 1). There is a trend over time towards increased utilization of prenatal diagnostic services in every setting

TABLE 1: UTILIZATION RATES FOR PRENATAL CYTOGENETIC STUDIES BY GEOGRAPHIC AREA AND PRACTICE SETTING

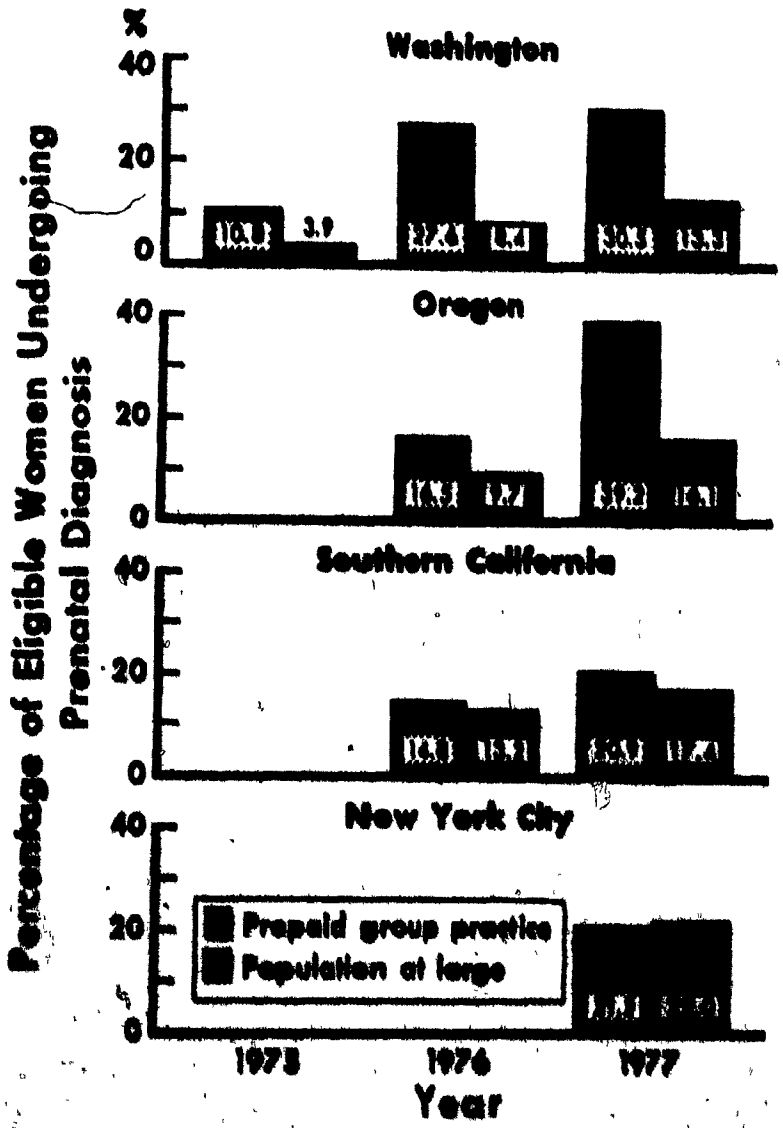
LOCATION	YEAR	No. PRENATAL STUDIES	No. WOMEN ELIGIBLE	RATE %
Washington				
a) General Population	1975	67	1727	3.9
	1976	158	1887	8.4
	1977	270	2035	13.3
b) Prepaid Practice	1975	11	102	10.8
	1976	35	127	27.6
	1977	46	151	30.5
Oregon				
a) General Population	1976	109	1126	9.7
	1977	202	1252	16.1
b) Prepaid Practice	1976	19	115	16.5
	1977	51	130	39.2
Southern California				
a) General Population	1976	1598*	12092	13.2
	1977	2184**	12572	17.4
b) Prepaid Practice	1976	242*	1630	14.8
	1977	377**	1808	20.9
New York City				
a) General Population	1977	1750	7942	22.0
b) Prepaid Practice	1977	66	311	21.2

*based on fiscal year 1976-1977

**based on fiscal year 1977-1978

FIGURE 1

A COMPARISON OF UTILIZATION RATES FOR PRENATAL CYTOGENETIC STUDIES BETWEEN MEMBERS OF PREPAID GROUP PRACTICES AND THE GEOGRAPHICALLY CORRESPONDING POPULATIONS-AT-LARGE



CHAPTER V

DISCUSSION

The study was conducted in multiple geographic settings to ensure that results would not simply reflect area-specific utilization patterns for prenatal diagnostic services. Midtrimester amniocentesis for prenatal cytogenetic diagnosis was selected as a tracer for this investigation because it represents both a cost and labor intensive technology which may be assumed to be medically non-discretionary for a defined and identifiable segment of the population. This assumption is justified on the basis of repeated studies which have concluded that the procedure is safe, accurate, and reliable as well as cost beneficial for the primary prevention of Down Syndrome.[12-17] Because all such studies have advocated midtrimester amniocentesis for all pregnancies in women aged 35 and older and in women with a positive family history for a detectable disorder, the data included in this study are limited to those groups.

The number of live births to women aged 35 and older was used as a proxy for the total number of pregnancies in that age group. This substitution is justified because women aborting spontaneously during the first trimester or those electing abortions cannot be considered candidates for prenatal diagnosis. Furthermore, the number of abortions

elected on the basis of an abnormality detected by prenatal diagnosis would be too small to substantially alter the calculated rate, and would be roughly similar in the contrasted practice settings.

The validity of the data is implicit in the sources from which they were collected. Birth data were obtained from hospitalization records, birth certificates, and tabulations of recorded live births kept specifically for the purpose of monitoring the size of given populations. It is unlikely that any consistent bias exists in the routine collection of these data.

The number of deliveries which may occur in locations geographically removed from a woman's place of residence would be quite small in comparison to the total numbers of live births occurring within the geographic settings studied. Thus, any such discrepancies which might exist in the birth data would be inconsequential for the purposes of this study.

The use of private physicians' services by members of prepaid group practices has been demonstrated in the past to be minimal;[4,8,22,23] fees for private obstetrics care provide powerful disincentives for such out-of-plan use. Moreover, it is particularly unlikely that group members who receive their prenatal care and prenatal diagnostic services from group physicians would opt out of the group for delivery. It is, therefore, unlikely that any major discrepancies exist in birth data as a result of out-of-plan use.

The number of midtrimester amniocenteses performed for cytogenetic studies was obtained from billing invoices, laboratory records, and records maintained specifically for the purpose of monitoring the utilization of prenatal diagnostic services. The numbers represent actual counts of services provided, and any errors would result only from under-reporting. Consequently, the rates calculated in this study represent the lowest possible utilization of prenatal diagnostic services by members of prepaid group practices.

Despite efforts to assure that the numbers of prenatal diagnostic services performed for the populations-at-large in each of the study settings are complete, it is possible that some studies were performed by laboratories outside of the geographic area. However, such out-of-area studies would have a small effect on the calculated rates because the denominators, women eligible for prenatal diagnosis, are large.

The study did not attempt to determine causal relationships. However, it is of importance to ascertain that the utilization patterns demonstrated in this study are attributable to some aspect of prepaid group practice rather than to some confounding variable.

While the accessibility of prenatal diagnostice services may limit utilization, it is unlikely that the generally high utilization rates noted in prepaid group practices can be explained on the basis of access. The laboratories

performing cytogenetic studies within the time frame of this investigation were in all cases unaffiliated with the prepaid group practices studied, and services were available to all on a regional basis. There was no suggestion of preferential treatment for members of prepaid group practices, although, if such treatment did exist, it could only be interpreted as a favorable commentary on prepaid group practice.

Past studies have demonstrated that members of prepaid group practices generally seek prenatal care at an earlier stage of pregnancy than women in the general population.[36] Fewer financial barriers exist to cause prepaid group practice members to defer medical care or refuse medically indicated services. This may in part explain the higher rates observed for prenatal diagnosis in some prepaid practice settings; delayed entry into the health care system by members of the general population may have precluded midtrimester amniocentesis, thus lowering the comparison rates.

Other sociodemographic differences may well exist between the populations enrolled in prepaid group practices and those served by fee-for-service physicians. Similarly, physician characteristics and practice habits may vary considerably between those who choose to practice in traditional or alternative systems of health care delivery. Finally, some variation in the utilization of services may be directly attributable to the health care system, per se, and to the practice incentives intrinsic to its organization.

While each of the group practices studied offers a broad range of medical services on a prepaid basis, they differ in a number of respects including sociodemographic characteristics of both subscribers and physicians, size, level of integration, organizational structure, centralization of medical authority, and extent of provider controls. These consumer, provider, and organizational factors may all contribute to differences in utilization rates between settings. The value of such comparisons are limited in this study, however, because of differences in the methodologies employed in the various settings for obtaining data and calculating rates.

The diffusion of knowledge and innovation are facilitated if they are compatible with organizational goals.[41] Thus, the use of a preventive and cost beneficial technology is entirely consistent with the objectives of prepaid group practice, health maintenance and cost-control. Moreover, quality assurance programs may be more easily implemented in more centrally directed medical group settings; indeed such programs exist in each of the prepaid group practices examined.[42]

While evidence demonstrating a decreased utilization of medical services by members of prepaid group practices is incontrovertible,[1-8] the data presented here clearly refute the contention that this reduction in services is indiscriminate. In each of the settings investigated, utilization

rates for prenatal diagnostic services for members of prepaid group practices were equal to or greater than those rates calculated for the geographically corresponding populations-at-large. This finding is particularly significant in light of the lower utilization rates previously observed for discretionary services by members of these same prepaid group practices.[1-8] The results suggest that whatever factors are responsible for the reduction of discretionary services delivered to members of prepaid group practices, these factors need not interfere with the delivery of non-discretionary services necessary for the practice of high quality medicine.

BIBLIOGRAPHY

1. Densen PM, Balamuth E, Shapiro S: Prepaid Medical Care and Hospital Utilization. Chicago, Hospital Monograph Series No. 3, American Hospital Association, 1958

2. Anderson OW, Sheatsley PB: Comprehensive Medical Insurance: A Study of Costs, Use and Attitudes Under Two Plans. Research Series No. 9. New York, Health Information Foundation, 1959

3. Densen PM, Jones, EW, Balamuth E, et al: Prepaid medical care and hospital utilization in a dual choice situation. Am J Public Health50: 1710-1726, 1960

4. Hetherington RW, Hopkins CE, Roemer MI: Health Insurance Plans: Promise and Performance. New York, Wiley-Inter science, 1975

5. Wersinger R, Roghmann KJ, Gavett JW, et al: Inpatient hospital utilization in three prepaid comprehensive health care plans compared with a regular Blue Cross plan. Med Care 14: 721-732, 1976

6. Perrott GS: The Federal Employees Health Benefits Program. Washington, D.C., Government Printing Office, 1971

7. Riedel DC, Walden DC, Singsen AG, et al: Federal Employees Health Benefits Program: Utilization Study. (DHEW Publication No. (HRA) 75-3125). Washington, D.C., Government Printing Office, 1975

8. Gaus CR, Cooper BS, Hirschmen CG: Contrasts in HMO and fee-for-service performance. Soc Secur Bull 39(5): 3-14, 1976

9. Schwartz H: Conflicts of interest in fee-for-service and in HMO's. N Engl J Med 299: 1071-1073, 1978

10. LoGerfo JP, Efird RA, Diehr PK et al: Variations in surgical rates: An analysis of differences between medical care plans. Presented at the thirty-fifth annual meeting of the American Federation of Clinical Research, San Francisco, April 29 - May 1, 1978

11. Kessner DM, Kalk CE, Singer J: Assessing health quality - the case for tracers. N Engl J Med 288: 189-194, 1973

12. NICHD: Midtrimester amniocentesis for prenatal diagnosis: safety and accuracy. J Am Med Assoc 236: 1471-1476, 1976

13. Simpson NE, Dallaire L, Miller JR, et al: Prenatal diagnosis of genetic disease in Canada. Report of a collaborative study. Can Med Assoc J 115: 739-746, 1976

14. Stein Z, Susser M, Guterman AV: Screening programme for prevantion of Down's Syndrome. Lancet i: 305-309, 1973

15. Hagard S, Carter FA: Preventing the Birth of infants with Down's Syndrome: a cost-benefit analysis. Brit Med J i: 753-756, 1976

16. Kaegi EA: Prenatal Diagnosis and Selective Therapeutic Abortion in the Prevention of Down's Syndrome - An Evaluation Emphasizing Medical and Economic Issues. M.Sc. Thesis, McMaster University, Hamilton, Ontario, April, 1976

17. Culliton BJ: Amniocentesis: HEW backs test for prenatal diagnosis of disease. Science 190: 537-540, 1975

18. Hook EB: Estimates of maternal age-specific risks of a Down Syndrome birth in women aged 34-41. Lancet ii: 33-34, 1976

19. Donabedian A: An evaluation of prepaid group practice. Inquiry 6: 3-27, 1969

20. Weinerman ER: Patients' perceptions of group medical care. Am J Public Health 54: 880-889, 1964

21. Klarman HE: Effect of prepaid group practice on hospital use. Public Health Rep 78: 955-965, 1963

22. Roemer MI, Shonick W: HMO performance: the recent evidence. Milbank Mem Fund Q 51: 271-317, 1973

23. Luft HS: How do health maintenance organizations achieve their "savings"? Rhetoric and evidence. N Engl J Med 298: 1336-1343, 1978

24. Committee for the Special Research Projectin the Health Insurance Plan of Greater New York: Health and Medical Care in New York City. Cambridge, Massachusetts, Harvard University Press, 1958

25. Roemer MI: The influence of prepaid physicians' service on hospital utilization. Hospitals 32: 48-52, Oct. 16, 1958

26. Hill DB, Veney JE: Kansas Blue Cross/Blue Shield outpatient benefits experiment. Medical Care 8(2): 143-158, 1970

27. Densen PM, Shapiro S, Jones EW, et al: Prepaid medical care and hospital utilization: comparison of a group practice and a self-insurance situation. Hospitals 36 (22): 62-68, 138, 1962

28. Family Medical Care under Three Types of Health Insurance. School of Public Health and Administration, Columbia University. New York, Foundation on Employee Health, Medical Care, and Welfare, 1962

29. Somers AR: The Kaiser Permanente Medical Care Program: A Symposium. New York, The Commonwealth Fund, 1971

30. Stevens CM: HMO's -- What Makes Them Tick? Health Care Policy Decision Paper No. 8, Boston, Massachusetts, Harvard Center for Community Health and Medical Care, Program on Health Policy, Harvard University, 1973

31. Steinberg HR, Schroeder SA: The demography of technology: an analysis of endoscopy in California. Abstract, The Robert Wood Johnson Clinical Scholars Program National Meeting, October 26-29, 1977

32. Broida J, Lerner M, Lohrenz FN, et al: Impact of membership in an enrolled prepaid population on utilization of health services in a group practice. N Engl J Med 292: 780-783, 1975

33. Freidson E: Patients' Views of Medical Practice. Philadelphia, William F. Fell Company, 1961

34. Kimbell LJ, Yett DE: An Evaluation of Policy Related Research on the Effects of Alternative Health Care Reimbursement Systems. Los Angeles, Human Resources Research Center, University of Southern California, 1975

35. Brook RH: Critical issues in the assessment of quality of care and their relationship to HMO's. Journal of Medical Education 48: 114-134, 1973

36. Shapiro S, Weiner L, Densen PM: Comparison of prematurity and perinatal mortality in a general population and in the population of a prepaid group practice, medical care plan. Am J Public Health 48(2):170-187, 1958

37. Shapiro S, Jacobziner H, Densen PM: Further observations on prematurity and perinatal mortality in a general population and in the population of a prepaid group practice medical care plan. Am J Public Health 50(9): 1304-1317, 1960

38. Shapiro S, Williams JJ, Yerby AS, et al: Patterns of medical use by the indigent aged under two systems of medical care. Am J Public Health 57: 784-790, 1967

39. Jahiel RI: Large scale prenatal cytogenetic diagnosis in New York City. Service and Education in Medical Genetics. Edited by I. Porter, EB Hook. New York, Academic Press, 1979 (in press)

40. Jahiel RI: personal communication, February 1, 1979

41. Tannon CP, Rogers EM: Diffusion research methodology: focus on health care organizations. The Diffusion of Medical Technology. Edited by G Gordon, GL Fisher. Cambridge, Massachusetts, Ballinger Publishing Company, 1975

42. Shapiro S, Steinwachs DM, Skinner EA: Survey of Quality Assurance and Utilization Review Mechanisms in Prepaid Group Practice Plans and Medical Care Foundations. Health Services Research and Development Center. The Johns Hopkins Medical Institutions, Jan., 1976

43. Fordnery MT: Insurance Handbook for the Medical Office. Philadelphia, W.B. Saunders Company, 1977

APPENDIX I

GLOSSARY

AMBULATORY SERVICES: Those services not requiring hospital admission

BENEFIT: 1. The amount payable by the insurer toward the cost of various covered medical or dental services. 2. The medical or dental service or procedure covered by the program.*

BLUE CROSS: An independent, not for profit membership corporation providing protection against the costs of hospital care, and in some policies also protection against the costs of surgical and professional care.*

BLUE SHIELD: An independent not for profit membership association providing protection against the costs of surgery and other items of medical care. Some policies also offer protection against the costs of hospital care.*

CAPITATION: A reimbursement system providing for the payment of a fixed sum per person, regardless of the number of services used.

COVERAGE: The extent of insurance benefits.*

DUAL CHOICE: Refers to federal legislation (U.S.A.) that requires employers to give their employees the option to enroll in a local health maintenance organization rather than in the conventional employer-sponsored health program.*

DISCRETIONARY SERVICES: Those services subject to questions of medical judgment.

FEDERAL EMPLOYEES HEALTH BENEFITS PROGRAM: A large employer sponsored contributory health insurance program providing employees with a wide range of choices of health care plan.

FEE-FOR-SERVICE: The method of billing by physicians or dentists in private practice, whereby the doctor or dentist charges for each professional service performed.*

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*Quoted from Fordnery MT: Insurance Handbook for the Medical Office

GROUP HEALTH COOPERATIVE OF PUGET SOUND: A large health maintenance organization of the prepaid group practice model offering a complete range of medical services as well as hospitalization benefits.

HEALTH INSURANCE PLAN OF GREATER NEW YORK (HIP): A private non-profit insurance plan providing both inpatient and outpatient services on a prepaid basis. Care is provided by partnerships of physicians who practice in groups. Hospitalization is not provided.

HEALTH MAINTENANCE ORGANIZATION (HMO): An organization that provides for a wide range of comprehensive health care services for a specified group at a fixed periodic payment. An HMO can be sponsored by the government, medical schools, hospitals, employers, labor unions, consumer groups, insurance companies, or hospital - medical plans.*

INDEMNITY: A benefit paid by an insurer for a loss insured under a policy.*

INDEPENDENT PRACTICE ASSOCIATION (IPA): An organization of physicians sponsored by a state or local medical association, concerned with the development and delivery of medical services and the cost of health care....A key feature is its dedication to an incentive reimbursement system...on the basis of fee-for-service.*

INPATIENT SERVICES: Those services requiring hospitalization.

KAISER FOUNDATION HEALTH PLAN: The largest health maintenance organization in the United States. It provides both hospitalization and a full range of health services to an enrolled population on a prepaid basis. Health care is provided by closed panels of physicians functioning in the multispecialty group practice model.

NON-DISCRETIONARY SERVICES: Those services absolutely necessary in a given situation, and, therefore, not subject to questions of medical judgment.

OUT-OF-PLAN SERVICES: Those services not covered in the benefit package of a health plan.

PREPAID GROUP PRACTICE: A plan under which specified health services are rendered by participating physicians to an enrolled group of persons, with fixed periodic payments made in advance, by or on behalf of each person or family.*

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*Quoted from Fordnery MT: Insurance Handbook for the Medical Office[3]

PREPAYMENT: Medical insurance benefits paid for in advance, generally though monthly premiums.*

RANGE OF SERVICES: The spectrum of services included in a benefit package, e.g., inpatient services, outpatient services, emergency services, etc.

RISK: Any chance of loss.*

SUBSCRIBER: One who belongs to a group plan. Synonyms: enrollee, insured, or policy holder.*

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*Quoted from [illegible] Insurance Handbook for the Medical Office