

1973

# PSRO and the Relationship among Health Need, Elective Surgery and Health Status

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## Recommended Citation

Wennberg JE. PSRO and the Relationship among Health Need, Elective Surgery and Health Status. Conference Proceedings, Perspectives on Health Policy, Boston University Medical Center, 1973.

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## PSRO and the Relationships among Health Need, Elective Surgery and Health Status

John E. Wennberg

**Herbert B. Hechtman:** Our subject today is one of controversy, and I think that is probably the only statement I will make today that everyone will agree upon.

Preadmission certification is a component of the PSRO legislation (Public Law 92-603), but it has not been enforced, primarily because of the hue and cry of the medical community. The medical community has not been able to agree on certain principles that are required prior to the application of preadmission certification.

What does "preadmission certification" mean? And, why was it developed? Of course, the whole PSRO concept was designed to limit the use of the most expensive medical facility — the hospital. Preadmission certification limits input, or ingress, into that type of medical setting.

The problems with preadmission certification involve the definition of the requirements for certification. Professionals themselves cannot agree on the disposition of diagnostic categories — whether, for instance, ulcer disease should be treated in a hospital setting. Not every surgeon or internist will agree that a patient with a peptic ulcer of the stomach or duodenum should be treated surgically. On the other hand, let's say that everyone can agree that a given diagnosis such as a lump on the arm, should be treated surgically; but you will find no uniformity of opinion as to the proper setting for that treatment. That lump on the arm may be the size of a pea or the size of a watermelon, and, depending upon the locale of the hospital and the professional involved, operation on that pea or watermelon will occur in an outpatient or an inpatient setting.

Our first speaker is Dr. John Wennberg, whose primary position is senior associate in the Center for Community Health and Medical Care,

Harvard University. Dr. Wennberg did his medical training at McGill University, received his Masters in Public Health at Johns Hopkins and finished his medical training there in internal medicine. Then he traveled around the Northeast as assistant professor of medicine at the University of Vermont, and then as clinical associate professor of medicine at Dartmouth Medical College. He has a number of publications, and he has testified extensively before local, regional and national medical groups and governmental regulatory agencies.

**John E. Wennberg:** Geographic variations in the use of surgery pose a central challenge to the PSRO mission. They demonstrate that surgery involves choice, and raises issues of "health needs" and the "medical necessity" of the procedure we, as a profession, select to use. Will implementation of PSRO lead to reduced expenditures and better health of the population because unnecessary and sometimes hazardous surgery is stopped? Will effective procedures for more pressing health problems be substituted for those that are unnecessary?

A great deal of empirical evidence exists on variation in the use of elective surgical procedures. Pioneering work by Lembcke<sup>1</sup> demonstrated large differences in the rate of pelvic-organ removal through elective surgery in suburbs of Rochester, N.Y. More recently, Lewis<sup>2</sup> reported two- and threefold differences for common elective procedures between neighboring parts of Kansas for those enrolled in Blue Cross insurance programs. I have been associated with the development of an ongoing health-data system that records information on virtually all hospital admissions of Vermont residents. By analyzing these data according to the residence of the patients (regardless of which hospital they use), we have observed even greater variation in the use of elective surgery.<sup>3</sup> We have also studied characteristics of the residents of different areas and of the physicians who serve them. These studies shed some light on the nature of the market for personal health services and have direct relevance to the issues of health needs and medical necessity. I want to review briefly our findings and then discuss the relevance to PSRO. I am going to suggest that, because of uncertainty concerning the dimensions of *both* health need and the effects on health of elective surgery, quality-control mechanisms founded on institution-based statistics and on traditional process-oriented peer review cannot assure that patterns of surgical practices are (or are not) "medically necessary." Because of this uncertainty, PSRO should develop a strategy for investigating the natural variations in use of health care to determine answers concerning the relationship between health need, elective surgery and health status.

### The Vermont Data

To look at the relationship between people and their physicians, and variations in rate of use of health services, we have divided Vermont into 13 areas, by residents' use of hospital (Fig. 1). In each area, by far the majority of admissions are to local hospitals. Since 10 areas have only one hospital and the remaining three only two (but with overlapping physician staffs), the differences between areas must be considered to reflect local circumstances — either differences in the people or differences in the physicians. The differences in surgery are extensive. The overall rate varies twofold in the extreme, and individual procedures show much greater differences (Table 1). The largest difference we have observed is for tonsillectomy where the range between extremes in age-adjusted rate is over tenfold. The differences are striking for other procedures and are not limited to elective procedures as is demonstrated by the case of appendectomy. Nor are variations limited to surgical procedures. Reimbursements under Medicare for diagnostic X rays differed by 400 per cent over service areas; electrocardiograms by 600 per cent and laboratory services by 700 per cent.

Are there differences in the people living in the hospital service areas that might explain the observed variations in use of elective procedures? We recently had an opportunity to conduct a household survey to investigate the possibility that variations in procedure rates occurred because of differences in people's rate of illness, personal income and insurance status. Information was obtained from about 300 households in each of five geographically contiguous areas selected for survey because of known variations in use of services. Comparing these five areas, we could find no differences in the characteristics of the populations to explain their different use of health care. Using standard morbidity indices employed by the National Center for Health Statistics, no differences in illness rates were detected between areas. The extent of insurance coverage was the same. While there were some differences in income, they did not relate to differences in consumption of health care. These findings support the belief that health care needs and ability to contact the health care system are not appreciably different between different areas of the state.

We, in fact, found that in each area, on an annual basis, the percentage of the population contacting physicians was nearly identical; about 75 per cent of all people see a doctor at least once a year. This suggests that patient decisions to seek care for their health needs are about the same between areas. We also obtained some direct evidence that once a physician contact has been made, the large majority of Vermonters expect that

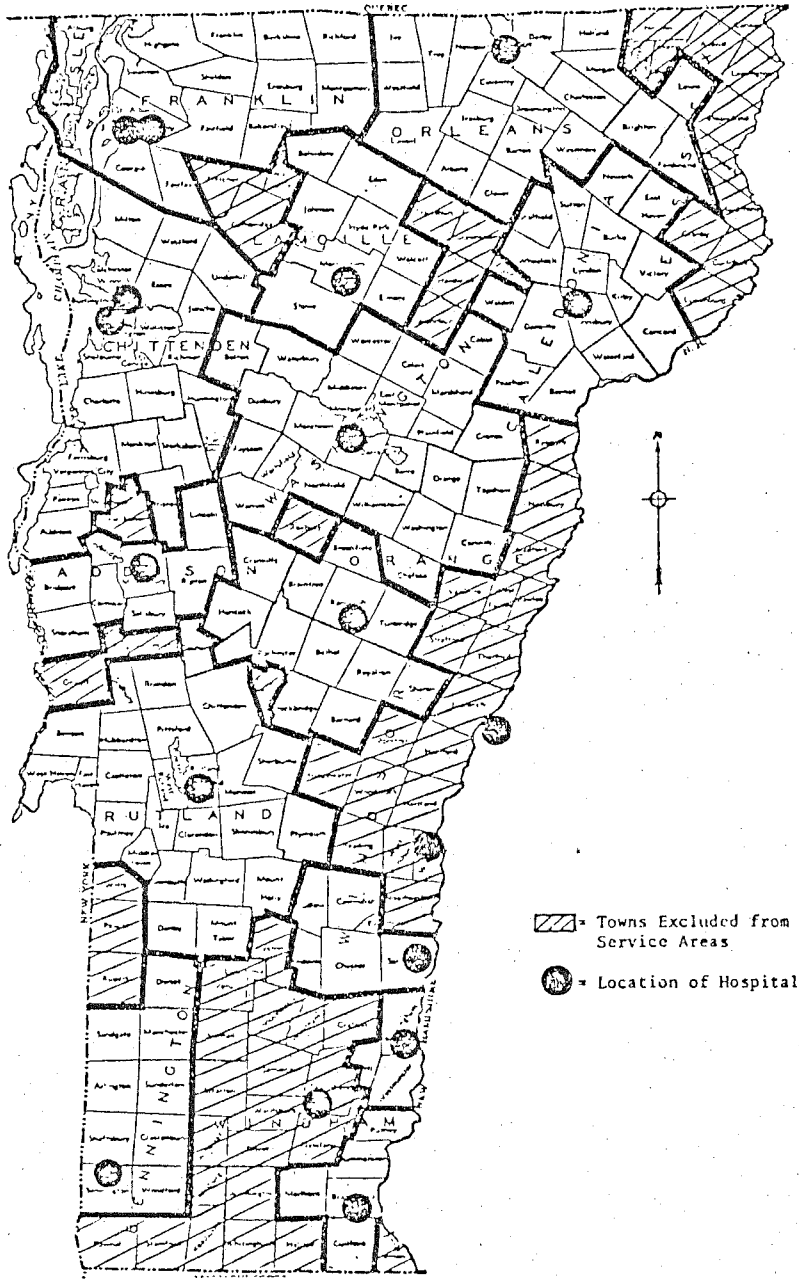


Figure 1: Outline Map of 13 Vermont Hospital Service Areas, 1969-1971.

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SURGICAL PROCEDURE	LOWEST TWO AREAS		ENTIRE STATE	HIGHEST TWO AREAS	
All Surgery	360	490	550	610	690
Tonsillectomy	13	32	43	85	151
Appendectomy	10	15	18	27	32
Hemorrhoidectomy	2	4	6	9	10
Males					
Hernioplasty	29	38	41	47	48
Prostatectomy	11	13	20	28	38
Females					
Cholecystectomy	17	19	27	46	57
Hysterectomy	20	22	30	34	60
Mastectomy	12	14	18	28	33
Dilation and currettage	30	42	55	108	141
Varicose veins	6	7	12	24	28

*Table 1. Variation in number of surgical procedures performed per 10,000 persons for the 13 Vermont hospital service areas and comparison populations, Vermont, 1969. (Rates adjusted to Vermont age composition.)*

the physician rather than themselves will decide the place where treatment occurs — and presumably the kind of treatment. In other words Vermonters expect their behavior in seeking care will correspond to the traditional patient role of reliance on professional judgment in assigning the amount of treatment and the place where it is received.

What about the role of the physician? Although people among the areas are about the same and they seek medical care in about the same proportion annually, they receive different kinds of care, at least partly because of differences in the physicians they contact or to whom they are referred. First, we found an overall (statistical) relationship between the characteristics of an area's physician manpower and rates of use of service. The more specialists, the greater was the expenditure for and use of hospitals (and, for general practitioners, vice versa); the more surgeons, the more surgery, and the more internists (and other physicians who do not do surgery), the more diagnostic tests. Second, we found that surgical procedures — in particular the elective procedures displayed in Table 1 — were allocated in a way which suggests that differences in judgment among individual surgeons play an important role in deciding which among the variety of elective procedures are in fact used. Although there is an overall relationship between the rate of surgery and the number of surgeons, two areas with identical age-adjusted surgery rates achieve that rate by treating considerably different kinds of problems. For example, the area highest in overall procedures in 1969 ranked among the highest areas in tonsillectomies, hernias and hemorrhoidectomies but among the lowest of the thirteen areas in appendectomies, cholecystectomies and hysterectomies. The area that ranked third in overall surgery was among the highest areas for appendectomies, cholecystectomies and hemorrhoidectomies but among the lowest for dilations and curettage and hysterectomies. Yet the evidence (albeit circumstantial) indicates that the distribution of problems is the same among areas.

This leads us to suggest that, at least in Vermont, surgeons do not allocate their professional workload across a range of health care problems, proportionate to population need and the relative numbers of surgeons. The preferences of individual surgeons rather than differences in patient illness or access to physicians, we believe, are a more likely explanation for the variations in procedure rates. Statistical correlations between certain diagnostic procedures and non-surgeons suggest this phenomenon is not limited to surgery. The bases for this behavior need to be further studied. They are, no doubt, complex, and may involve age, educational differences, or technical competence and skill in the performance of certain but not all procedures. But the important implication for

this discussion is that there is no consensus *even among the specialists themselves* on how to use the technologies of a particular medical specialty.

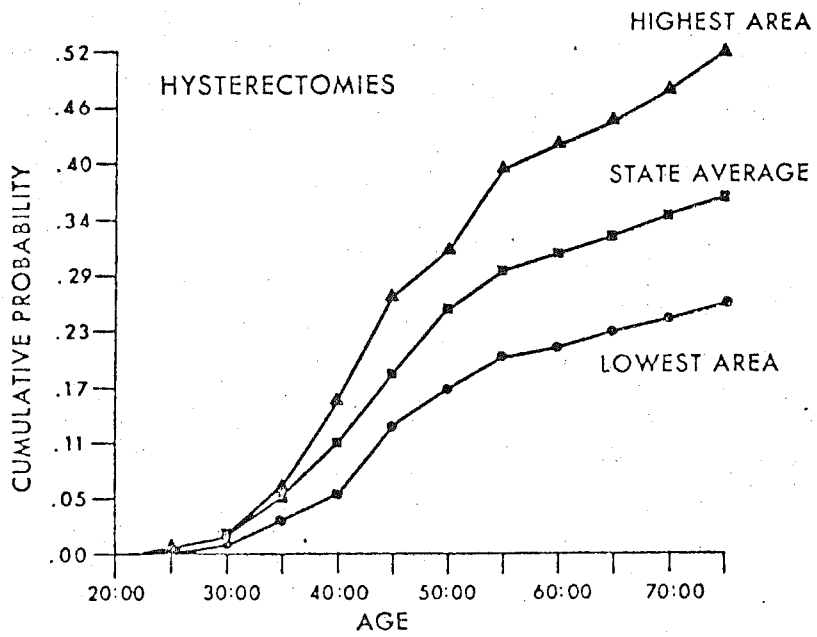
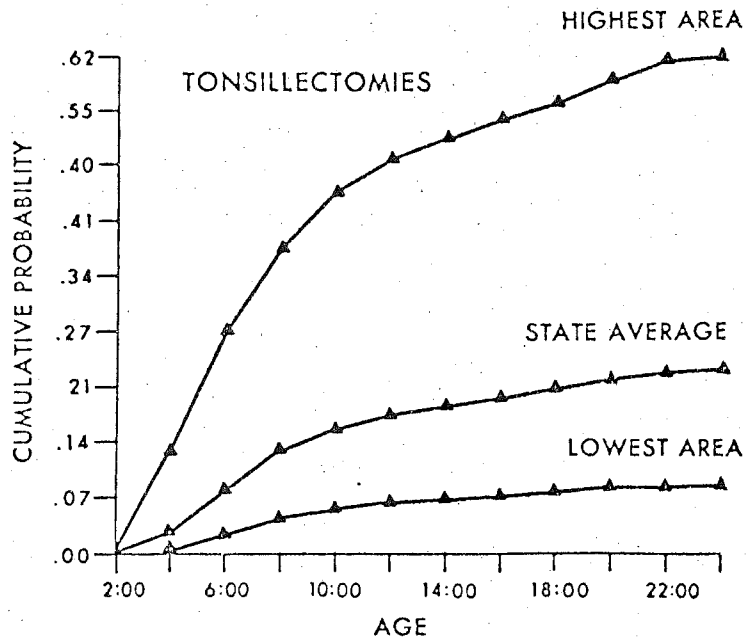
The impact of different levels of use of specific procedures on the residents of Vermont communities has been extensively documented. Based on three years data (1969-71), the area-specific accumulative probabilities of organ removal have been calculated for common surgical procedures. Figure 2 is reproduced from a recent report of the Cooperative Health Information Center of Vermont. It shows the probabilities for high and low rate areas for tonsillectomy, cholecystectomy and hysterectomy. If current rates continue, about eight per cent of resident children living in the low rate area lose their tonsils by age 20; in the high rate area, over 60 per cent of children will be tonsillectomized by the same age. The range in the probability of resident's loss of gall bladder by age 75 is 10 per cent to 30 per cent; for females, the corresponding figure for uteri is 23 per cent to 52 per cent. Because many, if not all, of the procedures which show marked variations have not been closely studied under controlled field trial conditions, there is little objective evidence about which judgments are "correct" in the sense of which leads to more "health" among survivors of the procedures. The costs, however, in terms of variations in expenditures and in terms of immediate case fatality rates are substantial.

#### PSRO and Medical Uncertainty

Will the processes of review initiated under PSRO reduce our uncertainty about the health value of elective surgical procedures? As we asked in the beginning, will they lead to effective use of medical care for more pressing health problems, or result in the reduction of expenditures and/or use of unnecessary and sometimes hazardous procedures?

I believe the success or failure of PSRO will depend on how closely it pays attention to the problem of end results. If the findings and interpretations of the Vermont study are accepted, we must recognize that there are important ideological and behavioral aspects to current patterns of choice of therapies and that, as a profession, we are uncertain about the health impact of many alternative choices. If PSRO review strategies lead the profession to substitute for individual physician judgments the "averaged" opinion of several physicians — either through "statistical averages" or through process-oriented standards and guidelines such as might be produced by the Delphi techniques, I am not at all sanguine about the prospect. Let me give two reasons why. First, the statistics that are usually available to PSRO tell almost nothing about the impact of





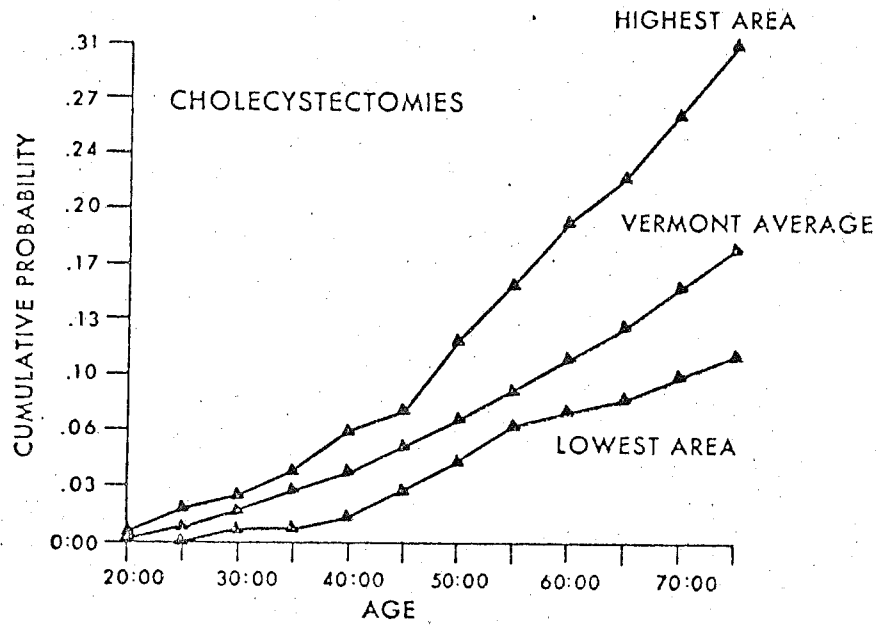


Figure 2: Probabilities of specific surgical procedures by given age, highest and lowest areas, and state average for 13 Vermont hospital service areas, 1969-1971.

clinical decision making on the population at risk. Statistical averages that derive from "numerator" data tell us something about an individual institution, but nothing about its effect and the effect of other institutions on the residents of a particular community. We can know the average length of stay for a cholecystectomy at a particular hospital, but not the probability of surgical removal of gall bladder in the community the hospital serves. We can learn something about the case fatality rate for surgery at a given hospital, but nothing about the possible effects on population longevity related to variation in the per capita use of surgery. Nor do these statistics substantially help with such elementary measurement problems as knowing how many dollars are being expended: variations in the per capita volume of services delivered are often more important in determining expenditures than are differences in the price of service or such efficiency indicators as length of stay in hospital or average occupancy of hospitals.\*

Secondly, process standards and guidelines for care which are developed by group consensus techniques such as Delphi need to be understood for what they are: hypotheses rather than established truths concerning the relationship between health-care processes and end results. These hypotheses will often need careful field studies to see if, in fact, things are as some people think. In the long haul, the way out of our uncertainty about the relationship between many specific medical and surgical procedures and health status is not to "correct" individual behavior to correspond to the collective opinion of a review committee. On objective analysis, this opinion will often be as uncertain as the individual's con-

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\* The level of correlation between institutional indices and per capita expenditures is surprisingly low among the 13 hospital service areas. The institutional indices, based on weighted average of local hospital experiences show the following:

	2	3	4
1. Per cent occupancy	.57	.00	.07
2. Average length of stay		.48	.46
3. Average day costs			.68
4. Per capita expenditures			

On the other hand, the correlation between hospital employees per capita and expenditures was .91. The statistics suggest that cost lowering strategies should be directed at review of employment practices. Concentrating the review process on length of stay will not substantially reduce expenditures unless it simultaneously leads to overall reduction in volume of service and employment. See reference 3 for methodology used in estimated expenditure and employment rates.

cerning the implication of one versus an alternative course of action. The speciality composition and individual preferences of the cohort of physicians on which this opinion is based will greatly influence the nature of the consensus. Further, it will vary from place to place and we can expect from the process neither uniformity nor a reduction in our uncertainty concerning the relative value of the many approaches to the delivery of health care.

I believe the first step toward clarity is to agree that medical necessity be interpreted in terms of the relationship between health care and health rather than in terms of the correspondence between the individual and collective judgments.

### A Strategy for Reducing Uncertainty

I suggest that the PSRO program should be directly involved in the social and technical problems of detecting what is the relationship between health care and health. When the value of specific procedures commonly used in medical practice is obscure or controversial — as must be assumed to be the case when procedure rates vary as widely as we now know they do — PSRO should serve as the structure for implementing studies to answer outstanding questions about their value. How an investigative strategy might be implemented through PSRO needs a great deal of thought and debate. As an opener, let me suggest an approach for identifying and pursuing a problem in end-result evaluation. It is based on successive steps for 1) identifying natural populations which exhibit puzzling variations in use of health care, 2) characterizing the limits of uncertainty through analytic or observational studies, 3) resolving remaining uncertainty through clinical trials.

1. By using population-based data, populations can be identified which appear to be similar in health related demographic variables but which are receiving varying amounts of a particular kind of care. The high and low tonsillectomy areas (Figure 2) are examples of the kind of natural experiments in use of health care that need to be evaluated. These communities are closely related ethnically and geographically, but differ markedly in exposure to tonsillectomy. Are people better off in the high or in the low areas? PSRO should find out.
2. Physicians participating in their PSROs should engage in analytic and observational studies to characterize the limits of uncertainty concerning the health value of different levels of procedure use. Using available data, the probable outcomes for populations subjected to sur-

gical therapy at the high and the low rates should be quantitatively estimated. The costs should be added up, including the dollars, the loss of life associated with intensive risk of surgery and estimates of the non-fatal morbid complications. The schedule of benefits, particularly those based on projections from randomized clinical trials, should be estimated. Based on the contrasts provided between costs and benefits by such an analytic review, a PSRO may conclude that substantial end-result information is available about use of the procedure, and consensus will emerge. Further observations on variations in procedure rate should provide evidence of how this consensus has, in turn, influenced behavior. But data to support strong conclusions concerning the risk and benefits of various levels of use of surgical procedures may only rarely be available. PSROs should be prepared to undertake observational studies to further characterize health needs, risks and benefits. Some observations on risks can be made by appropriate analyses of hospital discharge abstracts. Others will require more direct observations on the population at risk to see if differences exist in the distribution of morbidity or benefits imputed to the procedure. In the case of tonsillectomy, do school children in high T&A rate areas have less absenteeism? Less hearing loss, etc? From this investigation, a specific hypothesis about the relationship between T&A and population health status should emerge. If no differences are found between populations in the distribution of benefits, then the level of uncertainty about the value of the procedure is high at any observed rate. On the other hand, if differences exist between areas which suggest unmet surgical need in low-rate areas, then there is some presumptive evidence of end-result differences.

3. It is important to know if detectable differences in need or end-result indicators do or do not exist between apparently similar populations with widely varying exposure to a procedure. This more closely specifies the limits of uncertainty concerning the value of the procedure. In some instances it may be sufficient for the problem at hand, and professional consensus will emerge: it may be clear to all after examination of the evidence that there is no therapeutic benefit for T&A at the high level. Or, uncertainty may persist and call for random trials to further clarify the situation. Random clinical trials can be conducted under PSRO auspices and ought to exploit the fact that certain physicians have inclinations toward or away from specific procedures. It is in this context that I would like to suggest that a preadmission certification program might work. In instances where dis-

agreement persists about the value of procedures, both patient and physician may find protection in a strategy that pairs physicians with known opposite biases for deciding jointly to assign patients to study groups. For T & As a feasible study could employ a pediatrician and a surgeon. In instances where they disagree on treatment, patients would be randomly assigned and evaluated prospectively.

There are obviously numerous technical difficulties in this or in any approach to detecting end-result relationships. Without doubt, PSROs will need help from academic centers. There are also difficult problems involved in obtaining informed consent but I believe that when honest, open disagreement on the value of a procedure exists, patients can be adequately informed of this uncertainty and some will agree to randomization. There are perhaps even greater problems in convincing physicians that professional responsibility extends to assurance of end-result value. I do not wish to underestimate these problems. In my judgment, our pervasive uncertainty concerning health need and the effect of elective surgical procedures on health status makes it important for the professions to overcome these difficulties.

#### References

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