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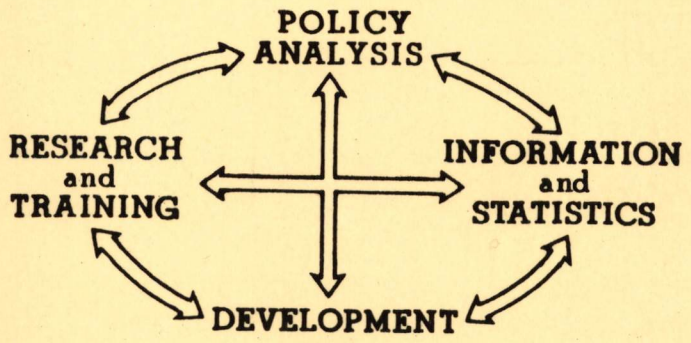
IMPROVING HEALTH CARE

THROUGH

RESEARCH AND DEVELOPMENT



DRAFT INTERIM WORKING PAPER

PANEL ON HEALTH SERVICES RESEARCH AND DEVELOPMENT

PRESIDENT'S SCIENCE ADVISORY COMMITTEE

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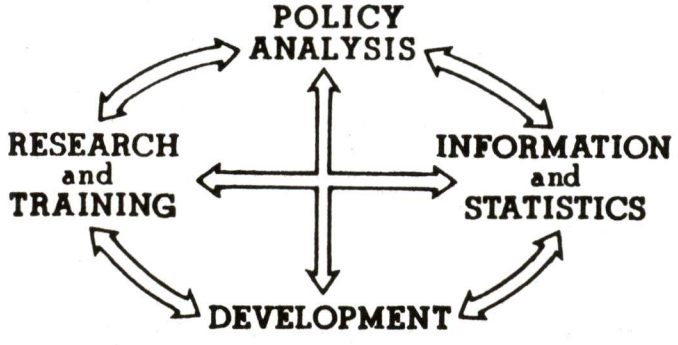

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PANEL ON HEALTH SERVICES RESEARCH AND DEVELOPMENT

Edward J. Connors, M.H.A.	Director, University of Michigan Hospital
Paul M. Densen, Sc.D.	Director, Center for Community Health and Medical Care, Harvard University
Victor R. Fuchs, Ph.D.	Professor of Economics and of Community Medicine, Graduate Center and Mount Sinai School of Medicine, City University of New York
Robert J. Haggerty, M.D.	Professor of Pediatrics, University of Rochester
Jean L. Harris, M.D.	Executive Director, National Medical Association Foundation, Inc.
Theodore P. Heuchling, S.M.	Vice President, Arthur D. Little, Inc.
Leonard Laster, M.D., ex officio	Assistant Director for Human Resources, Office of Science and Technology
William R. Marshall, Ph.D.	Dean, College of Engineering, University of Wisconsin
Baldwin Maull, LL.B.	Former Chairman, Marine Midland Banks, Inc.
David Mechanic, Ph.D.	Professor of Sociology and Director, Center for Medical Sociology and Health Services Research, University of Wisconsin
Edmund D. Pellegrino, M.D.	Vice President for the Health Sciences, State University of New York at Stony Brook
David Z. Robinson, Ph.D.	Vice President, Carnegie Corporation of New York
Lloyd H. Smith, M.D.	Professor of Medicine, University of California at San Francisco
William A. Spencer, M.D.	Director, Texas Institute for Rehabilitation and Research and Professor of Rehabilitation, Baylor College of Medicine
John G. Truxal, D.Sc.	Vice President, Polytechnic Institute of Brooklyn
Kerr L. White, M.D., Chairman	Professor of Medical Care and Hospitals, Johns Hopkins University

Staff

Jane H. Murnaghan, Research Associate
Clifton R. Gaus, Sc.D., Assistant Professor
Allyson D. Avery, Research Assistant

Department of Medical Care and Hospitals, Johns Hopkins University

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IMPROVING HEALTH CARE THROUGH RESEARCH AND DEVELOPMENT

Report of the
President's Science Advisory Committee Panel on
Health Services Research and Development

I. SUMMARY

The day is not far off when the President of the United States will be held as responsible for the health of the nation as he is for its economy. The Executive branch of our government must have the capacity to anticipate problems in the provision of health services, to formulate coherent and coordinated policies and standards for our pluralistic health care system, and to stimulate the development, testing and evaluation of new forms of organization and technology that will improve the health care system and the health status of the population in the future. To accomplish this, we must have a strong Federal framework for health services R & D, experienced professionals committed to the field, and a broad foundation of information, knowledge, and ideas.

Little disagreement exists about the reasons why change must occur in the health care systems of the country. As summarized in the President's Health Message of February 1971, the problems center around maldistribution of resources, inequities in accessibility and availability of care, wide variations in quality, and the rapidly increasing burden of medical costs. There is, however, wide divergence of opinion about how things should change. The purpose of health services R & D is to provide workable alternatives and solutions to these problems.

The charge of the Panel on Health Services Research and Development was to examine critically the current contributions and future potential of health services

R & D in improving the health status of the nation and to recommend ways in which to use this R & D resource more effectively. In the past eight months, we have reviewed extensively the current status of the field and on-going efforts in government, industry, universities, non-profit organizations and foundations. We have met with representatives from the government agencies responsible for major health programs and have examined their current activities and plans for the near future. We have consulted a variety of persons with experience in the field, both in the United States and abroad, have reviewed the reports of other major panels, scientific groups, and individual investigators, as well as materials from the National Academy of Sciences, the National Academy of Engineering and other organizations. We have given special attention to the problems that arise in applying the traditional R & D approach of science and technology--the type of effort that has been eminently successful in the fields of defense, space and nuclear energy--to what is essentially a large and complex social system and a service industry.

Our general conclusion is that we have made substantial progress in the United States in developing our capacity for health services R & D. But we are fast being overtaken by social and political forces and will have to move promptly to keep up with the growing public and private demand for better information about the health care system and for effective measures to correct its inequities and inadequacies.

In the view of the Panel, the present movement to reorganize and improve our health care system requires a major commitment to health services R & D. It is important that we concentrate our available talents and resources for health services R & D on the key issues, and we have outlined in the first section of our report the opportunities as we see them, with examples of the types of questions that need

to be asked and answered. The heart of the problem, however, is not the current content or focus of health services R & D, but the need to promote a better understanding of this process itself, its uses and limitations, and to strengthen this process so that the Federal government has a powerful tool for dealing with health policy issues and can provide a strong measure of leadership for the country's health care system.

The major challenge as the Panel sees it is to use both human and financial resources more effectively. In meeting this challenge, the essential needs are clarification and restructuring of the different tasks involved, stronger Federal leadership and coordination, and greater emphasis on expanding the information base, the intellectual content, and the professional capability.

We have therefore built our recommendations around an analysis of the four primary functions involved in health services R & D: policy analysis, information and statistics, development, and research and research training. First responsibility for each of these functions must be fixed and strong organizational settings provided for them in the Federal government. Then we must devise constructive methods of coordinating the four functions. Finally, we must widen the debate on the problems and issues in the provision of health care so that both the private and public sectors are more responsive to health services R & D and the process of change. If these steps are taken to strengthen the continuing process of health services R & D, we will have a far more effective capability for dealing with the country's health care problems. We believe our strategy for change is practical and administratively feasible; it does not depend upon major Federal reorganization or large amounts of new Federal funds.

Recommendations

1. The Panel recommends that a strong POLICY ANALYSIS GROUP of permanent civil servants with professional training be created in the Office of the Secretary of Health, Education, and Welfare, and that one or more extramural INSTITUTES FOR HEALTH POLICY STUDIES be established.

If national decision-making in health areas is to be informed and the costs of "fire fighting" and "muddling through" avoided, it is essential to maintain a policy group that anticipates important issues, studies alternatives, and stimulates long-range analytical studies. In our review, it became clear that the Federal government needs more resources to support the decision-making process. We propose that a permanent, nonpartisan group of civil servants with professional training be created to assist the Secretary of Health, Education, and Welfare and his assistants in dealing with problems affecting the nation's health care system.

Such a group, to be effective, must have a long-range policy analysis component that is immune from short-term operational and political considerations and can provide the intellectual climate for thorough consideration of alternatives and the development of sound policies in health. The proposed Policy Analysis Group should, therefore, have one division for long-term analysis.

In addition, we recommend the establishment of at least one free-standing Institute for Health Policy Studies largely supported with Federal funds. This Institute, although primarily responsive to the needs of the Secretary of Health, Education, and Welfare, should have an independent board and the freedom to initiate its own analyses. One location for such a unit might be the newly established Institute of Medicine of the National Academy of Sciences. Foundations and other

institutions should be encouraged to develop additional policy study groups around the country.

2. The Panel recommends that a BUREAU OF HEALTH STATISTICS, with a COMMISSIONER appointed by the President, be created in the Office of the Secretary of Health, Education, and Welfare and that the Secretary immediately establish a TASK FORCE to define the Bureau's specific responsibilities and functions and its relations to other units of the Department and to other Federal agencies, and to determine its initial staffing needs and budget.

The evolution, implementation, and evaluation of policies to improve the nation's health care require sophisticated information and statistical systems that provide national and regional data on important health indicators, distribution of manpower, facilities, services and costs, and a variety of other factors relevant to the workings of health services systems. The existing information systems are neither sufficiently developed nor adequately responsive to major health policy issues. Moreover, it was evident to the Panel that efforts to develop the health information system are fragmented among different agencies with insufficient communication or collaboration. Data-gathering efforts even within single agencies are not well coordinated, and the lack of uniform definitions and methods make it virtually impossible to make useful comparisons and evaluations.

We propose that responsibility for Federal health statistics be both centralized and elevated in a new Bureau of Health Statistics, with a presidentially appointed Commissioner. The new Bureau should be given broad authority to collect its own statistics, to set standards for data collection by operating health programs and institutions, to develop new information systems, and to coordinate

the health statistical resources of the Federal government. Because the creation of this new Bureau will affect in varying degrees the existing statistical components of a number of departments and agencies, we propose that a Task Force be set up to define its specific responsibilities, to work out its new relationships, and to establish its initial budget.

3. The Panel recommends UNIFYING LEGISLATION AND APPROPRIATIONS to support the newly created DIVISION OF HEALTH CARE DEVELOPMENT within the Health Services and Mental Health Administration of the Department of Health, Education, and Welfare.

Until recently, health care development activities have been highly fragmented among the units of the Health Services and Mental Health Administration as well as among other agencies. There has been little collaboration among the different categorical programs, and the net effect has been a piecemeal attack upon the complex problems of bringing about changes and improvements in our highly diversified health care system. The new direction in national health policy calls for an integrated approach to problems of providing health care. The Panel enthusiastically supports the movement towards consolidation of resources and talents in the new Division of Health Care Development in keeping with this new approach. We believe that a greater return on our investment in health services development can be realized if we coordinate the activities of special projects like the consumer-oriented Comprehensive Health Planning Agencies and the provider-oriented Regional Medical Programs. We recommend unifying legislation and appropriations to support strong management of the Division.

Some of the work of the Division should be conducted through closely

affiliated but decentralized Health Care Development Units under Federal contract. Such units should be directly connected with operating institutions, agencies or organizations and have the capacity to modify service arrangements in order to develop, test and evaluate new systems of health care.

4. The Panel recommends that a NATIONAL HEALTH CARE RESEARCH INSTITUTE be created within the Health Services and Mental Health Administration of the Department of Health, Education, and Welfare.

With the current ferment in health services, we must not lose sight of the fact that we are critically short of first-rate professionals in the field of health services R & D and that existing analytical concepts, indicators and methods are not sufficiently developed to answer many important questions bearing on the future of health care organization. In giving attention to immediate public concerns, and in using the knowledge we now have as effectively as possible, it would be unfortunate to neglect the basic resources essential to the long-range vitality of our evolving health services system. It is the Panel's conclusion that the present mode of funding basic research and research training by the National Center for Health Services Research and Development and by the Health Services and Mental Health Administration does not adequately protect these long-range interests from immediate pressures and demands. We recommend that a separate Institute be established for research and the related function of training new research professionals, analogous to the successful model used in the biomedical field by the National Institutes of Health for thirty years.

We further recommend that decentralized, independent Health Care Research Centers be set up in universities and other environments to expand the methodology

for health services research and to study on a long-term basis such issues as the best measures for improving health maintenance and education, accessibility of care and manpower distribution, financing and quality. These centers, depending on their mission, would not necessarily be tied directly to health care delivery systems. They would provide settings for interdisciplinary research and the training of professional investigators.

5. The Panel recommends that the EXECUTIVE OFFICE OF THE PRESIDENT assume responsibility for COORDINATION of the Federal government's investment in health services R & D through administrative and budgetary mechanisms.

Our Panel encountered major failures in communication and coordination among various agencies in the Department of Health, Education, and Welfare and among the Federal departments concerned with health services, such as the Office of Economic Opportunity, the Department of Defense, and the Veterans Administration. In our view, these failures in communication and coordination constitute a central weakness in the health services R & D effort. Our previous recommendations provide workable structures for the four major functions of health services R & D; it is essential that these functions be coordinated at policy-making levels to insure that the R & D process as a whole works effectively. Similarly, it is essential that units with related functions in Federal agencies share their experiences and coordinate their efforts if we are to make the most of our national investment in health services R & D.

On the Federal level, we recommend that the Executive Office of the President assume responsibility for interagency coordination and suggest a number of alternative ways for carrying out this responsibility. For the Department of Health,

Education, and Welfare, we recommend a special R & D coordinating committee chaired by the Secretary.

6. The Panel recommends, as a means of enhancing the potential of health services R & D, that an independent NATIONAL COMMISSION ON HEALTH SERVICES be established and funded by a consortium of PRIVATE FOUNDATIONS to consider organizational, administrative, and educational arrangements, incentives, and support mechanisms that will encourage and assist universities, health care institutions, professions, government, and industry in improving the health care system and the health services of the country.

The Panel has devoted much of its attention in this report to the Federal government's role in health services R & D, because the Federal government controls most of the money for this purpose, and because it is in the strongest position to exercise leadership. We recognize, however, that responsibility for the provision of health services and for the conduct of health services R & D resides primarily in the private sector. We believe that there is an urgent need for further steps to make the private sector more receptive to the process of change and to involve it more deeply in this process. In the long run, success of the health services R & D effort depends upon the active collaboration of universities, health care institutions, professions, state and local governments and industry in clarifying the public issues in health care, in establishing the objectives for health services R & D, and in introducing improvements in the health care system.

We recommend that a consortium of private foundations set up a national commission to examine the entire field of health services, not isolated components like medical education, financing, group practice or manpower. Within this

broad context, the Commission should consider specific steps that will encourage health services institutions, educational centers, agencies and organizations to be more responsive to the present and future health care needs of the country.

II. OPPORTUNITIES FOR HEALTH SERVICES R & D

Successful application of science and technology has helped the United States to achieve major national goals like the exploration of outer space and the exploitation of nuclear energy--accomplishments made possible as a result of the nation's considerable investment in research and development. Now public concern is focused on the adequacy of our social systems. The expectation is that R & D can contribute substantially to improvements in the quality of our domestic life. Prominent among the areas of concern is health and the health services system.

1. Process of Health Services R & D

Health services R & D is an iterative process designed to influence a complex social system. It encompasses a wide range of activities and methods from fundamental research, the collection of statistical information, applied research, development, testing and evaluation, to policy analysis and long-range planning. Its overall objectives are to improve the provision of personal health services and to make more efficient use of scarce resources. Usually personal health services are differentiated from environmental health services, the distinction being that the latter generally do not involve direct contact between health professionals and individuals. Included in personal health services is the full spectrum of health care, from preventive measures through arrangements for treatment, to restoration of function and social rehabilitation.

To be most useful the process of health services R & D must be responsive to present and future policy issues and have access to the necessary data and, in many instances, to operating health care programs, institutions or systems. It should not be expected that R & D will always provide information of specific

value to policy-makers in choosing among competing options. Rather it should be expected that R & D will alter the climate of decision-making and the manner in which the issues and problems are conceptualized by decision-makers.

No definitive list of problems for research and development can be prepared in the abstract. Political, social and operational realities govern precise choices and priorities. Nevertheless, a classification scheme for health services R & D is possible (Appendix C) and the Panel can identify certain problem areas requiring research and development in the immediate future. The following sections illustrate these areas with representative examples of the questions that need to be answered.

2. Problems of Consumer Behavior

a. How do different deductible and co-payment provisions in health insurance plans influence the use of preventive, curative and rehabilitative services?

b. To what extent do the attitudes and expectations of patients influence the use of services and the outcomes of the services? What determines compliance with therapeutic regimens?

c. How much and in what ways does health education modify the need for and use of health services?

d. What are the precise factors that give rise to the widespread national concern about the accessibility of medical care? Are they related to problems of organization (e.g., office hours, night calls, house calls and weekend coverage); distribution (e.g., travel times and availability of ambulance services); appropriateness of the care (e.g., expensive

super-specialty care provided for primary care problems and the need for repetitive self-referrals); financing (e.g., costs of care and complexities of insurance coverage and claims processing); or communications (e.g., language and social barriers between patients and health professionals)? Which of these problems is important to whom? What can be done about them?

e. What is meant by consumer participation? How should it be recognized and exercised? What is the impact of varying arrangements for consumer participation on the efficiency and responsiveness of health care organizations and use of services?

3. Problems of Provider Behavior

a. How do different types of organizational arrangements affect the productivity and efficiency of physicians, dentists, nurses, and other health workers (e.g., solo, partnership and team practice, multi-specialty groups, single-specialty groups, and rotating assignments to satellite clinics)?

b. What are the effects on their productivity and efficiency of different mechanisms for paying physicians (e.g., fee-for-service, capitation, sessional stipend and salary) and different incentives (increments for volume of services provided, referrals generated, night, weekend and "shift" work, and pooled bonuses)?

c. Does the threat of malpractice litigation (the "defensive" practice of medicine) influence the volume, frequency and nature of services provided?

d. Does peer review and other forms of quality assessment result in changes in the clinical performance of physicians? Does it improve the end results of care?

4. Problems of Organization

a. What alternative organizational arrangements are possible and what would be required to assure everyone a feasible point of entry into a responsive health care system and prompt access to a full range of services?

b. Which services are best organized on the basis of populations defined by geography or political subdivisions (e.g., blood banks, emergency care services and rehabilitation services)? Which are best organized on the basis of populations defined by enrollment and contractual arrangements (e.g., prepaid comprehensive care through group practices and health maintenance organizations)?

c. What is the most appropriate way to meet basic mental health care needs in patients seeking primary care?

d. How do mental health centers, alcoholism and drug addiction centers relate to other parts of the health care system?

e. How do staff ratios of physicians, nurses and aides per hospital bed vary with numbers of patients treated per bed per year (i.e., "throughput", one of the few readily available measures of hospital productivity)?

f. What are the optimal sizes for hospitals? How should the location of hospitals be determined in relation, for example, to populations, to providers, to other hospitals or to market areas? Should single-specialty hospitals be built (e.g., mental health, cancer, rehabilitation and veterans hospitals)?

g. What do hospitals actually accomplish? What are the ranges, variances, and medians among hospitals and nursing homes of different case-fatality rates (i.e., number of deaths per thousand patients treated by diagnosis, age and sex); operative rates (i.e., number of patients operated on per thousand patients by diagnosis, age and sex); procedure rates (i.e., major procedures performed by diagnosis, age and sex)? How do charges vary by episode of illness or admission, by diagnosis, age and sex among hospitals within a community and between communities?

h. To what extent are hospital beds used inappropriately? What are alternative solutions to the use of hospital beds? Is home care a useful form of service; if so, how useful, under what circumstances and auspices and for whom?

i. How should potential savings in operating and capital costs for hospital beds be attributed to various projections in the growth of health maintenance organizations? What is the optimal enrollment for a health maintenance organization or a health care corporation? How is competition among providers of care best encouraged and required?

5. Problems of Efficacy

a. What would be the benefits of preventive health care (e.g., health maintenance systems versus complaint response systems) on the health status of populations and the future requirements for health services?

b. What are the relative costs and benefits of identifying and intervening with curative or restorative care at different stages of selected medical problems such as chronic mental disease, chronic lung disease,

diabetes mellitus, rheumatoid arthritis or childhood behavioral disorders?

c. What are the relative costs and benefits of different treatment plans or patient management regimens for major chronic and social disease categories such as cardiac failure, essential hypertension, chronic renal failure, drug abuse, alcoholism or child learning disabilities?

d. What is meant by the term "quality of care"? What are its individual and collective dimensions? What are its qualitative and quantitative aspects? How can social components be distinguished from psychological and biological components?

e. How can the outcome of health care be measured and evaluated for individual patients, for institutions, for professionals, for administrators, and for the public? Is the slow development of useful measures due to lack of interest, lack of information, lack of analytical capability or lack of problem definition? What standards should be employed? Who should establish and enforce them?

f. What are the costs to individuals and society of inappropriate care, (e.g., elaborate diagnostic exercises for trivial complaints, or repetitive patient self-referral)? To what extent does patient dissatisfaction contribute to unnecessary or excessive utilization of physicians, hospital outpatient departments and emergency rooms?

g. How can the health status of individuals and populations be measured? Can a single reliable index of health status or several indices and profiles useful for purposes of health care planning and evaluation be

developed? Can measures of health, rather than traditional measures of ill-health, be used in measuring health status? Can a general unit be used to combine a number of highly diverse components in the way that monetary units are used in economics? Is the use of duration of disability or some related unit of functional impairment as a common unit for this purpose a possibility in health?

h. What is known about standards for the efficacy, reliability, safety, calibration and maintenance of therapeutic and diagnostic instruments, materials and devices? To what extent can or should national standards for diagnostic and therapeutic care, equipment, devices, facilities, products and drugs be promulgated and enforced?

6. Problems of Manpower

a. What do doctors do in their offices and clinics? What could be done by other health workers? What kinds of problems are brought to primary care physicians? What resources are needed to manage these problems? How do patients move through health care systems?

b. What can be learned from schools of osteopathy about the preparation of family physicians, since most of their graduates enter this specialty?

c. How is the use of physician extenders likely to affect the costs and quality of health care? In what organizational settings and for what populations are these effects optimized?

d. What incentives are effective in changing the geographic and specialty distributions of physicians?

e. What position should be taken towards chiropractors' services in public programs in relation to past history and present acceptance? (New York Medicaid spent over $1 million on chiropractic services in 1971.)

f. What kinds of people with what kinds of training are required to plan, manage, monitor and evaluate health care systems and institutions of different kinds? How many are needed? How and in what institutions should they be trained? How should their training be supported?

g. How are knowledge, skills and attitudes acquired through formal education related to clinical behavior and competency? What learning modalities and environments are most effective? What knowledge is essential for various types of clinical practice?

7. Problems of Financing

a. What is known about financial mechanisms that encourage prompt, prudent and responsible use and responsive provision of care at the time of earliest need and maximum benefit?

b. How should costs, charges, services and outcomes or end results of care be linked so that meaningful cost-benefit analyses can be conducted?

c. What are the requirements for capital financing of health care institutions and systems? What are the effects of equity versus debt capitalization?

d. How does the mode of hospital ownership (e.g., profit, not-for-profit or non-profit), form of control (e.g., voluntary, public, proprietary or religious), organization pattern (e.g., solitary, merger, chain or satellite relationship) influence use of services, productivity and end results of patient care? How should the boards of hospitals and health care systems be chosen? To whom are the boards accountable?

e. What is the impact of ownership of facilities versus contractual arrangements on the use, costs and quality of services provided by group practices and health maintenance organizations?

f. What economies are associated with merger, shared services, and leasing versus purchasing of equipment and services?

g. What are the appropriate methods for costing the various proposals for national health insurance? What are the costs of these proposals under certain assumptions regarding the growth of health maintenance organizations, changes in the supply of manpower and continuing price controls?

h. How should private and voluntary health insurance be regulated? How should premiums, benefits and services be linked?

8. Conditions for Health Services R & D

Few of these questions can be answered easily. For many the data are not currently available, but the capability and the need exist for developing the necessary information systems. Other studies require control of the physical resources in ways that will permit variations in their use and staffing patterns and even in their physical configurations as a basis for experimentation and evaluation. In these instances the costs and time requirements will be much greater than is currently realized. Funds judiciously employed, however, to establish experimental settings where new developments can be initiated and evaluated offer great promise for supporting the pluralism and diversity that characterizes health care in the United States. They offer also the future prospect of constructive change, scientifically supported, carefully tested and critically evaluated.

It is the purpose of this report to determine how we can best encourage and support the study of some of these questions and help to resolve the problems that generate them.

III. BACKGROUND OF THE RECOMMENDATIONS

1. Need for Health Services R & D

Health care has grown to be a major national enterprise. It is the country's third largest industry, employing about four million people. National expenditures for health care are now greater than those for education. In 1971, they reached $75 billion, or 7.4 percent of the gross national product, and it is predicted that by 1974 annual expenditures will exceed $105 billion, or 7.8 percent of the gross national product. There is a growing consensus that all is not well with the health care system, that the nation as a whole is not spending its money wisely, and that more equitable, more effective, and more efficient methods can be found to provide health care. Increasingly the public is looking to the Federal government for leadership in financing health services, in developing new patterns of care, and in setting standards, regulating, and monitoring the health care system. The day may be approaching rapidly when the President of the country is held accountable for its health care, as he is now for its economy. The unwritten social contract that governs the relationship between the health care establishment and the people it serves is undergoing a period of major renegotiation through both the political process and the market place.

The initial question that arises is whether R & D can materially assist the public and private sectors in improving our health services system. To date, the contributions of R & D have been important but modest in contrast to the promises implied and the expectations aroused. In must be recognized, however, that health services R & D is a relatively new pursuit in the United States and abroad. Its potential was first recognized in the late 1950's by a handful of investigators.

Time is required to build the core group of professionals, the institutional settings, the techniques and methods, and the constituency for a new field of research. Health services R & D is still a newcomer in academic circles, in schools of medicine and public health, in hospitals and health departments, in industry and the Federal government.

Furthermore, it should be recognized that health care itself is a complex social system involving many individuals, institutions, and deep-seated traditions and patterns of behavior. The cost-benefit of a specific R & D project in the health field can seldom be measured with precision. Under the most favorable circumstances R & D has uncertain outcomes; some investments are successful, others are not. Payoff is most likely when knowledge of needs, creative ideas and the resources to implement the results of R & D exist in a common setting. The Department of Defense (DOD), the National Aeronautics and Space Administration (NASA) and the Atomic Energy Commission (AEC) are at once the consumers, producers and financers of the technologies they research and develop. They experience the needs, they have the access to sources of ideas, and they have control of substantial resources to implement them. Industry is typically a financing and producing entity in which uncertainty as to consumer needs adds to uncertainty in R & D payoff. In the health services enterprise, uncertainty about the benefits of R & D is aggravated by the fact that consumers, providers and financers are all diffuse and disaggregated. Only the Federal government, in its expanding role as financer, is a large enough factor in the health services enterprise to modulate the forces on it, potentially in the public interest. With all the

uncertainties as to its outcome, R & D remains the only instrument by which that modulation process may be made more rational and more likely to serve the public interest.

Given these limiting conditions, the Panel is favorably impressed with the accomplishments to date of health services R & D. Representative examples of useful and potentially influential research are described in Appendix D, and of current research in Appendix E.

We believe that a strong focus on health services R & D is essential in the years to come. The sheer size of the nation's investment in its health services system requires a vigorous R & D component. We need the information and capability in the Federal government to anticipate the "crises" that constantly arise on the health scene. We need the organizational framework to conduct experiments and demonstrations in advance of major commitments of private and public funds. We also need the ability to learn as we go by evaluating the impact of the different major health programs like Medicaid that have been enacted. There is little prospect of realizing the national goals embodied in the President's Health Message of February 1971 and in current Congressional and administrative proposals unless a substantial effort is made to expand our basic knowledge about providers and consumers and to develop, test and evaluate new approaches to health care. To invest increasing amounts of public and private funds in health services without sufficient attention to monitoring, evaluating and improving the efficiency and effectiveness of the entire system is wasteful.

Will a major commitment to health services R & D improve the nation's health status? Here the connection between cause and effect is more tenuous. It is

frequently assumed that the status of the nation's health is related to the quality and quantity of its health care, and that sooner or later improvements in health care will lead to measurable improvements in its health status. However, many other factors are involved--the extent to which biomedical research has produced useful means of controlling, ameliorating and curing disease, the social and economic status of the population, cultural and personal habits, and the quality of the environment, to name the most obvious. It is doubtful whether there is any personal health service for which it could be stated with confidence that increased investment would produce measurable improvement in health; this statement could also be made about some environmental factors. It is unrealistic, therefore, to expect that health services R & D will have an immediate payoff in terms of better health, although it may have a direct impact on the accessibility and quality of health care, on the productivity of the health care industry, and on the public's satisfaction with its health services. The challenge for health services R & D is to design more efficient, more effective and more acceptable methods of providing services. In addition, health services R & D has the important mission of developing measures of health status and of demonstrating the relative importance of different factors, including changes in the health services system, in improving health status.

2. Health Services Research and Biomedical Research

The focus in health services R & D is on making biomedical knowledge available to treat, control and eliminate disease and to restore function or minimize disability, rather than on the development of that knowledge. Therefore biomedical research and health services research are complementary, although at times the

boundaries between them are blurred. The success of the former implies the need for the latter. If we fail to invest adequately in health services research to improve the availability of knowledge developed in the laboratory, we cannot realize the full benefits of our investment in biomedical research.

The example of the coronary care unit will help to illustrate the kind of contribution that health services R & D can make and the interdependence of health services R & D and biomedical research. Biomedical research establishes the significance of the physiological alterations associated with cardiac arrhythmias and failure and the theoretical bases for treatment. Biomedical engineering designs the diagnostic and therapeutic equipment used in coronary care units. The contribution of health services R & D is first to determine in geographically defined populations the prevalence of chest pain and electrocardiographic abnormalities, the prevalence of death from heart attacks, and the frequency with which patients from either group are treated by physicians or admitted to hospitals--in other words, the need and demand from the community's point of view for the type of treatment that might be provided in coronary care units. If there is a need that coronary care units appear able to satisfy, prototype units are developed, and controlled clinical trials are conducted to determine whether or not such units are more beneficial than traditional hospital care, and if so, how beneficial and for which types of patients. In such trials, the clinician is primarily interested in efficacy; the special role of health services R & D at this stage is to include consideration of cost, staffing and acceptability. On the basis of this kind of research and controlled trial, decisions are made about widespread installation of coronary care units. Once such units have been shown to be useful, health services research is concerned with planning

their location in relation to the needs of the population, with developing on-going methods of evaluation and quality control, and with comparing the performance of different coronary care units. In actuality this has not been the sequence of events that has occurred in the United States in the case of coronary care units. These units were widely introduced before their efficacy and costs had been demonstrated. Available evidence now raises serious questions about how beneficial they actually are.* At this stage it is virtually impossible to retreat, and it may be that the public and its hospitals are saddled with an expensive and yet frequently inappropriate mode of treatment. Greater awareness of the potential of health services R & D and the conditions necessary for the evaluation of new health care arrangements could preclude this type of premature national investment in expensive facilities on a widespread scale.

A second example of health services research is the field testing of the Salk polio vaccine in 1954. About 400,000 children participated in what was the largest public health experiment in this country's history. The value of epidemiological and statistical concepts and methods in enhancing and complementing basic biomedical research on tissue culture and applied research in developing and producing the vaccine were clearly demonstrated. Without this critical field trial, urged by knowledgeable epidemiologists and health statisticians, the fruits of laboratory research might not have been made available so rapidly and widely. The trial illustrates the need for large numbers, adequate time, precise planning, and careful organization in the conduct of much useful health services research.

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* Mather HG et al: Acute myocardial infarction: Home and hospital treatment. British Med J 3:334-338, 1971 (see Appendix D-12)

3. Technology and Health Care

Health services R & D relies heavily upon the resources and methods of technology, especially in the areas of communications science, automation, electronics, biomedical engineering, operations research, and systems design and analysis. Much attention has been devoted recently by government committees and independent groups of experts to the possibilities for expanding the use of technology in improving the country's health care system.

Discussions of the possible role of technology in health care, however, are too frequently simplistic and emphatic in one of several directions:

a. Technology holds the potential for solution of many specific problems or deficiencies in the provision of health services; all that is necessary is to release the nation's fantastic technological capabilities.

b. Technology alone can control or even decrease costs of health care; the only missing element is an incentive structure which drives hospitals and doctors to adopt the automation of information services and of routine health care tasks.

c. Technology will destroy the individuality and personal nature of health care; when the physician is supplanted by a machine, the patient or consumer will be at the mercy of an automated monster whose decisions he cannot influence.

d. Technology, widely applied, will tend to equalize the quality of health care at a mediocre level.

Such arguments are commonplace when policy advisors consider the diversion of national technological capabilities from defense and aerospace goals to societal systems (whether health or education, urban housing or mass transportation).

A thoughtful evaluation of the potential role for technology in health care must be based upon the recognition that medical care is a personal service and health care organizations are social systems. Such social systems are inherently complex, they are not subject to simple optimization, and they cannot readily be described in terms of discreet goals, mathematically related to external factors. Indeed, computer simulation of complex societal systems has demonstrated that their behavior can defy intuitive prediction in the sense that the long-term results of particular policies may be exactly opposite to those anticipated.

The needs and demands of people, not the availability of technology, should determine policies, priorities and objectives. When technological innovations have been introduced widely and prematurely in the health services system in the absence of clearly demonstrated need and effectiveness, the results may be to increase the cost and complexity of the health care process without necessarily leading to better outcomes for patients. Examples are the coronary care unit discussed above, indiscriminate use of automated laboratory screening tests, and total computerized hospital information systems. It is of utmost importance, therefore, that those concerned with technological innovations in health services do not work in isolation and that they be an integral part of the R & D effort. Health services R & D seeks to combine the talents of administrators, economists, engineers, epidemiologists, physicians, social scientists, statisticians and others. If successfully pursued, health services R & D can provide the framework for intelligent use of the country's extensive technological capacity in the interests of improving the productivity and effectiveness of the health care system. The opportunities and problems surrounding the use of technology are discussed in greater detail in Appendix F.

4. Policy, Organization and Research

The President's Health Message of February 1971, the May 1971 White Paper of the Department of Health, Education, and Welfare (HEW), the current proposals for health maintenance organizations and national health insurance and other health bills before Congress reflect a growing national commitment in the field of health and a significant redirection of this commitment. The government's role in the years immediately following World War II was to bolster the private sector in dealing with special problems or special groups. Federal funds were earmarked for the construction of hospitals and other facilities, for control of venereal disease, tuberculosis and other communicable diseases, and for health services for special groups such as babies and mothers, the Indian population, veterans, and the urban poor. At the same time, the Federal government entered the field of biomedical research in a major way with the establishment of the National Institutes of Health (NIH), which reinforced the categorical approach to health problems by creating separate organizations and constituencies for each group of diseases. Although the categorical approach may be useful and pragmatic for biomedical research and under some circumstances for health services, there is growing awareness of the need for integration and rationalization of the country's health care system. The Administration has stated its commitment to assure that all members of the community have access to medical services, to moderate costs by more efficient use of resources, to provide comprehensive and continuous services rather than categorical and episodic services, and to reduce financial barriers. The fulfillment of this commitment requires an integrated approach to care.

The Hill-Burton Act of 1946 contained the germ of the new comprehensive approach to health problems in its provisions for planning and regionalization of health services, although not much attention was paid to these questions in the early years. The major shifts in Federal policy came with the introduction of Medicare and Medicaid in 1965, and the Partnership for Health legislation in 1966 and 1967, which established the concept of comprehensive health planning. In 1967 the National Center for Health Services Research and Development (NCHSR&D) was established, creating for the first time a focus for the efforts of the growing body of investigators interested not only in the problems of special diseases or groups of patients, but in the health care delivery system as a whole, its components and their organization, financing, efficiency and effectiveness.

The gradual evolution in national health policy from the categorical approach to more comprehensive or broader concern for the country's entire health care system has profound implications for health services R & D. Descriptive research was possible and limited analyses were feasible under the circumstances that have prevailed in the past, but planned experiments and critical tests and evaluations are extraordinarily difficult in the absence of aggregations of resources into health care systems that have specified objectives and that serve defined groups of people. As more structured systems evolve, it becomes possible, for example, to introduce information systems for management and evaluation, and to develop, test and compare different ways of organizing, staffing and financing services. With the development of systems of care, it also becomes economically feasible to introduce and evaluate technological innovations. These developments in national policy make health services R & D more useful and more effective.

With this need in mind, the Panel's first step was to survey the current status of health services R & D in the United States. Our purpose was to identify problem areas, so that constructive measures can be taken to meet the new and rapidly growing demands placed upon health services R & D.

5. Impediments to the Conduct of Health Services R & D

The impediments we have identified in our discussions with government officials and other consultants, in extensive readings, and in special studies and surveys can be summarized briefly under the following headings. They are discussed in more detail in the context of our recommendations for improvement.

a. Need for wider appreciation of the contributions and limitations of health services R & D

The field of health services R & D has not received wide support from universities, foundations, and industry, and it has not yet attracted sufficient numbers of first-rate professionals from certain disciplines like economics and engineering. Specifically, the traditions, organizational patterns and attitudes of universities, schools of medicine and schools of public health have made them slow to respond to needs and opportunities for improving health care through changes in education and research. In the Federal government, which provides most of the financing and leadership in the field, the Panel has encountered both a lack of enthusiasm or interest in health services R & D, and a lack of appreciation of the time, money and difficulties involved. A case in point is the fact that NCHSR&D was not assigned a prominent position in the hierarchy of HEW, it was given little new money and personnel, and it inherited a large number of grants not strictly germane to health services R & D. Even

now, it controls only a fraction of the government funds available for health services R & D. For these reasons it is not in a good position to provide strong leadership for the government and the entire health care community.

At the same time, there appear to be unwarranted expectations in some quarters that R & D can provide clear-cut solutions to complex political questions; that demonstrations and experiments can be carried out despite the fact that the conditions rarely exist in which we can control or manipulate the actions and attitudes of providers and consumers; or that the ills of the health care system can be solved simply by applying the methods of industrial technology, as discussed above. There are strong pressures on Federal agencies to use their R & D funds for short-term projects, not for long-term investment in research and the training of research professionals.

The field is new and needs time to develop, and the nature of the political process makes it difficult to sustain Federal programs with only long-term rather than short-term benefits. We lack a strong commitment on the part of the leadership in the Federal government to build up the field of health services R & D and to protect its basic research component--the kind of commitment that has led to the flowering of biomedical research.

b. Need for clearly defined Federal health policies and priorities

The broad goals stated in the President's Health Message of February 1971 of equity, accessibility, and quality constitute a landmark in the evolution of national health policy. However, these goals must be made "operational"--they must be translated into specific policies and programs, and priorities must be established--in order to serve as guidelines for an effective and

coordinated development effort in health services. In contrast to basic research, development requires clear specification of objectives. It is unrealistic to expect major contributions from the developmental effort in the absence of clearly established policy directives. The history of the Regional Medical Programs illustrates the difficulties that arise in making effective use of funds for health services development when the goals of the program are not consistent and clear and its relationship to other Federal health services programs has not been stated explicitly.

The Federal government is the principal source of funds for directed research, development, testing, and evaluation of new methods for financing, organizing, staffing, and monitoring health services, and it is, therefore, largely responsible for establishing policy directives and relating development projects to these directives. So far as the Panel can determine, the process of translating national health strategy into operational objectives and priorities does not work smoothly and consistently in HEW, and there is little evidence of interagency coordination of development projects. We have the impression that decisions are often made precipitously, frequently on the basis of incomplete analyses and in response to external events and pressures. These conditions make it difficult for the Federal government to use its health services development money wisely and efficiently.

c. Need for clarification and restructuring of the different tasks involved in health services R & D

In its analysis of the opportunities for health services R & D, the Panel has identified four major components or functions: policy analysis; the

collection and diffusion of information and statistics; development, testing and evaluation of new health services systems and processes; and research and the related activity of training new investigators for the field. The Panel notes that there is considerable confusion in the minds of many about the potentials and limitations of these four activities and the relationships between them in the continuum of health services R & D. Each has different responsibilities, organizational requirements, staffing patterns, timing requirements and funding needs. Failure to take into account these differences weakens the total thrust of health services R & D and leads to unrealistic expectations. Therefore, the Panel has built its recommendations around a separate consideration of each function, concluding with proposals for coordination.

The need for adequate analytical capability for health affairs in the upper echelons of HEW emerges clearly from this analysis. The function of supporting the Secretary in making decisions requires ability to respond on short notice and acute awareness of the political process; this function should not be confused with program development or research. There is no permanent staff for policy analysis analogous to that in the Office of Management and Budget, and there has been a constant turnover of policy analysts in the Office of the Secretary in recent years. This lack of stability and continuity in the professional staff at the policy-making level in health can only be regarded as a major impediment to any attempt at national development of resources or discernment of priorities. It is not realistic to expect NCHSR&D to perform this as well as all the other functions involved in health services R & D; it is part of one of the operating or line divisions of HEW, and the staff role of policy analysis is not compatible with its other assignments.

d. Need for expansion and coordination of the statistical system for health and health services

The Panel believes that major improvements should be made in the scope, refinement and comparability of our health statistical system. We are more advanced in counting livestock and produce than in measuring the parameters of health services and health status, and we lag behind many other countries in the development of our health statistical system. The general-purpose data currently available are not sufficiently sophisticated and detailed to support the needs of policy-makers, administrators and investigators. The wealth of information generated by operating programs, institutions and organizations is largely untapped and inaccessible, and there are few areas in the spectrum of health services where uniform definitions and classifications are used so that simple comparisons and evaluations can be made. Federal responsibility and funds for the collection and dissemination of health statistics are divided between the Departments of Commerce, Labor, and HEW, and are further subdivided within the latter department between the National Center for Health Statistics (NCHS), the Social Security Administration (SSA), the Social and Rehabilitation Service (SRS), and other operating units. The Regional Medical Programs, Comprehensive Health Planning Service and NCHSR&D all sponsor data gathering and information systems that are uncoordinated with each other. The various Federal agencies that provide or finance health services--for example, VA, OEO, and DOD--use their own methods and forms. The problem of piecing together health information from various sources and reconciling the differences in definitions, even within the Federal government, are insuperable under the current arrangements.

e. Need for more and better educated professionals in the field of health services R & D

Health services research and development draws upon a wide variety of knowledge and skills, including familiarity with complex social relationships and structures, economic concepts, epidemiological and statistical methods and ideas, medical science and technology. It is clear from the Panel's review that we have not yet succeeded in building up the "critical mass" of educated professionals required to meet current and projected needs, and that much more attention must be given to the content of educational programs and the settings in which professionals can best be prepared to enter the field.

f. Need for prompt communication of the results of health services R & D

No central national reference unit covering all aspects of the field has been developed. Abstract periodicals like Excerpta Medica's Health Economics, and Public Health, Social Medicine and Hygiene; Medical Care Review; Medical Socioeconomic Research Sources; Abstracts of Hospital Management Studies; and Hospital Abstracts each covers only a part of the published literature. The unpublished reports of projects and grants, which may be of considerable value to those involved in research as well as development, seldom receive distribution outside the agency that provides the funds. There is a distinct lack of good annotated bibliographies and of analytical studies of the state of the art in the critical areas of health services R & D.

g. Need for coordination of Federal health services R & D

The perennial problem of communication and coordination in a government structure as large and complex as ours assumes major proportions in the case

of health programs and health services R & D. In addition to the HEW, DOD, VA, OEO, the Department of Housing and Urban Development (HUD), the Department of Labor and more recently, NASA, have substantial interests in health services and contribute in varying degrees to the Federal health services R & D effort and to the fund of information and experience about health and health services. In HEW itself, there are numerous health programs that are largely autonomous and frequently overlapping.

The Panel views health services R & D as a dynamic process in which there is a constant flow of information between the four functions of policy analysis, information and statistics, development, and research and research training. We believe that much better use can be made of available resources if the different Federal units and agencies that contribute to this process can pool their efforts and experience.

h. Need for broad understanding of the basic issues and options in the health care system

Health services R & D makes its greatest contribution in a climate of understanding and appreciation of the problems that confront the health care system. We have yet to draw together the many institutions, agencies and professional interests in a common debate of the issues and the opportunities for constructive change. There have been many Presidential commissions, Federal panels, and committees sponsored by private and professional groups that have addressed facets of the nation's health care system in recent years. Although they have contributed to the agenda of problems for discussion, few have been entirely free from association with special interests or political

events, and few have been in a position to view their concerns in the context of the system as a whole. For example, basic decisions about numbers, kinds and training of health manpower depend upon equally basic decisions about the way in which health care will be organized and financed in the future. Until we develop a broader base of understanding, health services R & D will not reflect the needs of the overall system, and it will continue to encounter apathy and resistance to change in many circles.

It is of utmost importance that private interests join with the public in clarification of the issues that underlie the current dissatisfaction with the health care system. The Federal government can establish policies and priorities and can exert considerable leverage on the system through the power of the purse, but the system itself is largely owned and run by the private sector. To realize the potential of health services R & D and to gain acceptance for the ideas it generates, the private sector must be an active partner with the Federal government in the process of change. This partnership must encompass the entire spectrum of health care providers, consumers, financial intermediaries, regulatory bodies, and educational institutions.

IV. RECOMMENDATIONS

1. The Panel recommends that a strong POLICY ANALYSIS GROUP of permanent civil servants with professional training be created in the Office of the Secretary of Health, Education, and Welfare, and that one or more extramural INSTITUTES FOR HEALTH POLICY STUDIES be established.

Because of the growing responsibility of HEW for leadership in improvement of the country's health care system, there is an urgent need for a permanent Policy Analysis Group to provide professional continuity and to support the policy-making process. The Group should logically be located in the upper echelons of HEW where policy options are developed and decisions are being made.

On the basis of the Panel's information, this is one aspect of health services R & D that requires aggressive development. In the words of one consultant to the Panel, there is no "institutional memory" within the Office of the Secretary; the focus of responsibility is not clear and currently staff members do not come with the expectation of serving more than a few years. NCHSR&D has been expected by some to provide this service, but the mandate has never been made explicit. In any event, NCHSR&D is several administrative levels removed from the site of major decision-making, it lacks the professional staff for this function, and it has other responsibilities that are not necessarily compatible. Under the present arrangements, it appears that policy-makers in HEW are forced to cope on an ad hoc basis with the issues as they arise. There are no well-established channels for translating the accumulated knowledge and experience of health services R & D into action. The effectiveness of health services R & D depends in large measure on these channels of communication.

The functions of the proposed Policy Analysis Group would be to provide the Office of the Secretary with the best available information, derived from R & D and from statistical sources, to analyze policy proposals, and to develop policy options. It should also be expected to play an important role in guiding the development and directed research conducted and sponsored by the Department so that these activities can reflect the policy priorities of the Department. Other countries with sophisticated health care systems have found it necessary and useful to set up permanent units for planning and policy analysis in their Ministries of Health, and it seems equally important for our Department of Health, Education, and Welfare to have such support.

The professionals in the Policy Analysis Group should have backgrounds in economics, medicine, sociology, statistics, political science, law, public administration and health care administration. In addition, most should have substantive training or experience with health services institutions, professions, policies and information, and be familiar with the history and patterns of health services both in the United States and in other countries. The size of the Group is much less important than its quality, its demonstrated performance, its nonpartisan character, and its long-term continuity. This unit would do a great deal to create a new esprit de corps in the health sector of the Department and to establish standards and goals for the kinds of health professionals now being attracted to the Department.

Many of the assignments of the Policy Analysis Group will be short-term and in response to immediate needs; therefore, special provision must be made to support the complementary function of long-term analysis and planning. Leadership

and responsibility for health services in the United States have been widely dispersed among government agencies, professional groups, non-profit and not-for-profit institutions, and other organizations, and there has been little incentive for research institutes and investigators to consider overall national strategies and long-term policies in the health care field. In view of the emerging role of the Federal government as a catalyst in the integration and improvement of health services, we must learn to look more critically at the total impact of national health policies and the direction in which we are headed.

There are several ways in which a long-range analytical capability can be structured. At the very least, there is a need for a "think-tank" division within the proposed Policy Analysis Group. The difficulty is to protect such a division from the "quick-response" syndrome that inevitably permeates the political arena but the effort should be made. In addition, the Panel recommends that one or more federally funded extramural institutes be established.

The mission of the external Institute for Health Policy Studies would be to act as a clearinghouse for ideas, an originator of ideas, and an independent site for objective analyses of the possibilities for administrative action on health matters. Although primarily responsive to the needs of the Policy Analysis Group in the Office of the Secretary of HEW, the Institute should also be expected to initiate studies of its own. It should have a substantial full-time professional staff, as well as authority to subcontract with other agencies and institutions. A self-perpetuating, nonpartisan board of distinguished citizens experienced in and concerned with social policy issues, public administration, and health care problems should oversee its activities; they should not be formal representatives of

special interests, professions or institutions.

The government should be expected to contribute about three-quarters of the necessary financial support for the extramural policy research Institute. It would be desirable if private foundations could provide the remainder, as much on the grounds of maintaining the independence of the Institute and supporting the public interest as on the grounds of financial need.

Precedents for federally funded R & D organizations where policy analysis is a major concern are the Institute for Defense Analyses (IDA), and the Institute for Research on Poverty at the University of Wisconsin, supported largely by single departments, and the Urban Institute, funded by several departments. Examples of two different kinds of centers supported primarily by private sources are the Brookings Institution and the Institute for Policy Studies. The Institute of Medicine of the National Academy of Sciences is a possible locus of health policy analysis, as well as the Urban Institute or the Brookings Institution. We believe, however, that there is considerable merit in having at least one institute devoted primarily if not solely to the problems of health services, because the problems are sufficiently complex to merit a concerted effort. This effort should be reasonably well isolated from the pressure of daily decision-making, although not from political realities and social forces. The important point is to build up our resources for long-term as well as short-term analyses, evaluation, and planning of health policies and strategies.

Establishment of the Policy Analysis Group will be difficult in view of recent traditions and current staffing patterns in the higher echelons of HEW. It is of utmost importance that the budget of the Group be treated as a regular line item;

otherwise it will be extremely difficult to assure its continuity and nonpartisan nature. Possibly the necessary funds can be found in the existing budget of the Office of the Secretary to start up this group; if not, a new appropriation should be sought. We suggest that about 0.2 percent of the Department's health services R & D budget be devoted to this function.

The necessary level of support for external institutes can be assessed on the basis of demand and performance, but the Panel suggests that about 0.8 percent of HEW's health services R & D budget be allocated for this purpose. It may prove desirable for HEW to support more than one extramural institute for policy analysis; however, the experience of the Office of Education with Educational Policy Research Centers, which we believe have been unduly fragmented, suggests that it would be preferable to start with one first-rate institute. New legislative authority may be necessary to guarantee the permanence and independence of the proposed Institute.

In addition, private foundations and other organizations should be encouraged to develop and support independent non-profit or not-for-profit institutes or operating foundations for health policy analysis. These institutes can look to the Federal government and particularly HEW, for some funds, but should have more independence and flexibility than an institute supported entirely by Federal funds. Examples of such organizations include the Battelle Memorial Institute and the Stanford Research Institute. The new Institute of Medicine of the National Academy of Sciences is an example of a different type of independent body. Indeed, there is no intrinsic reason why profit-making organizations should not be supported or commissioned to conduct policy analysis on a continuing basis.

There is a great potential for constructive analyses in the health care field and diversity should be encouraged. Much of the existing national and international data and information from health services R & D has yet to be evaluated adequately, aggregated, and digested, and much more will become available as the field gains in productivity and stature. In our view, a vastly increased commitment to policy analysis is imperative to sift the flow of information in the context of changing social pressures and political events and to synthesize it into feasible policy options.

2. The Panel recommends that a BUREAU OF HEALTH STATISTICS, with a COMMISSIONER appointed by the President, be created in the Office of the Secretary of Health, Education, and Welfare and that the Secretary immediately establish a TASK FORCE to define the Bureau's specific responsibilities and functions and its relations to other units of the Department and to other Federal agencies, and to determine its initial staffing needs and budget.

The Panel believes that a great virtue of the American pluralistic system is the opportunity it affords for innovations and comparisons of diverse health care arrangements over time and among populations. Comparisons, however, can only be made when the data for evaluation are available and comparable.

A review of the present health statistical capacity in the United States shows considerable room for improvement. There is as yet no nationwide system for reporting information about the use of all hospitals in relation to discharges, diagnoses, procedures performed, lengths of stay and charges. Such information is essential to examine differences in the efficiency and effectiveness of the nation's hospitals. There is no established system for obtaining national data about the

content of ambulatory medical practice, and little information is available about the problems patients bring to sources of primary medical care, the distribution of these problems in the population, what is done about them, and what it costs the consumer. We need this information to plan and evaluate new arrangements for primary care and to make important decisions about the education of physicians and other health manpower. Useful measurements and indicators of health status are virtually nonexistent and need to be developed and related to health services statistics locally and nationally. Few if any decentralized health services information systems, linked to persons and populations so that they are useful for planning, have been set up for regional, state and local jurisdictions.

There is an urgent need for a central focus for health statistics that will provide leadership and coordination within the Federal government. NCHS, SRS, SSA, NCHSR&D, the Center for Disease Control, OEO and VA all have their own definitions, terms, classification schemes, sampling frames, population bases and categories for the health statistics they collect. Much variability in these parameters also exists among regional, state and local agencies, professional associations, and other organizations and institutions. Reported prevalence rates for crippled children, for example, vary as much as 100 percent among states because uniform definitions of crippling conditions are not used. These variations not only make it difficult to aggregate or compare data across agencies or geographic areas but also result in duplication of effort and inefficient use of basic records and statistical resources.

Considering that justification for public support of the nation's costly health services is based largely on the available statistical intelligence about its health

problems, the amount of money devoted to providing statistics and improving their value is modest indeed. In its analysis of Federal statistical programs, the Office of Management and Budget shows budget obligations for health, vital and environmental statistics of $35 million in fiscal year 1972. This amounts to about fifteen hundredths of one percent of total Federal appropriations for health. NCHS is receiving $15.3 million, or less than half the total appropriation for health, vital and environmental statistics. Other agencies outside HEW that share these funds and collect and process health statistics are the Bureau of Labor Statistics and the Manpower Administration in the Department of Labor, and the Bureau of the Census in the Department of Commerce. Undoubtedly more funds could be profitably invested in developing the statistical system for health and health services, but the main point that emerges from analysis of these figures is the need for convergence of authority and responsibility.

To provide the needed focus for the Federal health statistical function, the Panel recommends that responsibility for health statistics be centralized and elevated in a new Bureau of Health Statistics within HEW. This Bureau should have a Commissioner appointed by the President as in the case of the Commissioner of Labor Statistics and the Director of the Bureau of the Census. The Commissioner should report directly to the Secretary or to his designee in a staff relationship. Such an arrangement will provide the necessary leverage for adequate coordination.

Establishment of this new Bureau will require careful organizational planning within HEW, and the Panel therefore recommends that a Task Force composed of Federal representatives and professionals outside government be established

promptly to detail its responsibilities, functions, organizational relationships, staffing and financial requirements. Since the Bureau would assume responsibility for certain statistical functions of existing health programs, the Task Force should examine the current practices of all Federal agencies collecting health statistics in an effort to consolidate and coordinate as many functions as possible in the Bureau. The Task Force should also examine the need for new legislation to support the work of the Bureau and assist in drafting it.

In designing the new Bureau the Task Force should consider carefully the recommendations of the President's Commission on Federal Statistics and the July 15, 1971 memorandum from the Director of the Office of Management and Budget on "Reorganization of Federal Statistical Activities". The Panel believes the detailed responsibilities of the Bureau should be worked out by the Task Force, but suggests certain general functions that the Bureau undertake:

a. Determination of need and broad, general specifications for statistical and informational programs for the Department's activities in health.

b. Planning, analysis, collection, prompt dissemination and publication of general-purpose health and health services statistics derived from surveys and records, and development of more useful analytical statistical measures, indicators and indices of the type currently provided by the present NCHS. This work should be conducted in an Office of Data Analysis.

c. Approval of the design for basic data collection, tabulation and analysis systems and development of pertinent standards,

common terms, definitions and classification schemes for operating Federal health programs, such as federally financed insurance plans, federally operated direct health services plans and other Federal programs for financing or regulating health care, health manpower and health institutions.

d. Approval of the methods for data collection and analysis to be used in program evaluation by all Federal health agencies.

e. Development and promulgation of recommended standards, common terms, definitions and classification schemes for use in the collection, aggregation, tabulation and analysis of health and health services data by state and local governments, institutions and health care systems.

f. Provision of financial support and technical assistance for the creation of State Centers for Health Statistics and Federal-state-local cooperative health statistics systems.

g. Research and development of indices to measure the health status of individuals and populations.

h. Contracting with Federal agencies to design and collect data for special-purpose projects they may wish to conduct in relation to their operating programs.

i. Provision of centralized facilities for collecting and processing statistical data bearing on health in a service-oriented Office of Data Processing.

j. Promotion of better methods for communicating health and health

services statistical information promptly. There are many constituencies, both Federal and non-Federal, for health statistics and many needs to meet. The Bureau will require adequate funds to support an active program for publishing and distributing its material.

The precise budget for the new Bureau cannot be prepared until its tasks are defined, but the Panel foresees that a considerable increase in funds will be needed. Transfer and coordination of existing appropriations will not be sufficient to support adequately the activities outlined about. Funds for the new Bureau might constitute 8 percent of HEW's budget for health services R & D. Although a substantial increase in the present level of investment for health statistics, this amount will be quite modest in comparison to total national health expenditures.

We believe that top priority should be given to expanding and coordinating the nation's health information system, because this system is a basic requirement for all health services activities, both public and private--policy-making, legislation, administration, planning, institutional management, quality control and evaluation.

3. The Panel recommends UNIFYING LEGISLATION AND APPROPRIATIONS to support the newly created DIVISION OF HEALTH CARE DEVELOPMENT within the Health Services and Mental Health Administration of the Department of Health, Education, and Welfare.

The development of new arrangements for organizing, financing and providing health care is complicated and costly. Long-standing traditions constrain the attitudes, behavior and relationships of patients, physicians and institutions. Strong prejudices about the best mechanisms for controlling the flow of money from

the people who pay to the people who are paid obscure the issues.

Establishing the guidelines for institutional reform is an entirely different process from accomplishing it. Here administrative, managerial, political and social skills, to say nothing of the need for great sensitivity with respect to interpersonal relations, are required. Not only does this kind of social change require people with different talents from those who undertake research, generate information or develop policy options, but the scale of operations is frequently much greater and most projects involve working directly in new or existing health care institutions and systems. It takes a sustained effort to introduce new ideas and evaluate their impact. Because of the many social and political variables, the timetables and outcomes in developmental projects are less predictable than in basic research. For the same reasons, developing social systems and organizations, particularly those that involve established professions and institutions, differs from developing weapons systems and space exploration systems. In the former, technology is used to support interpersonal transactions; in the latter people are used to support technological transactions.

In the past, public and private agencies have devoted their resources for health care to needs of special groups like children, the urban poor, the elderly, migrant workers or Indians, those with chronic diseases such as heart disease, kidney disease, stroke, or cancer, or those with social diseases such as tuberculosis or venereal disease. HEW has been "balkanized" into categorical programs, each vigorously defended by special interest groups. There has been little evidence until recently of coordination or collaboration; for the most part, various programs have operated independently, not only in financing and providing

health services but in introducing new kinds of health centers, manpower, information systems, and other innovations. Valid comparisons and evaluations have been difficult to make, and the net effect has been to attack the complex problem of social and institutional change in an unsystematic, piecemeal, and largely ineffectual way.

In addition, the funds to construct facilities, develop plans for services and to pay for care flow through different channels. Each program has its own benefits, its own eligibility requirements, its own funding cycle, application date, review mechanism and administrative arrangements. Medicare and Medicaid are two major examples, but others are Maternal and Child Health Programs, Children and Youth Comprehensive Health Services, Comprehensive Health Centers, Comprehensive Mental Health Centers, Neighborhood Health Centers, migrant labor health programs, health maintenance organizations and the Regional Medical Programs. The Panel recognizes that there may always be a need for some categorically funded programs--often on a temporary basis--to deal with new, unusual health problems or special populations of great public concern. But to organize and fund a major part of the country's health services through these separate mechanisms is wasteful in the face of contemporary needs and knowledge.

Not all of these programs can or should be amalgamated, but the concern now is for the health care of entire general populations, including both those who seek or need care and those who do not. This is a profound shift in posture and priorities; it requires new and different organizations and management and greater coordination of the flow of funds from the Federal government.

The Panel wholeheartedly supports concentrating current developmental programs of HSMHA in the functional and flexible new Division of Health Care Development. We emphasize the additional need for consolidation of its funding under new unifying legislation and appropriations. Organizational and institutional changes in our health care system will be easier to achieve if the Division's funds are also coordinated.

The components of the new Division are the provider-oriented Regional Medical Programs Service, the consumer-oriented Comprehensive Health Planning Service, the Hill-Burton program for construction of health care facilities, the Health Maintenance Organization Service, and NCHSR&D. According to the Panel's proposals, only those sections of the present NCHSR&D directly concerned with development should be included in this Division; the research and training activities would be the responsibility of a separate entity, the new National Health Care Research Institute discussed in the next section. Although the Division must have a first-rate professional staff to manage creatively its complex program and large budget, the bulk of the development work will be done extramurally.

Some seven Health Services Research and Development Centers associated with universities and health care programs currently receive their primary support from NCHSR&D, and about another seven are receiving some Federal funds. The purposes, activities, accomplishments and relationships of the Centers to health care facilities and health services vary widely. As in other aspects of this new field, there is confusion between basic research, applied research, development, testing and evaluation. In some cases these R & D centers are being called upon to perform tasks for which they are not well suited, and their sponsors do not

always appreciate the time and continuity of support required to build up multi-disciplinary research teams and produce visible results.

The distinguishing feature of several of these independent Health Services Research and Development Centers is their direct involvement with or responsibility for the provision of patient care. The expectation is that they will be able to observe and modify the care process so that meaningful developmental research, experiments and evaluation can be carried out.

Evidence from the directors of these centers suggests that they are beset by budgetary and staffing problems. They have no assurance for more than a few months or a year in advance that support will be continued. Consequently, they are unable to recruit and retain first-rate staff who can be integrated into the patient care arrangements--a slow process that involves professional acceptance, education and attitudinal changes on the part of all concerned. As a result, meaningful demonstrations are extremely difficult to plan or carry out. There is little likelihood that substantial organizational or institutional changes in medicine can be accomplished under the present conditions of uncertain and insufficient funding.

On the basis of this experience, the Panel believes that the Division of Health Care Development should concentrate its support on a limited number of free-standing Health Care Development Units that are so related to patient care institutions, organizations, agencies and resources that they can change, manipulate and evaluate the health care system or the medical care processes with which they are concerned. The Division should be prepared to make long-term commitments to these Units. A few strong units capable of developing, demonstrating, testing and

evaluating new ideas or methods on behalf of the Division of Health Care Development would be preferable to many more limited and diffuse centers with inadequate funds and staff.

A close relationship should exist between the Division of Health Care Development and the proposed Units. This will require understanding, commitment, flexibility, and imagination on the part of the project officers in the Federal government and the administrators in the institutions and agencies involved.

Units might be established in collaboration with university health centers, medical society foundations, hospital chains or corporations, or prepaid group practices; with state, local and regional health planning agencies; or with governmental offices responsible for emergency medical care services, community crisis control and information centers or blood banks. The central requirement for each Unit is that the principals be in a position to introduce or materially influence changes in health care arrangements in order to develop, test and evaluate new ideas, methods or systems.

There are many current developmental activities that could be pursued more vigorously and new ones that could be initiated if the Division pools and concentrates its substantial resources and funds. Among the major initiatives that could be tackled by the Division and undertaken in concert with one or more Health Care Units, the Panel recommends that consideration be given to the following areas:

a. Development of <u>standards</u> for instruments, processes and ingredients of medical care, including development of the kinds of information required to assess them.

We believe there is a clear need to develop and regulate standards

of quality for technological applications in health care. Such quality standards must assure the efficacy and the reliability of instruments, equipment and reagents used in diagnostic, therapeutic, monitoring and test procedures. They must also balance the desire to stimulate technological innovation with the hazards of misapplication.

The Food and Drug Administration (FDA), the National Bureau of Standards (NBS) and the Center for Disease Control (CDC) are working on the problems of standards for medical devices, equipment, reagents and tests. Congress has evidenced interest, and institutional and professional associations have recognized the need. However, the impact of this interest is not yet discernible, and this effort should be accelerated and expanded substantially.

Leadership in this area appears to rest with FDA. However, the Units associated with the Division of Health Care Development would be appropriate settings for developing procedures, training personnel in the use of instruments and equipment, providing calibration and maintenance services, and for generally facilitating the introduction and use of technology in health services. In any event, the Division of Health Care Development should take a vigorous interest in seeing that the need for quality standards in technological equipment and methods is satisfied. To accomplish this the Division should consider developing plans for an Office of Health Care Technology.

b. Development of methods for <u>evaluating</u> patient care, including the problems of quality assurance and objective assessment of the end

results and outcomes of the medical care process.

This is a complex task involving measurement of functional capacity and disability and the development of information systems to monitor changes. These activities are best undertaken in actual practice settings where enrolled populations can be observed over extended periods. Individuals must be trained to use these methods and to install the systems in uniform fashion so that comparable results can be obtained; again this is best accomplished in clinical settings.

c. Development of new types of health manpower or reassignment of current manpower tasks, including new approaches to the central problem of providing primary care through physicians and physician extenders.

Much developmental work is needed in this area in order to guide our practical policy decisions about the training of family physicians or middle-level personnel. For example, we need more sophisticated functional analyses of the tasks performed by physicians and nurses in their work settings in relation to the problems brought to them by patients. The needs are greatest at the level of primary care, but redistribution of work assignments at the levels of secondary care (community hospitals) and tertiary care (major medical centers) also offers considerable scope for better deployment of scarce manpower. Several Health Care Development Units should be concerned with these problems and the related aspects of training the prototypes of

new kinds of health manpower and evaluating their work in practice situations.

d. Development of new community health care systems for populations defined by geography or political subdivisions, e.g., emergency medical care systems, community crisis control and information centers, community blood bank systems or rehabilitation services.

For example, coordinated emergency medical services should be developed for both urban and rural settings. A complete system would include a centralized communication service for reporting emergencies; automated dispatching of ambulances, with consideration of the standards for their equipment and personnel; automated routing of ambulances through congested city streets, using the same system developed for fire and police vehicles; and automated selection of emergency care facilities. Technology can provide logically designed and engineered ambulances to replace today's converted hearses.

Discussions of such coordinated emergency medical care systems customarily focus either on such glamorous innovations as the use of helicopters to transport accident victims to hospitals in the military pattern, or on the political problem of authority for the system in a particular community. While the helicopter concept is appealing in certain suburban or rural areas, it represents a "high" technology effort where "low" technology would permit major improvements for large numbers of people. With respect to the political problem, introduction of such a system would certainly require public education

and support as well as clear designation of the responsible agency or authority, and in all probability new state or local legislative action. In the current emphasis of Federal agencies on encouraging local action for social and technological developments, this application in health care would seem to be a natural priority item. The availability of adequate Federal funds should encourage resolution of the control and authority problems.

e. Development of new health care systems for populations defined by enrollment, e.g., health maintenance organizations, health care corporations, health care networks and prepaid group practices.

The current emphasis on health maintenance organizations offers great possibilities for constructive change in the health services system. In one sense the entire program is experimental, but there should be some assurance that there are feasible opportunities for testing and evaluating, for example, new staffing patterns, technological devices, health services information systems, support and supply systems or accounting systems. Accordingly, several Health Care Development Units should be integral parts of health maintenance organizations.

f. Development of measures for helping special populations, including the handicapped and the aged.

For example, development of orthotics (braces) and prosthetics (devices) for either missing sensation or impaired movement is a health technology field ready for exploitation. Many rehabilitation

products are not available to those who need them. There are almost four million persons with severe motor handicaps from neurological diseases alone, and an equal number of totally blind or deaf persons. Devices are an essential part of the program of restorative care for the physically handicapped, enabling them to achieve independence in daily living. Their availability is limited by lack of purchasing power on the part of the handicapped population, lack of venture capital by industry, and lack of trained professionals to prescribe the devices and instruct patients in their use.

Developmental areas include methods for early identification of the physically handicapped who could benefit from restorative services; application of services and systems to support or substitute for motor function; use of visual and acoustic sensory prosthetic devices for the blind; and use of typewriter (teletype) communication systems for the totally deaf and movement-handicapped. These and many other developmental efforts could stem from a new merger of engineering technology and medicine, and a national program to stimulate industrial production and improve availability and accessibility through proper prescription and usage.

Similarly, the rapid growth of the aged population emphasizes another potential role for technology. Possibilities range from those indirectly related to health problems to those obviously health-related. Transportation and mobility aids, such as escalators which decrease

agility demands on the user, buses with floors at curb level, and more easily moved doors at building entrances, illustrate the former possibilities. Medically related technological possibilities range from numerous devices, such as those designed to simplify the lives of patients with urine incontinence, to the broader issues of computer-controlled systems for individualized recreation and of nursing home redesign.

Rehabilitation engineering centers that are related to the service units for the handicapped currently being developed by SRS in HEW need support. The involvement of industry with these rehabilitation engineering centers should be encouraged through provision of practical information about the specifications and standards for devices. Regional service centers for the handicapped (in conjunction with hospitals and rehabilitation facilities) to evaluate, prescribe, fit and train handicapped persons in the use of devices and to maintain and repair them should be developed. Incentives or subsidies are needed to insure adequate supplies and widespread distribution of effective devices. In addition, controlled field trials are needed to measure the cost-benefit of expanding insurance coverage to include orthotic and prosthetic devices.

g. Development of new <u>health care facilities and equipment</u>, including automation, renovation, consolidation, mergers, shared services and regionalization of facilities.

For example, the field of instrumentation is an area in which major attempts were made during the 1960's to influence health care. The

Kaiser-Permanente automated multiphasic screening clinic led to a large number of off-shoots, both federally sponsored and privately funded. A major problem was the frequent inadequacy of medical and health data to permit evaluation of the efficacy and yields of the tests, or of the effects of screening on health care, even in such standard tests as those for glaucoma, gout, anemia or cervical cancer.

Pattern recognition for some elements of laboratory analysis and medical diagnosis has now passed through the period of vague promise into the era when serious workers are developing algorithms for actual clinical problems. In at least scattered cases, automated results approach the human capabilities with respect to rates for yields, false positives, and false negatives.

Recent studies of voluntary supervisory control of the human autonomic system suggest significant opportunities for the use of instrumentation in learning to effect this control and potential health benefits from exercising it.

There are many specific possibilities, each of which requires an as-yet unmounted development effort; they include fiber optics for detection of intrauterine deformities and for other internal examinations, non-insertive flow meters, and instrumentation for bedside blood tests in hospitals, as well as more tangential efforts such as alcoholism tests before being able to start an automobile.

h. Development of new methods, or adaptation of current methods for planning health services for general populations living

within political subdivisions, e.g., cities, standard metropolitan statistical areas, counties, states and regions, and the country as a whole.

For example, there are a number of countries that have active health services planning units employing relatively sophisticated methods. It would be desirable to examine their methods and information systems and to consider adapting those that are suitable for development in this country. Several Health Care Development Units could be attached to state, regional or local health planning agencies and have as their primary mission the development of the proposed Federal-state-local statistical systems that relate planning and evaluation to the needs of general populations.

Similarly, formulation and implementation of national health policy involves many decisions about the allocation of resources. To develop informed policies and to protect them from irresponsible attack will require effective programs of market and opinion research, and of public information and education. In the end, health policy must be supported by an enthusiastic and well-informed constituency. At least one Unit should be concerned with these problems.

i. Development of new approaches to <u>health education</u>.

There seems to be general agreement that the "wired city" with cables into each home will be a fact by the end of this century. Since these systems can provide 20 to 40 television channels, a significant number will be available for community, social, and educational purposes.

Two-way communications between home and the central station will be possible through use of the telephone. In all probability, modest amounts of computer storage and data processing will be economically available through the home television receiver.

The potential impact of such technology on mass communication may be large as was the transition from radio to television. These new mediums could be exploited in a major effort to bring into the health care system the third of the public now said to be separated from it. Such exploitation will demand national efforts to develop, test and evaluate educational and informational materials, simply because of the need for economies of scale in relation to costs.

The relatively large sums of money available through present programs within the Division of Health Care Development, each supported by separate legislation appropriations, and independent professional and political constituencies, need to be consolidated. The current efforts at conjoint funding employed by HSMHA are imaginative and constructive, but they should now be ratified formally by one consolidated act and appropriation that identifies health care development as a major Federal responsibility. We recognize the political complexities of implementing this proposal, but the need is urgent and early action is required.

In allocating its resources, the new Division should weigh such factors as the likely availability of solutions to problems under consideration; the likely cost of developing and implementing those solutions; the number of people potentially benefited; and the extent to which they would be benefited.

The Panel recommends that about 65 percent of the health services R & D

budget of HEW be allocated for the new Division of Health Care Development and 10 percent for the extramural Health Care Development Units, making a total of 75 percent for developmental activities. Better use can undoubtedly be made of current appropriation levels if the confusing disarray of categorical programs is integrated in the new Division. Large amounts of money will be needed to plan and staff the extramural units, to set up adequate information systems and to underwrite the substantial risks involved in developmental programs. Direct costs of patient care services can be paid for from other financing and insurance sources.

4. The Panel recommends that a NATIONAL HEALTH CARE RESEARCH INSTITUTE be created within the Health Services and Mental Health Administration of the Department of Health, Education, and Welfare.

Effective development of health care systems requires knowledge, based on research and information, to determine the areas most susceptible to intervention and change. Research provides the intellectual "capital" for the entire R & D effort and the environment for training new research professionals. It is as necessary to the evolution of an efficient health care system as is biomedical research to the understanding of disease processes and the development of new treatments. Health services R & D draws upon a wide range of knowledge and skills, including familiarity with complex social relationships and organizational structures, economic and fiscal concepts, epidemiological and statistical methods and ideas, medical science, and technology. Special conditions are necessary to recruit and retain professionals from established disciplines like economics and sociology, to promote cross-disciplinary research, and to educate new kinds of professionals for the multidisciplinary field of health services R & D. A special network of

communications is also necessary to coordinate and consolidate the efforts of diverse disciplines.

Bearing in mind that the division between research and development is highly arbitrary at best, the Panel nevertheless believes that the research component of health services R & D, and the related activity of training for research, need a certain amount of separation and protection from the development component. Similarly, development needs to be free from some of the traditional academic constraints on research. Organizational separation should be regarded as a mechanism for promoting the core function of each mission. Communication and exchange of personnel between the research and the development components are essential bridges and should be encouraged.

In order to foster creativity in basic research, there must be ample opportunity for investigators to define their own perspectives, conceptual approaches and areas of study, frequently in response to fundamental considerations rather than administrative definitions. Directed research employing a "customer-contractor relationship" is useful for the conduct of developmental activities, particularly in "undernourished" areas of the health care system.* On the other hand, it is also essential to trust individual investigators in the pursuit of untargeted research that has no prospect of immediate payoff. For example, an investigator studying the organization of community hospitals should not have to demonstrate at the outset that his findings will please all the diverse interests affected, any more than another investigator studying the growth of cancer cells should have to

* A Framework for Government Research and Development. London, Her Majesty's Stationery Office, Comnd. 4814, 1971 (Rothschild and Dainton Reports)

establish the utility of his findings for the practice of medicine.

Academic settings are more likely to attract some of the different disciplines involved in health care research than are operating health services institutions like hospitals and prepaid group practices. Stable support through the grant mechanism is necessary to build up sound research and research teaching programs, and the nature of many research issues relevant to health services requires a long-term commitment. Industry reckons that it takes seven to ten years for a new research group to start making a contribution to profits; health services R & D may well be no different.

Development, in contrast to research, is directed towards accomplishing specific objectives and must be carried on in the midst of the health care delivery system. Far greater sums of money must be invested in development than in research in order to achieve measurable changes and improvements in the health care system. Some development activities may also require long periods of time, but they can often be conducted in stages and the funds effectively handled through the use of contracts. These differences are important and are not fully appreciated by all in authority within the Federal government and in the health care industry as a whole. Relatively few administrators and others in positions of leadership have had opportunities to familiarize themselves with the field of health services R & D, to work in health care institutions, or to practice clinical medicine.

Under present arrangements, both components of R & D are the responsibility of NCHSR&D. Quite predictably, the long-term research and training activities have been overshadowed by the more immediate demands placed on NCHSR&D to develop and demonstrate new methods of improving health services. There is

constant pressure to curtail research training programs and to use grant money to accomplish specific service demonstrations rather than to support basic research.

The Panel proposes that a separate organization be established for health services research and research training. We have debated at some length the relative merits of locating this organization in NIH, but conclude that this would lead to more isolation of research from development than is desirable, and that health services research probably has more in common with the activities of HSMHA, which includes the National Institute of Mental Health (NIMH), than it does with the biologically oriented institutes that comprise NIH. We therefore recommend that the proposed National Health Care Research Institute be located in HSMHA, to maintain and protect its interaction with the Division of Health Care Development and the programs in HSMHA providing direct services. In essence this proposal means converting NCHSR&D into the proposed National Health Care Research Institute, strengthening its grant programs for research and research training, and transferring its present developmental responsibilities to the Division of Health Care Development.

The Panel recommends that training in the areas that contribute directly to health services research should be funded by the new Institute. This includes primarily training in epidemiology, health economics, health statistics, medical sociology, biomedical engineering, biostatistics and health services research per se. Probably limited training in other fields such as systems analysis, operations research, industrial management, accounting, architecture, law, political science and psychology, as applied to health services, should be supported also. We recognize that an argument can be made for funding these training programs

through the Bureau of Health Manpower Education in NIH, but we believe that the specialized nature and the urgency of the mission associated with the National Health Care Research Institute, the proportionately smaller numbers of health services investigators required, and the need for direct working relationships between those conducting health services research and those responsible for research training argue persuasively for placing this training responsibility with the new Institute.

On the other hand, we believe that training programs for health personnel who provide services rather than conduct research, including new types of physicians' assistants whose effectiveness has been carefully evaluated, are more logically located in the Bureau of Health Manpower Education. The Bureau should also be responsible for the training of health services administrators and managerial professionals; however, their adequate exposure to the concepts of health services R & D is of utmost importance to the field, and the new National Health Care Research Institute should cooperate with the Bureau of Health Manpower Education in improving the content of such training programs. The lack of familiarity on the part of administrators and managers with health services R & D is a major obstacle, and there is much overlap between the interests and activities of health services investigators and administrators. The categories of professionals for research, for which the new Institute would be responsible, and the training needs of administrators, for which the Bureau of Health Manpower Education would be responsible, are described in Appendix G.

The Panel further recommends that the National Health Care Research Institute support a number of independent Health Care Research Centers. These free-standing

Centers should usually be distinguished from the Health Care Development Units described above that are involved directly or indirectly in the provision of personal health services, but in a few cases it may prove desirable to combine them. The Health Care Research Centers should be largely funded by the National Health Care Research Institute but managed by universities (individually or through consortia), non-profit, not-for-profit organizations, industries, and professional or institutional associations. Their concerns could include fundamental and applied research and many would undertake interdisciplinary research, but they might have different response times and priorities than are customary for most university departments and research institutes.

While general Health Care Research Centers might exist, specialization is also needed. The areas to be studied include, for example: organizational, administrative and managerial problems; manpower problems; economic, fiscal and accounting problems; attitudinal and behavioral problems of providers and consumers; health care technology; information handling problems; biomedical engineering; quality assessment problems; and licensure, medical ethics, malpractice, and other medico-legal problems.

It is by no means easy to attract first-rate economists, epidemiologists, engineers, clinicians, sociologists and other needed professionals into the field of health services research. These Centers can be instrumental in overcoming this problem if they are closely related to universities so that the professionals can maintain their ties with their primary disciplines. If the proposed National Health Care Research Institute can develop close working relationships with the Centers, they may also become an important channel for communication and exchange

of personnel between the government sector and the academic community. In this connection, a variant of the Clinical Associates Program successfully pioneered by NIH should be introduced.

To accomplish its mission the new Institute will need to develop and retain a strong staff of professionals who themselves conduct research. In the experience of NIH, the presence of active investigators provides administrators and managers of grants with professional colleagues and intellectual stimulation. This enhances the entire enterprise and keeps the research and research training programs in close touch with the field. Most of the research conducted by the staff of the Institute would be concerned with analyses of secondary data, but some research, including primary data collection, might be conducted in collaboration with extramural colleagues in universities and other research organizations.

In addition to promoting basic research and the training of research personnel, the new National Health Care Research Institute would also be responsible for facilitating communication of the results of health services R & D. The special needs of these three functions, and the types of support mechanisms they require, are summarized in the following sections.

a. Research

There is a dearth of trained and experienced health professionals who who appreciate the value of health services research and who have the experience to design and direct useful research projects and evaluation. The gradual dismantling of the Public Health Service, the realignment of the Commissioned Corps, the frequent reorganizations in HEW and the slow pace with which schools of public health and schools of medicine have changed their curricula

to meet contemporary health problems have all contributed to this state of affairs.

In understanding health services research, it it important to distinguish between problems that can be the object of research and those that involve policy decisions or demonstrations. It is also important to appreciate that some problems are not feasible to tackle until the necessary information base or organizational setting has been developed. There is, in addition, a need to understand time factors in the conduct of health services R & D. Analysis of secondary data, readily available in tabulated form, has a quite different time frame from that required for a household survey to determine, for example, reasons for non-enrollment in a new health care plan. Both are short-term projects in relation to the time required for planning and starting a prototype health care system for 100,000 people that will permit comparative studies of new manpower to be made. Simulation of the cost-effectiveness of a new emergency bed-allocation system for a metropolitan area can be accomplished in weeks if the data are available; comparisons of the impact on utilization of co-payments in government health insurance programs in several different countries may take years.

The contributions that can be expected from different kinds of research need to be understood. Each has its place but no one approach is suitable for all forms of health services research. For example:

1) Controlled clinical trials of therapeutic regimens, administrative practices, and organizational patterns can be used to assess their relative efficacy and costs, provided the cooperation of the medical

profession and patients can be secured.

2) Analyses of comparable data, properly standardized, derived from operating institutions and health care systems can be used for evaluating services and policies.

3) Extrapolations and projections derived from secondary analyses of data arising from experiences that are not strictly comparable but nevertheless provide useful information can contribute to conceptualizing and planning services or demonstrations.

4) Scholarship based on historical accounts of experiences with health care organizations, manpower, financing and evaluation in the United States and in other countries can be used as a basis for developing policy options.

Perhaps the least well-understood function in health services R & D is the process of evaluating health services, institutions and systems and the conditions that are necessary and sufficient. The crux of the problem is often to define precisely the goals and priorities of an institution or system. In the case of neighborhood health centers, for example, is the primary object to provide a point of entry into the established medical care system, to provide a full range of health and social services, or to provide a focus for community action and job opportunities? What is the "neighborhood" or target population? These questions must be settled before suitable measures of outcome can be devised; the measures of outcome in turn determine the collection of data for evaluation.

b. Training

The rule of thumb in the experience of NIH and the National Academy of Engineering is that an annual investment of $80,000 to $100,000 is required for each academic investigator, and industry estimates that it requires $30,000 to $50,000 to support an R & D engineer. Using these guides, annual national expenditures on health services R & D of about $315 million would be expected to support at least 3,200 professionals and as many as 10,000. The best estimate available from NCHSR&D suggests that no more than 400 persons with professional training for the field, principally Ph.D.'s and M.D.'s with some Masters-level technicians, are currently engaged to any substantial extent in health services R & D. NCHSR&D projections of the minimal national requirements for full-time professionals in the field of health services R & D are shown on Table 1.

Table 1

PROJECTED CUMULATIVE NATIONAL NEEDS FOR MANPOWER IN HEALTH SERVICES R & D
1972-77

Category	Fiscal Year 1972	1974	1977
Basic Disciplines Related to Health Services R & D (Ph.D.'s): Economics, Sociology, Operations Research, Biomedical Engineering, Industrial Engineering, Systems Analysis and Statistics	500	750	1,000
Physicians with Health Services R & D Capabilities (M.D.'s plus M.Sc., Ph.D., or D.Sc.): Epidemiologists and Health Services Investigators	250	500	1,000
TOTAL	750	1,250	2,000

Source: See Appendix H

The needs for adequately prepared manpower at all levels should be related to the national investment in health care. Comparisons with other social systems or with industry do not seem helpful. From the information presented to the Panel by its consultants and from its review of the documents available to it, as well as the general semblance of disarray that characterizes the health care field generally, the Panel concludes that there is an urgent need for improvement in both numbers and quality.

c. Communications

The new Institute should establish a major unit responsible for the timely and enlightened communication of ideas, concepts, methods, data sources, research-in-progress, results, findings and implications from health services R & D nationally and internationally. New information should be disseminated rapidly, with maximum effort directed at prompt diffusion through the health care industry, including Federal agencies responsible for health services. A variety of media should be used, including computerized storage and retrieval systems, microfiches and suitable periodicals and other publications. The unit should publish or support a monthly journal, abstracting national and international literature bearing on health services. The best model is Hospital Abstracts, a monthly survey of world literature, prepared by the Department of Health and Social Security of the United Kingdom. The proposed new publication, however, should be broader in scope and coverage and might be called Health Services Abstracts.

A second responsibility is to establish a first-rate, timely publication service for research reports, monographs, state of the art papers and related

material in the field. This could be done through special arrangements with the Government Printing Office or through contracts with private publishers. Current periodicals, and possibly new ones, should be subsidized so that more frequent and larger issues can be produced and subscription rates reduced. Aspects of the publication programs of CDC, the former Hill-Burton Program, NIMH, NCHS, SRS and SSA are helpful in presenting information, research findings, discussions of problems and descriptions of programs. The current publication program of the Nuffield Provincial Hospitals Trust in the United Kingdom is a particularly useful model to emulate.

d. Support Mechanisms

The mechanism for the support of research and research training are well founded on experiences in NIH and similar units elsewhere in HEW. Several types of support seem especially useful at the present time in order to increase the country's capability in health services R & D.

To attract capable individuals to a new field, long-term stable support should exist. Accountability, performance and periodic peer review are essential, and a climate of trust and cooperation should characterize the relationship between the funding agency and the professional or student.

The prospects for careers in government at all levels and in universities, as well as opportunities in the health care industry generally, including health maintenance organizations, health care systems, hospitals and clinics, fiscal intermediaries, and industries concerned with technology in the health care field, should be examined and publicized by the National Health Care Research Institute.

1) Research Program and Project Grants

Research training can only take place in the presence of active research being undertaken by first-rate investigators who teach as they learn. Proximity to or involvement with health professionals and institutions is usually desirable and frequently essential. When economists, engineers, epidemiologists, sociologists and statisticians are given substantive experience with health services and health services information, even if it is secondary data, the prospects of their entering the field and contributing are likely to be enhanced. There is, therefore, a continuing need to support the underpinning of the entire health services R & D enterprise with stable, long-term research support for groups, departments, units, institutes or centers affiliated with universities, non-profit, not-for-profit and for-profit organizations.

2) Research Training Grants

Training grants that provide stability and continuity of support for faculty and students are essential to increase the flow of well-trained professionals competent to conceptualize the problems and undertake health services research, development and evaluation, as well as to develop statistical and information systems and to conduct policy analysis.

Support can be provided either for entire institutions or for departments and should be available for those disciplines that are both fundamental to health services research, such as epidemiology, economics, engineering, sociology and statistics, and for those that are concerned

with the more applied aspects of health services R & D.

3) Research Career Development Awards

The Research Career Development Awards program should be reinstated and vigorously pursued with more generous funding. Such a program of career awards in health services R & D was announced in 1969. It offered continuing, stable support, initially for five years but renewable for successive five-year periods, for investigators from any suitable discipline who were prepared to make full-time commitments to health services research. Only six candidates were funded and the program was discontinued because of lack of money. The negative impact of this kind of "on-again-off-again" policy on a new field when competent people are extremely scarce cannot be overemphasized.

4) Industrial Grants

The exclusion of profit-making organizations from receipt of grants from HEW does not appear to be in the best interests of the country or the field. Policies in this regard should be reviewed and revised to encourage greater participation by the private sector.

Finally, the Panel recommends that the new National Health Care Research Institute use peer review as a basis for decision-making and rely primarily on the grant mechanism, with judicious use of contracts when the program needs warrant them and when the Institute has the professional competence to undertake substantive research efforts in collaboration with colleagues in external institutions. Forward funding or other types of long-term, stable support for investigators with demonstrated competence should be provided in order to retain them in the field

and to encourage others to enter it.

About 16 percent of the Federal health services R & D budget of HEW should be devoted to the work of the National Health Care Research Institute, with at least one-third allocated for training new research professionals.

5. The Panel recommends that the EXECUTIVE OFFICE OF THE PRESIDENT assume responsibility for COORDINATION of the Federal government's investment in health services R & D through administrative and budgetary mechanisms.

The first four recommendations are based on the Panel's conclusion that realignment and consolidation of the different functions of health services R & D will make better use of available funds and professional personnel in HEW and will generally strengthen the field. The proposed Policy Analysis Group, the Bureau of Health Statistics, and the Division of Health Care Development will give distinct emphases to three major activities presently located at different organizational levels and in different administrative enclaves that now appear to be successfully isolated from purposeful collaboration. The proposed National Health Care Research Institute is a somewhat different situation; here the problem is to give stability, visibility and independence to a necessary function that has little immediate payoff and is therefore especially vulnerable in the political arena. Coordination of these four functions within the Department is essential if their collective potential is to be realized.

The problem of intra-governmental coordination is even greater than that of coordination in HEW. In particular, the Panel recognizes substantial opportunities for developing, testing and evaluating new health care arrangements by VA and DOD, both of which have clearly defined populations that are prerequisites for

much work in health services R & D. Similarly there are experiences and programs that can be exchanged among departments and agencies, and experiments and demonstrations of mutual value that can be undertaken. OEO currently organizes health centers and "networks" that are uncoordinated with those supported by HEW. SSA, SRS, VA, and DOD use different terms, definitions, classification schemes and data aggregation policies. Useful experience is lost insofar as simple comparisons and standardization of experience is concerned, and opportunities are missed for record-linkage as a means of reducing unnecessary utilization or of studying the natural history of disease. Given the high costs of data acquisition, this lack of coordination and failure to maximize resources can only be regarded as extremely wasteful. Most of the professionals in health services R & D in the Federal government recognize the need for coordination and are interested in working more closely together; however, it requires strong commitment and leadership to overcome the organizational barriers between Federal departments, agencies and units.

The Panel has considered a variety of coordinating mechanisms. Some of these are intra-governmental and others involve only HEW. The problems, issues and expenditures on health are certainly of sufficient magnitude to command attention comparable to that assigned to the space program or to large-scale technological initiatives. For example, the problem might be addressed by a special Cabinet Committee or by the Domestic Council or a subcommittee reporting to it. For really effective coordination the budgetary review process in the Office of Management and Budget should be involved. This process might include close consultation with a Federal Health Services Council established by the Office of

Science and Technology for this purpose. This body would be analogous to the Federal Council on Science and Technology, chaired by the President's Science Advisor, and would consist of senior representatives of those Federal departments and agencies involved in the provision, regulation or support of health services and health services R & D. It could be augmented by extra-governmental consultants as circumstances warranted.

An annual report by the Council, summarizing the country's major health problems and needs and the progress of health services R & D in meeting these needs, should prove a useful contribution to public awareness of the issues and alternatives for progress. The efforts of all Federal agencies concerned with the nation's health care could be identified and related to expenditures in a coherent fashion. The advantages of both diversity in health services R & D and purposeful coordination with prudent use of scarce resources could be pursued.

Within HEW, we recommend a strong committee chaired by the Secretary to coordinate the four functions of health services R & D that we have identified and the activities of the organizational structures we propose. This committee should be composed of the heads of the four health services R & D units and the administrators of FDA, SRS, SSA and HSMHA; it would also be desirable to include representatives of DOD, OEO, and VA.

The Panel sees considerable merit in establishing an extramural advisory panel, perhaps analogous to the former National Advisory Health Council, to perform an additional coordinating function and recommends that this method be adopted also. The extramural advisory panel should be composed of representatives of consumers (the public) and providers (professional, institutional and fiscal

interests). It should be chaired by the Secretary of HEW, or his designee, and should have a permanent secretariat based in the Policy Analysis Group. The flow of political and social concerns, information, the results of R & D efforts and of policy analysis options could be reviewed and debated by this panel. The definition of problems and the assignment of R & D tasks and responsibilities is more likely to proceed in an orderly fashion if periodic accountability to an external advisory body is a regular expectation.

6. The Panel recommends, as a means of enhancing the potential of health services R & D, that an independent NATIONAL COMMISSION ON HEALTH SERVICES be established and funded by a consortium of PRIVATE FOUNDATIONS to consider organizational, administrative, and educational arrangements, incentives, and support mechanisms that will encourage and assist universities, health care institutions, professions, government, and industry in improving the health care system and the health services of the country.*

The Panel's charge was limited to the problems of health services R & D and its potential for improving the country's health care system and its health status. For two reasons much of our discussion and most of our recommendations focus on the Federal government's opportunities for furthering these goals: first, most of the money for health services R & D flows through the Federal government, and second, most of the policy issues that require or are susceptible to resolution with respect to the furtherance of health services R & D lie within the province of the Federal government. However, although Federal spending and Federal

* Dr. Robinson was not present during the discussion of this recommendation and abstains.

initiatives in policy analysis, information and statistics, development, research and research training are necessary conditions for constructive health services R & D, they are not sufficient conditions. The great bulk of the country's health services are provided outside the Federal establishment and the great bulk of health services R & D is conducted in non-governmental institutions, agencies and organizations.

To exploit the potential and reap the benefits of health services R & D, the Panel recognizes that the health care establishment and the health services industry of the country must be responsive to change and to the ideas that we have advanced. Without greater appreciation and understanding of health care problems, issues and options on the part of universities, health care institutions, professional associations, state and local health departments, health planning agencies and industry, our recommendations for the vigorous pursuit of health services R & D will have limited prospects for implementation. Effective participation by the non-Federal sector is of special importance in the case of our recommendations for establishing extramural Institutes for Health Policy Studies, Health Care Development Units, Health Care Research Centers, State and Local Health Statistics Centers, and for broadening the base of research and research training.

In addition, there is the pressing problem of relating the education of health professionals--general physicians, specialists and super-specialists, nurses, dentists, physicians' assistants, health care administrators and managers and other professional and technical personnel--to the changes occurring in the country's health care arrangements. Millis in his report to the Board of Directors

of the National Fund for Medical Education* has called for establishment of a national commission on medical education. The drawback with a commission of this kind is that it cannot arrive at sound conclusions about medical education and its financing without considering the larger issue of the context in which health care is to be organized, health professionals educated and medicine practiced. The medical profession shares the responsibility with other professions and with the consumers for establishing the nature and objectives of the health care system and the relations of those who work in it to each other. We believe that the problems themselves, and the roles and contributions of the different institutions, agencies and organizations in the health field, are sufficiently interdependent to warrant a commission with a broader mandate.

Defining the problems, debating the issues and specifying the options will help to create the climate for constructive change in the private sector and will give a new sense of direction to the R & D effort. Examples of some of the major issues that we believe the proposed Commission on Health Services should address and that should, in turn, be the subject of health services R & D are:

a. Medical Manpower

Who is to provide primary medical care? How are the professional and other personnel to be trained? How many should be trained? How do they relate to one another? Where should they work? How do they relate to other levels of patient care?

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* Millis JS: A Rational Policy for Medical Education and its Financing. New York, The National Fund for Medical Education, 1971

What types and how many physicians should be trained for practice in different medical specialties? Should training programs be determined by the service needs of current institutional commitments, by the numbers of residencies approved for training in each of the twenty medical specialties, or by epidemiological estimates of the prevalence of conditions that can be managed effectively by each specialty? How can obsolescence of specialties and of knowledge, on the one hand, and prompt introduction of unforeseen scientific and technological advances, on the other, be taken into account in long-range plans for medical education?

There is much interest in the "health care team", in new kinds of middle-level health personnel, and in redefinition of traditional roles of physicians, nurses and other health personnel. How should health manpower be deployed to meet the needs of the system as a whole and to increase productivity? What is an effective functioning team? How should tasks be assigned or delegated? What kinds of people should be trained to undertake what functions? Should training take place in isolated schools and programs or under some form of consolidated and coordinated auspices? The proposed Commission can serve an especially useful role by bringing together the different professional groups to reconsider their functions and relationships in the context of the changing health care system.

b. Health Care Administration

What kinds of administrators do we need for our health care systems, institutions, and agencies? Can traditional training programs in public health administration and hospital administration be expanded to meet this

need? How should these individuals be trained to manage and monitor the health care systems of the country?

c. Technological Innovation

The continuum from discovery or invention through the construction of prototype devices, instruments and systems, to the phases of testing and evaluation for efficacy, field trials of cost-effectiveness, production, marketing and achievement of widespread acceptance and use is an unusually lengthy and complicated sequence. Universities, industries, health care institutions, systems and professions are all involved in the process and affected in varying degrees by patent policies, government funding, market characteristics, standards, controls and incentives. How can useful knowledge derived from biomedical and bioengineering research be translated into services promptly and efficiently at the lowest cost? Coupling of the various components in this chain of events is essential if the potential of technology is to be realized in a complex, pluralistic social system such as health care.

d. Health Departments and Planning Agencies

Federal health legislation in the past decade has to a large extent circumvented state and local health departments and the Federal bureaucracies that have administered traditional categorical services programs. In an era when the major priorities were basic environmental sanitation, control of infectious diseases, the operation of acute and custodial hospitals, the collection of vital statistics, and the administration of categorical programs for the poor, the public health departments did an

excellent job. In western industrialized countries, however, the problems have become more complex and diverse. With rare exceptions, health departments have not changed substantially with the times. Public health is an integral component of medicine and the health care enterprise; it too is now called upon to change. What is the future of state and local health departments? What part should they play in improving the country's health care system? What should be their relation to the new health planning agencies and the proposed state and local health information systems? Who should be responsible for franchising and monitoring the personal and environmental health services for a state or locality and for seeing that the needs of populations within given geographic or political areas are met?

e. Schools of Public Health

Schools of public health should be a major national source of ideas, methods, skills and perspectives on the problems of health care organization and one of the major sources of trained personnel to study the problems, develop and manage the systems, administer the health departments and planning agencies, generate statistics and information that are needed to monitor the health needs and health services of communities, conduct health services R & D, and initiate and analyze policy options. All too frequently these schools participate in dysfunctional competition with schools of medicine to the detriment of both and the neglect of pressing national problems. How can these institutions be encouraged and supported to become more responsive to contemporary health care problems? How can they be integrated into the mainstream of the health care enterprise in university medical centers?

What kinds of health professionals should they seek to educate? The Panel believes that the future of schools of public health is sufficiently critical to the nation's health services R & D effort to merit special attention by the proposed National Commission on Health Services.

f. University Health Sciences Centers

Health services R & D is particularly dependent on the talents that currently reside not only in schools of public health and schools of medicine and their teaching hospitals, but also in schools of engineering, schools of allied health professions, schools of nursing, departments of economics, operations research and sociology and, to a lesser extent, in schools of dentistry, schools of law, schools of architecture, and other primary university departments. The problems of coordination in the Federal government are only exceeded in complexity by those in the universities. Large organizations, particularly when bureaucratized, change slowly. When creative individuals wish to merge their efforts in interdisciplinary groups to establish new disciplines or professions or to tackle new problems, the traditional departmental and school structures of the university are subjected to major stresses. How can university health sciences centers respond more effectively to the problems of the health care system? What organizational patterns will provide the greatest support and flexibility for interdisciplinary health services R & D and the training of new investigators?

The Panel recommends that a consortium of private foundations establish and fund the proposed National Commission on Health Services on a continuing basis. A wide variety of groups, professions and institutions, to say nothing of the public, have a vested interest in the deliberations and recommendations of such a commis-

sion. Presidential commissions are frequently constrained by political timetables and events. Provider-sponsored boards of inquiry under such auspices as the Association of American Medical Colleges, the American Medical Association, or the American Hospital Association have difficulty persuading others of their objectivity, and consumer groups rarely have the resources to mount the kind of inquiry needed.

What the Panel envisages is not a commission on health care costs, not a commission on health insurance, or one on efficiency, facilities or manpower, not one on medical education or nursing education, or on hospitals or group practice or technology in health care, not one on licensure, malpractice or accreditation problems, but a National Commission on Health Services with a broad mandate to look at the interplay of these and other elements of our health care system. A small body of distinguished citizens above the fray should hear arguments, review briefs, weigh the evidence and suggest measures that would strengthen the entire health care enterprise in the United States.

Only an independent Commission is likely to have the objectivity and credibility to educate and persuade health care providers, teachers, administrators, and politicians that improved mechanisms for change must be established both within and between the component health professions and organizations that participate in our pluralistic system. Federal funds and administrative leadership are necessary ingredients but they are not sufficient. Intellectual stimulation is also essential. The National Commission on Health Services should propose measures that will encourage further evolution and desirable change in the future, and through a substantially augmented R & D effort, help all citizens reap the the benefits of biomedical research.

V. FUNDING

The nation's investment in biomedical research since World War II has been remarkably successful. As a result, medical care now has efficacious preventive and therapeutic knowledge that the majority of Americans believe can and should be effectively and efficiently applied. This view is reflected in the changing balance in recent years between Federal investment in biomedical research and investment in health services R & D (Table 2). Because the definition of the latter has varied over time and in different agencies of the Federal government, in part due to lack of familiarity with the field and in part associated with the desirability of demonstrating interest or of obscuring activity, the figures for these expenditures can only be regarded as approximations.

Table 2

FEDERAL EXPENDITURES FOR HEALTH SERVICES R & D AND BIOMEDICAL RESEARCH IN RELATION TO NATIONAL AND FEDERAL HEALTH EXPENDITURES
1967-72 (millions of dollars)

Expenditures	Fiscal Year					
	1967	1968	1969	1970	1971	1972
National Health Expenditures	47,900	53,600	59,900	67,200	75,000	81,000
Federal Health Expenditures	10,801	14,132	16,556	18,072	20,698	22,247
Health Services R & D						
Amount	82	100	166	179	222	238
Percent of National Health Expenditures	0.2	0.2	0.3	0.3	0.3	0.3
Percent of Federal Health Expenditures	0.8	0.7	1.0	1.0	1.1	1.1
Biomedical Research						
Amount	1,364	1,547	1,528	1,582	1,747	1,878
Percent of National Health Expenditures	2.9	2.9	2.6	2.4	2.3	2.3
Percent of Federal Health Expenditures	13	11	9	9	8	8

Source: See Appendix H

Although Federal expenditures on health services R & D trebled between 1967 and 1972, increases in the percentage invested in relation to national and Federal health expenditures were more modest, particularly in terms of constant dollars. The former increased from 0.2 to 0.3 percent and the latter from 0.8 to 1.1 percent. On the other hand, the percentage invested by HEW in health services R & D was slightly larger; in 1970 it was 1.2 percent of HEW's health budget and in 1971 it was 1.3 percent (Table 3).

Table 3

HEW EXPENDITURES FOR HEALTH SERVICES R & D
IN RELATION TO HEW EXPENDITURES FOR HEALTH
1970-71 (millions of dollars)

Expenditures	Fiscal Year	
	1970	1971
HEW Health Expenditures	13,034	14,977
HEW Health Services R & D		
Amount	161	189
Percent of HEW Health Expenditures	1.2	1.3

Source: See Appendix H

The Federal government now provides about 70 percent of the national investment in health services R & D and industry about 20 percent (Table 4). The extent to which the public and private sectors should share responsibility for the nation's health services R & D is a matter of debate, but there can be little doubt that the benefits accrue to the entire population and that Federal investment is fully justified in the public interest. In addition, it seems reasonable to expect that the larger the Federal component of the nation's health expenditures, the larger should be the

Federal government's investment in R & D in order to achieve effective and efficient use of the resources it is providing.

The amount of support that can be anticipated from non-governmental sources, particularly industry, will depend to a considerable degree on the extent to which health care is organized, markets are identified and aggregated, incentives created and disincentives minimized.

In light of the urgent need to reform the health care system, its professions and institutions, the opportunities for substantial leverage on the system through imaginative investments by private foundations should be recognized; their current contribution of only five percent of the national support for health services R & D hardly seems to be in keeping with the pluralistic traditions of the health care arrangements in the United States.

Table 4

ESTIMATES OF NATIONAL FINANCIAL SUPPORT FOR HEALTH SERVICES R & D
1970-71 (millions of dollars)

Source of Funds	Fiscal Year	
	1970	1971
Federal Government	$178.9	$222.4
State Governments	4.5	5.0
Local Governments	0.9	1.0
Universities and Colleges	3.3	3.3
Private Foundations	17.2	17.2
Other Non-profit Institutions	10.0	10.0
Industry	50.0	55.0
TOTAL	$264.8	$313.9

Source: See Appendix H

The present level of Federal investment in health services R & D of one percent of Federal health expenditures includes health services R & D conducted by VA, OEO and other Federal agencies, as well as the one percent of selected Federal programs currently set aside for their evaluation. The general division of funds is shown in Table 5. Again it should be mentioned that the figures are derived from categories used in preparing the Federal budget, and are not sufficiently refined to single out all health services R & D. It seems clear that the NIMH and the Maternal and Child Health Service of HSMHA both support health services R & D and yet the funds are not so identified in the records of the Office of Management and Budget.

Table 5

DIVISION OF FEDERAL EXPENDITURES FOR HEALTH SERVICES R & D
1970-71 (millions of dollars)

Agency	Fiscal Year 1970		Fiscal Year 1971	
Department of Health, Education, and Welfare		$161.4		$189.1
Health Services & Mental Health Administration	135.1		160.2	
Regional Medical Programs	66.6		74.7	
NCHSR&D	25.5		37.3	
Community Health Planning	16.7		20.4	
National Center for Health Statistics	8.2		9.2	
Direct Patient Services	7.5		7.6	
Disease Control	6.1		7.3	
Office of the Administrator	2.5		2.7	
Medical Facilities Construction	2.0		1.0	
National Institutes of Health	26.3		28.9	
Veterans Administration		14.1		16.2
Department of Housing and Urban Development		1.4		8.8
Office of Economic Opportunity		1.3		8.0
Other Agencies		0.7		0.3
TOTAL		$178.9		$222.4

Source: See Appendix H

About 70 percent of these funds ($160 million in 1971) were spent by HSMHA. In addition, it is worth noting that NCHSR&D, from which so much has been expected, controlled only about one-fourth of the health services R & D budget in HSMHA and about one-sixth of total Federal expenditures in this field in 1971.

There are no clear guidelines for the levels of support that should be provided for health services research, development and evaluation. Industry spends an average of four percent of gross annual sales on R & D, but there are wide variations. Another rule of thumb states that for every dollar spent by industry on successful fundamental research, $10 is spent on development and $100 on all tasks involved in the introduction and marketing of the new idea or product.

The Panel is of the opinion that effective coordination and realignment of tasks could make much better use of the resources currently available. Money alone will not solve the problems identified, but its thoughtful, coordinated deployment can make it maximally effective. Increased flow of dollars for health services R & D must go hand in hand with measures to redirect and coordinate the entire effort within the Federal establishment, and with measures to develop the professional manpower, the information base and other essential resources for these activities. Increased funding for health services R & D should not be undertaken at the expense of basic investigation into the causes and treatments of diseases. Without aggressive investment in biomedical research, health services have little to contribute. At the same time, it should be recognized that access to the fruits of biomedical research depends in large measure upon the organization and financing of effective and efficient health services. The Federal government is currently spending one-eighth as much on health services R & D as on biomedical research (Table 2), and

this is probably a fair estimate of the ratio of spending for the country as a whole. Given the traditions of Federal R & D investment in the defense, space and nuclear energy fields, as well as the investment in biomedical research, it can scarcely be argued that health services R & D is over-funded in relation to either Federal or national expenditures on health. Indeed, it is more reasonably argued that in view of the size of the health care "crisis", the Federal government's stated objectives, and the public's expectations, we should increase the percentage of Federal funds invested in improving the efficiency, availability and quality of health services at this point in time.

The Panel suggests, however, that an overall national investment in health services R & D of about one percent of total national health expenditures should be adequate to support a flourishing and effective R & D effort in this field. It also appears reasonable to apply approximately the same percentage to the Federal budget for health, including Medicare and Medicaid, in determining the Federal government's level of support for health services R & D. Depending upon the nature and extent of its responsibilities for financing health care, perhaps through national health insurance, annual health expenditures by HEW in fiscal year 1974 could amount to $35 billion or more. One percent applied to this base in 1974 would generate a potential health services R & D budget of $350 million annually, which is substantially more than the present level of Federal funding and should be enough to support the activities discussed in the Panel's recommendations. Within this range, it should be possible to develop and defend a health services R & D budget for HEW that addresses many of the immediate health care problems discussed in this review and at the same time provide resources for ideas and proposals that are

new and different and that arise from the creative involvement of those concerned with improving health care.

The Panel suggests that the health services R & D budget of HEW might be distributed among the major areas of policy analysis, information and statistics, development, research and research training, in accordance with Table 6.

Table 6

PROPOSED PERCENTAGE DISTRIBUTION OF HEW EXPENDITURES ON HEALTH SERVICES R & D

Function	Percentage	
Policy Analysis		
Policy Analysis Group, Office of the Secretary, HEW	0.2	
Long-range Health Policy Studies, Intra-governmental or Extra-governmental	0.8	
		1.0
Information and Statistics		
Bureau of Health Statistics, Office of the Secretary, HEW		8.0
Development		
Division of Health Care Development, HSMHA	65.0	
Health Care Development Units, HSMHA	10.0	
		75.0
Research and Research Training		
National Health Care Research Institute, HSMHA		
Research	10.0	
Research Training	6.0	
		16.0
TOTAL		100.0

Apart from investment in health services R & D, the Panel underscores the need for a major investment, accompanied by a reorientation of educational programs, in training programs for health care administration and management. The dimensions of this problem have been discussed previously; clearly additional funds for this purpose should be provided through the Bureau of Health Manpower Education in NIH.

Undoubtedly state and local governments, private foundations and industry should all assume responsibility for larger proportions of the total investment in health services R & D. The extent to which this can be accomplished will depend in large measure upon Federal leadership in establishing and supporting the field, but there is also much room for creative innovation from the private sector.

VI. IMPLEMENTATION

The redistribution of tasks and responsibilities in health services R & D recommended by the Panel should not be difficult to implement since no major reorganization within the Federal government is proposed. Most of our recommendations appear to be consistent with the thinking and indeed with recent organizational changes in HEW. Our sixth recommendation does involve a deliberate initiative from the private sector. The following steps are required for implementation.

Policy Analysis Group: Presumably no new legislation is required to establish this group, but a new line item in the HEW budget may be needed. The problem will be to give credibility to the idea of a permanent, non-partisan staff of trained civil servants, to recruit first-rate professionals from the Department and from industry and academic circles, and to provide more visibility to the opportunities for meaningful careers in health care administration and policy analysis.

The creation of one or more free-standing, federally funded Institutes for Health Policy Studies might require additional legislation, although they could probably be initiated and supported through long-term contracts. If the Institute of Medicine or some other established institute were to undertake this responsibility, the task would be simplified considerably.

Bureau of Health Statistics: NCHS is now attached in a staff relationship to the Office of the Administrator of HSMHA. It already enjoys close working relationships with the Office of Research and Statistics in SSA and with those responsible for designing information systems in NCHSR&D. It should be the responsibility of the Task Force we have proposed to examine the need for new

legislation to set up the Bureau headed by a Commissioner, and to develop a budget as the basis for requesting new and specific appropriations. There are certain risks involved in consolidating funds and responsibility for health statistics and information now dispersed among a number of departments and agencies, but we believe these risks are offset by advantages in having the country's health information system examined as a whole by Congressional committees and by the Executive branch of the government.

Division of Health Care Development: A new Division of Health Care Development has already been established in HSMHA. Whether or not specific components like the Regional Medical Programs Service and the Comprehensive Health Planning Service retain a measure of separate identity, new legislation is needed to consolidate the existing legislation and appropriations. The current procedures encourage fragmentation, fiscal gerrymandering, confusion in the eyes of providers and consumers, administrative waste and counterproductive bureaucratic rivalry. We recognize that unifying legislation will not be easy to achieve, but we believe that it is urgently needed and should be actively pursued by HEW and Congressional supporters of health services R & D.

Undoubtedly the Division of Health Care Development will require the lion's share of health services R & D funds, but its prospects for real impact will depend upon support and direction from the Policy Analysis Group, the enunciation of national health policies, an effective information system and adequate numbers of trained professionals.

National Health Care Research Institute: Essentially the Panel's recommendation is that NCHSR&D be converted to the new Institute, that its responsibilities

for development be assigned to the Division of Health Care Development and that its responsibilities for establishing definitions, terms, classification schemes and information systems be assigned to the Bureau of Health Statistics. In turn, its responsibilities and its funds for fundamental and applied research and for research training should be increased substantially. To this end, separate legislation creating the National Health Care Research Institute may be desirable, although the existing authority for NCHSR&D may be adequate.

Coordination: The realities of the situation are that coordination is a frustrating assignment and difficult to accomplish in the Federal government. Appropriate models exist for the kinds of Federal and departmental coordination we believe to be central to the entire health services R & D effort. What we need are one or two strong advocates who can give health services R & D the necessary leadership and see to it that the Federal government makes a coordinated and concerted effort to improve the country's health care system.

National Commission on Health Services: The need is great and the opportunity unique for a consortium of private foundations to make a substantial contribution to the American health care system. Open and dispassionate discussion of the issues in our pluralistic society should help to guide decision-making and to assure the prudent use of health services R & D in the public's interest.

APPENDIX A

Individuals Consulted by the Panel at its Meetings

Stuart Altman, Ph.D.	Deputy Assistant Secretary for Health Planning and Evaluation, Department of Health, Education, and Welfare
Colonel William S. Augerson	Military Assistant for Medical and Life Sciences, Office of the Director of Defense Research and Engineering, Department of Defense
Lewis M. Branscomb, Ph.D.	Director, National Bureau of Standards, Department of Commerce
J.H.U. Brown, Ph.D.	Interim Associate Deputy Administrator for Development, Health Services and Mental Health Administration
Howard R. Davis, Ph.D.	Chief, Mental Health Services Research and Development Branch, Division of Mental Health Services Programs, National Institute of Mental Health, Health Services and Mental Health Administration
James F. Dickson, M.D.	Program Director, Engineering in Biology and Medicine, National Institute of General Medical Sciences, National Institutes of Health
H. Bruce Dull, M.D.	Assistant Director, Epidemiological Intelligence Service, Center for Disease Control, Health Services and Mental Health Administration
Merlin K. DuVal, M.D.	Assistant Secretary for Health and Scientific Affairs, Department of Health, Education, and Welfare
Benny B. Hall	Deputy Administrator, Health Services and Mental Health Administration
Brig. General George J. Hayes	Principal Deputy Assistant Secretary of Defense (Health and Environment), Department of Defense
Emanuel Horowitz, Ph.D.	Deputy Director, Institute for Materials Research, National Bureau of Standards, Department of Commerce
Robert M. Krughoff, J.D.	Director, Office of Research and Development Planning, Office of the Assistant Secretary for Planning and Evaluation, Department of Health, Education, and Welfare
S. Ake Lindgren, M.D.	Deputy Chief Medical Officer and Director, Health Planning Department, Swedish Board of Health and Welfare, Stockholm
Harold Margulies, M.D.	Director, Regional Medical Programs Service, Health Services and Mental Health Administration
Gordon McLachlan	Secretary, Nuffield Provincial Hospitals Trust, London
A. Wendell Musser, M.D.	Assistant Chief Medical Director for Planning and Evaluation, Veterans Administration

Marc J. Musser, M.D.	Chief Medical Director, Veterans Administration
Dorothy P. Rice	Chief, Health Insurance Research Branch, Social Security Administration
Gerald R. Riso	Interim Deputy Administrator for Development, Health Services and Mental Health Administration
H. Rocke Robertson, M.D.	Leader, Health Sciences Study, Science Council of Canada, Ottawa
Joseph M. Rule, Ph.D.	Development Department, E. I. du Pont de Nemours, Inc., Wilmington
Paul J. Sanazaro, M.D.	Director, National Center for Health Services Research and Development, Health Services and Mental Health Administration
Carl A. Smith, M.D.	Associate Director for Health Affairs, Office of Economic Opportunity
DeWitt Stetten, Jr., M.D.	Director, National Institute of General Medical Sciences, National Institutes of Health
Milton Turen	Assistant Chief (Health and Medical), Office of Management and Budget
Robert van Hoek, M.D.	Interim Deputy Administrator for Health Services, Health Services and Mental Health Administration
Keith Weikel, Ph.D.	Director, Division of Health Evaluation, Office of the Assistant Secretary for Planning and Evaluation, Department of Health, Education, and Welfare
Howard West, M.P.H.	Director, Division of Health Insurance Studies, Social Security Administration
Vernon Wilson, M.D.	Administrator, Health Services and Mental Health Administration
Theodore D. Woolsey	Director, National Center for Health Statistics, Health Services and Mental Health Administration

Individuals Contributing Written Comments on Health Services R & D

Joel J. Alpert, M.D.	Director, Family Health Care Program, Children's Hospital Medical Center, Harvard University
Donald O. Anderson, M.D.	Professor of Health Care and Epidemiology, University of British Columbia
Odin W. Anderson, Ph.D.	Professor and Associate Director, Center for Health Administration Studies, University of Chicago
G. Octo Barnett, M.D.	Director, Laboratory of Computer Science, Massachusetts General Hospital

Lester P. Breslow, M.D.	Director, Center for Health Services Research and Development, University of California at Los Angeles
Gordon Chase	Administrator, Health Services Administration, City of New York
Rodney M. Coe, Ph.D.	Executive Director, Medical Care Research Center, Jewish Hospital, St. Louis
Morris F. Collen, M.D.	Director, Medical Methods Research, Permanente Medical Group, Oakland
Eugene A. Confrey, Ph.D.	Associate Director for Program Planning and Evaluation, Bureau of Health Manpower Education, National Institutes of Health
Sam A. Edwards, Ph.D.	Director, Health Services Research Center, Hospital Research and Educational Trust and Northwestern University
Jack Elinson, Ph.D.	Professor, Division of Sociomedical Sciences, School of Public Health and Administrative Medicine, Columbia University
Paul M. Elwood, Jr., M.D.	Executive Director, Institute for Interdisciplinary Studies, Minneapolis
Kenneth M. Endicott, M.D.	Director, Bureau of Health Manpower Education, National Institutes of Health
Martin S. Feldstein, Ph.D.	Professor of Economics, Harvard University
Merwyn R. Greenlick, Ph.D.	Director, Health Services Research Center, Kaiser Foundation Hospitals, Oakland
William J. Horvath, Ph.D.	Assistant Director, Mental Health Research Institute, University of Michigan
Sidney Katz, M.D.	Professor and Director, Office of Health Services Education and Research, Michigan State University
Maurice LeClair, M.D.	Deputy Minister of Welfare, Department of National Health and Welfare, Ottawa
Charles E. Lewis, M.D.	Professor and Head, Division of Health Administration, University of California at Los Angeles
Robert Q. Marston, M.D.	Director, National Institutes of Health
Walter J. McNerney	President, Blue Cross Association
Howard N. Newman, J.D.	Commissioner, Medical Services Administration, Social and Rehabilitation Service
George G. Reader, M.D.	Professor of Medicine, New York Hospital-Cornell Medical Center

Marshall A. Rockwell, M.D.	Health Research Program Manager, RAND Corporation
Milton I. Roemer, M.D.	Professor of Health Administration, University of California at Los Angeles
Irwin M. Rosenstock, Ph.D.	Professor of Public Health Administration, School of Public Health, University of Michigan
Edwin F. Rosinski	Vice Chancellor, University of California at San Francisco
Sam Shapiro	Director, Research and Statistics, Health Insurance Plan of Greater New York
Cecil G. Sheps, M.D.	Director, Health Services Research Center, University of North Carolina
Robert M. Sigmond, M.A.	Executive Vice President, Albert Einstein Medical Center, Philadelphia
George A. Silver, M.D.	Professor of Epidemiology and Public Health, Yale University
Rosemary A. Stevens, Ph.D.	Associate Professor of Epidemiology and Public Health, Yale University
Harry P. Sultz, D.D.S.	Professor and Director, Community Services Research and Development Program, State University of New York at Buffalo
Samuel J. Tibbitts	President, Lutheran Hospital Society of Southern California, Los Angeles
Trygve W. Tuve, Ph.D.	Associate Director for Manpower, National Institute of General Medical Sciences, National Institutes of Health
Vernon E. Weckwerth, Ph.D.	President, Minnesota Systems Research, Inc.
Burton A. Weisbrod, Ph.D.	Professor of Economics, University of Wisconsin
Norman A. Weissman, Ph.D.	Assistant to the Deputy Administrator, Health Services and Mental Health Administration
Samuel Wolfe, M.D., Dr.P.H.	Director, Center for Health Care Research, Meharry Medical College
Charles R. Wright, Ph.D.	Professor of Communications and Sociology, University of Pennsylvania
Alonzo S. Yerby, M.D., M.P.H.	Professor and Head, Department of Health Services Administration, School of Public Health, Harvard University

APPENDIX B

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APPENDIX C

Descriptive Classification of Health Services R & D

The field of health services R & D can be classified in different ways. The following arrangement, agreed upon by the staffs of the Office of Management and Budget and the Office of Science and Technology, identifies most of the important areas.

1. Concepts and analytic methods of health care services and systems, including:

   Ethical, legal, and political issues
   Human behavior in illness
   Social organization of medical care systems
   Cost-effectiveness analysis
   Simulation and modeling
   Economic analysis, econometrics
   Comparative studies, national and international
   Operations research methods
   Systems analysis methods
   Epidemiological methods
   Social analysis methods
   Health statistics
   Health intelligence systems

2. Organization and delivery of health services, including:

   Integration of health services
   Coordination of health services; mergers; shared support systems
   Regionalization of health services
   Polyclinics; hospital outpatient departments
   Ambulatory care facilities, offices, clinics
   Model health care organizations
   Home care services
   Emergency medical care services
   Health care systems
   Rehabilitation services

3. Health services planning, policies and strategies, including:

   Health policy formulation
   Authority, control and ownership; responsibility and accountability
   Health legislation; regulation
   Nationwide health care planning
   Mechanisms for effecting change in health services
   Control and regulation of health services

4. Development and use of health information systems, including:

   Hospital information systems
   Health management information systems
   Medical data systems
   Care process surveillance systems
   Health statistics
   Health costs and charges reporting systems
   Hospital admission/discharge and insurance claims reporting systems
   Patient record systems

5. Measuring and improving effectiveness of health services, including:

   Determining health care requirements and needs
   Public and professional responses to health services
   Efficiency of health services systems
   Social and economic impact of health services
   Patient acceptance, compliance and satisfaction

6. Quality assessment and evaluation of health services, including:

   Standards for health care: structure and process
   Indices of health service outputs
   Changes in status of health and health care
   Economic costs of disease
   Licensure and accreditation

7. Improving accessibility to and equalizing distribution and utilization of health care services, including:

   Utilization of health services
   Demand for health services
   Admission, discharge, transfer and referral policies
   Location of health care facilities
   Transportation to, from and within health care facilities and systems
   Impediments to receiving adequate health care
   Qualifications for receiving health care
   Communications systems

8. Improvements and innovations in health services facilities, including:

   Design
   Utilization and location of facilities
   New construction techniques
   Use of new materials
   Plant layout and work methods improvement

9. Improvements in health services manpower, including:

   Licensing and regulation of manpower
   Training, recruitment, and occupational upgrading
   Measuring and forecasting requirements for health personnel
   Use of paramedical and ancillary personnel
   Measurement of productivity and manpower trade-offs
   Health care teams and personnel configurations
   Distribution and utilization of personnel
   Factors affecting supply of health services manpower
   Mid-level health workers, pediatric nurse practitioners, midwives, helping sisters, feldschers, emergency care personnel
   Turnover and occupational persistence

10. Utilization of technology in health services, including:

Automated information systems
Automated clinical laboratory systems
Patient physiological monitoring
Automated patient interviewing and diagnostic systems
Medical data systems
Advanced management techniques
Manpower savings through automation
Standards for facilities, equipment and devices
Identification and aggregation of markets

11. Financing, costs, charges and incentives of health care services, including:

Cost reduction
Accounting methods
Cost containment
Cost trends
Prices for delivery of health services
Impact of actuarial practices
Health insurance plans
Methods of payment by consumer
Methods of payment for providers and health care personnel
Deductibles and co-insurance
Ownership of facilities, contractural arrangements
Capital formation, debt, equity
Profit and non-profit institutions and systems

APPENDIX D

Examples of Completed Health Services R & D

The Panel, with the assistance of some 40 investigators who were canvassed, identified representative examples of health services research that could potentially contribute to improvements in patient care or to improvements in the provision of health services. Descriptions of selected projects follow.

1. Case-Fatality in Teaching and Non-Teaching Hospitals

In an initial study, standardized case-fatality rates for several different conditions in teaching and non-teaching hospitals of the National Health Service in England and Wales, calculated for the period 1951-55, were compared. A second comparison was made for 1956-59. In each case, calculations were based upon data collected in the joint General Register Office-Ministry of Health national Hospital In-Patient Enquiry. Hospitals participating in the hospital discharge abstract system reported a random 10 percent sample of discharges; the proportion of beds included in the study increased from 79 percent of teaching hospital beds and 67 percent of non-teaching hospital beds in 1956 to 95 percent and 97 percent respectively by 1959.

Comparison indicated higher case-fatality rates from appendicitis, perforated peptic ulcers, hyperplasia of prostate, diabetic coma and other conditions in non-teaching hospitals than in teaching hospitals. Similar results were obtained in the second comparison, with little evidence that earlier differences had diminished, much less disappeared.

Two main lines of explanation were proposed. First, it is possible that the difference in case-fatality rates represented superior treatment in the teaching hospitals. Second, non-teaching hospital patients may have been socially or otherwise at an initial disadvantage. It had been already shown that, proportionate to the number of beds, teaching hospitals had more consultants and other staff. At the time of the final analysis, in 1959, little published evidence was available concerning the social differences among patients in the two types of hospitals, and further study in this area was indicated.

These pioneering studies illustrate the power of information about the use and end results of medical care institutions to suggest the nature and site of problems for more detailed study.

Lee JAH, Morrison SL, Morris JN: Fatality from three common surgical conditions in teaching and non-teaching hospitals. Lancet 2:785-790, 1957

Lipworth L, Lee JAH, Morris JN: Case-fatality in teaching and non-teaching hospitals 1956-59. Med Care 1:71-76, 1963

2. Prematurity and Perinatal Mortality: General Population vs. Prepaid Group Practice Population

After continued study of the differences in prematurity and perinatal mortality between patients enrolled in the Health Insurance Plan of Greater New York (HIP) and patients in the general population of New York City, an analysis based on a three-year experience, 1955-57, was conducted. Data indicated significantly lower prematurity and perinatal mortality rates in the population enrolled in HIP than in the total New York City population. The differences could not be explained by a more favorable occupational distribution among enrollees in HIP compared to the general population.

Further study is indicated on the measure of socioeconomic status, clarification of cultural and attitudinal attributes of population subgroups and their influences on health practices prior

2. (continued)

to and during pregnancy, and on the management of obstetrical care for patients of "private" physicians and "ward" cases.

This is the first well-designed study indicating the potential benefits of prepaid group practice for improving the quality of care.

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 48:170-187, 1958

Shapiro S, Jacobinzer H, Densen PM, Weiner L: 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 50:1304-1317, 1960

3. Hospital Beds for Mental Illness

Prediction of future needs for health services requires both cross-sectional estimates of current patterns and longitudinal descriptions of the past. Trends, their direction and rate of change may be identified, measured and related to scientific and technological developments as a basis for planning future services. The best way to do this is to define a population and observe it over time.

On April 1, 1961 a paper reporting the results of a study of mental hospital patients traced over five years supported the conclusion that mental hospital beds in England and Wales should be reduced from 3.3 to 1.8 per 1,000 population. This recommendation was based on a sample of patients first admitted to mental hospitals in England and Wales in 1954. Admissions, discharge, transfers and deaths of this group were followed and analyzed by age, sex, diagnosis, length of stay, readmission rate, and the numbers remaining in hospitals after various periods. Similar cohorts were started in 1955 and 1956 and the three cohorts were compared for two years to obtain the published projections. The impact of drug and community-based therapy on hospital use was measured with relative precision and made available promptly.

This study and its interpretation in relation to current developments in the drug and community-based therapy of mental illness was the basis for a public policy decision in the Hospital Plan for England and Wales of January 1962 (nine months after publication of the original article). This is an example of precise research, competently executed, clearly articulated and related to a specific health services problem. The savings to the country have been and will continue to be substantial and take full advantage of the biomedical research that preceded the health services research.

Tooth GC, Brooke E: Trends in the mental hospital population and their effect on future planning. Lancet 1:710-713, 1961

Ministry of Health: A Hospital Plan for England and Wales. London, Her Majesty's Stationery Office, Cmnd. 1604, 1962

4. Early Hospital Discharge in Obstetrics

Randomly selected control and experimental groups at Kings County Hospital in Brooklyn, New York, were discharged from hospital at different intervals post-delivery, and the difference in their respective experiences were compared. Mothers in the experimental group were discharged within 72 hours after delivery, while those in the control group were discharged five days after delivery.

4. (continued)

No basic statistical differences were shown in the health or wellbeing of the mothers who were discharged from the hospital early as compared to the controls. Mothers discharged earlier were less satisfied with the hospital stay and with general hospital care than those who stayed longer. Nevertheless, more than half the mothers were satisfied with their short stay. Although no statistically significant differences could be shown between the experimental and control groups, there did seem to be a consistent, although small, difference between the two groups. Almost all the mothers and babies of the longer-stay group did slightly better than the experimental group.

In addition, the short stay had some areas of jeopardy for the babies which should be recognized. In the early discharge group, it was possible that jaundice would not be recognized, unless daily visits had been made to the home during the first week after discharge by nurses with broad experience in obstetrics. Furthermore, because the early discharge babies were seen less often by the pediatrician, it was possible to dismiss babies with congenital defects without their being noticed.

Judging by the opinions expressed by patients, they usually preferred a hospital stay of three to four days, an interval midway between the periods employed for this controlled study. The evidence suggests that the substantial savings in costs for shorter hospital stays outweigh the slight subjective reduction in benefits experienced by the mothers. The babies' welfares could be protected by a responsible follow-up at home or in a clinic.

This study supported the decision to shorten hospital stays post-delivery from the earlier practice of ten days' stay to three or four, a practice that is now widely adopted.

Hellman LM, Kohl SG, Palmer J: Early hospital discharge in obstetrics. Lancet 1:227-232, 1962

5. Evaluation of Screening in the Early Detection of Disease

A related series of studies in the United Kingdom on the validity, therapeutic value, and cost-effectiveness of screening measures in the early detection of disease is a good example of health services research and development that has a direct bearing on health planning and policy decisions. Substantial resources would have to be diverted from other medical services in order to carry out many of these tests on a routine basis. Prior evaluation, therefore, is a matter of immediate practical concern to the administrators of the National Health Service, as well as to the medical profession generally.

The Department of Health and Social Security, the Medical Research Council, foundations, universities and the medical profession have all contributed to this research. About five years ago, one of the private foundations, the Nuffield Provincial Hospitals Trust, organized an expert working party to develop a scheme of evaluation and to review the accumulated evidence. The group selected ten screening procedures already widely in use for detecting urinary infections in pregnancy, cancer of the breast and cervix, deafness in childhood, diabetes mellitus, glaucoma (abnormal pressure in the eyes), iron deficiency anemia, genetic chemical abnormalities, tuberculosis of the lung, and RH blood factor disease of the newborn. Their approach is typical of the eclectic nature of health services research generally; it involved the synthesis of information from biomedical research, clinical practice, epidemiology, economics, technology, and sociology. The major issues examined were: Is the screening technique itself reliable? Does it pick up all those with the abnormality without including many who are not affected? Is the abnormality that it seeks to uncover one that can be effectively treated as a result of early detection and in the present state of knowledge about the natural history of the disease? Has a workable method been demonstrated to reach the population at risk and carry out the test? What are the benefits in relation to the costs?

5. (continued)

Very briefly, the working party concluded that the evidence was seriously deficient for six of the ten tests analyzed. Their findings were published in 1968 and have been widely read. They are supported by other evaluative studies of the periodic checkup and of multiple screening programs. The net effect has been to foster a more selective approach to the use of presymptomatic testing in the United Kingdom and to discourage the introduction of "multiphasic" screening centers until further evidence can be collected.

The timing of this research is worthy of comment. As the Nuffield expert working party pointed out in its report, it is important to initiate health care studies as soon as it appears that new knowledge may have general implications for the practice of medicine and the services provided; otherwise, public demand may make it impossible or unethical to conduct the necessary controlled trials.

Beck A: The Feasibility of Periodic Medical Examinations in General Practice. Assen, the Netherlands, Van Gorcum & Co., 1966

Nuffield Provincial Hospitals Trust: Screening in Medical Care. London, Oxford University Press, 1968

6. Level of Hospital Utilization and Selection of Patients in Finland

The regional hospital system in Finland, in which hospitals are normally jointly owned by groups of small municipalities ("communes"), enabled this analytical study of hospital utilization and of existing preferences in selecting patients to be conducted. The Kuopio Central Hospital District, chosen for analysis, had a population of 270,000 in 29 communes of different sizes in 1960. Among these there were no marked differences in general health or socioeconomic level, and the annual hospital admission rates ranged from 44 to 165 per 1,000 population. Basic materials for the study were the individual hospital discharge abstracts from each hospital in the district.

Lengths of hospital stay decreased as hospital admission rates for the populations of different communes increased. When the same relationship was examined for large hospital regions and the whole country, the opposite relationship was observed: higher hospital bed/population ratios were positively correlated with shorter lengths of stay. If the supply of beds is limited, only the most severe cases, which usually cannot be treated in a short time, are selected for admission. High utilization can be ascribed either to short-term "trivial" cases or to patients with chronic diseases.

Total hospital admission and bed day rates for different communes affected the relative amounts of hospital care given to various age groups. Growth in utilization had very little influence upon the hospitalization of children, but it correlated much more closely with the share of hospital treatment given to patients of working ages and was especially noticeable in the growth in the amount of care given aged people. Children had priority when hospital bed capacity was limited; the needs of aged people were met last.

Admissions were grouped according to diagnosis as urgent and non-urgent, and the selective influence of the total amount of hospital services used by these two groups was measured. The amount of care given to urgent cases was only very slightly dependent upon the total amount of services available or used. Growth in utilization was reflected mainly in the care of non-urgent patients. A similar relationship was found when different clinical entities or disease groups were studied. Acute diseases, especially those markedly affecting the working capacity of the patient, were preferred to the chronic illnesses, particularly those in the elderly.

6. (continued)

For some diseases there seemed to be a limit which was not exceeded by the need for treatment, however great the available bed capacity was. On the other hand, there were diseases or other conditions for which the demand did not show any signs of coming into balance with available beds. The slogan "the more beds--the more needs" seemed true with regard to the needs of non-urgent cases, elderly patients, and chronic patients. It does not apply to needs saturated at a known level of utilization.

An operational model of hospital utilization based on this kind of approach, and the availability of a hospital discharge abstract system, can be useful in planning, particularly in estimating the effect of increased hospital capacity on the case load. Using the model in the opposite direction, one can compare the utilization and saturation levels and thresholds reached or not reached in different geographic regions and thus obtain some indication of the real needs of the population.

This study established the point that, at least for some health problems, there is a saturation point for beds beyond which further beds are unnecessary and could be wasteful.

Vaananen IS, Haro AS, Vauhkonen O, Mattila A: The level of hospital utilization and the selection of patients in the Finnish regional hospital system. Med Care 5:279-293, 1967

7. Medical Care Price Index: A Study

This study compared estimates of a medical care price index based on average costs for the treatment of specific illnesses with those generated by the Bureau of Labor Statistics (BLS) medical care price index. The latter is based on prices of selected items of medical care and holds quality and quantity of services constant. The experimental price index was calculated for 1951-52 and again for 1954-65, using patient and physician data from the population of the Palo Alto Medical Clinic. The five specific illnesses used in developing the index were acute appendicitis, maternity care, otitis media in children, fracture of the forearm in children, and cancer of the breast.

The experimental price index recorded increases substantially greater than those indicated by the BLS price index. Five reasons were offered for the disparity:

a. The experimental index reflected changes in treatment of the specific illnesses; the BLS index held these changes constant.
b. The experimental cost data included individually priced items, such as ancillary services, the prices of which increased more sharply than others; until 1963, the BLS index used percentage estimates for such services based on overall increases.
c. The experimental index data incorporated the overall increases in fees and average costs of treatment; the BLS data did not allow such inclusion.
d. The experimental index reflected increases in physician specialization (estimating a doubling in fees for procedures which became the prerogative of specialists); the BLS index held this constant.
e. The experimental index reflected a to-be-expected increase in prices for the Palo Alto area, which doubled in population and became part of metropolitan San Francisco during the fourteen-year study.

Accepting what the BLS index attempted to measure, the study concluded it underestimated the actual costs of medical care over the fourteen-year period. Future BLS indices were expected to be more accurate, since they now include directly priced ancillary services and the differences in average and customary physician fees have greatly decreased. However, on the basis of the experience with the experimental index, the author argued that the BLS index must take into account changes in quality, as indicated by changes in treatment and increases

7. (continued)

in specialization. The BLS index would then reflect the full "actual" cost of care to the patient, who is severely restricted in shopping for care and must buy whatever is the current "quality" medical care.

Scitovsky AA: Costs of treatment of selected illnesses, 1951-65. Am Econ Rev 57:1182-1195, 1967

8. Evaluation of the Nurse's Role in Ambulatory Care

To evaluate a more active role for nurses in ambulatory patient care, a project was initiated at the University of Kansas in which patients from a medical clinic were divided randomly into two groups, after initial testing and evaluation. One group received virtually all its medical care from a nurse, with back-up support from a physician. Most of the clinic patients were women over fifty years of age and were from the lower socioeconomic levels of society. The majority of patients held rather strong opinions about having physicians perform most of the functions associated with medical care. A significant percentage of them had negative attitudes toward the setting of care. In general, these 66 patients had many complaints and made frequent use of clinic facilities.

All patients were re-evaluated one year later. Retesting of the control group revealed no changes. In the experimental group several significant changes were evident. The nurse was accepted as a primary source of care. There was increased adherence to appointment schedules and better utilization of time, as demonstrated by time and motion studies. The overall cost of the program on a dollar basis was lower. In addition, patients in the experimental group exhibited a decreased frequency of complaining and less tendency to call upon physicians for minor complaints. The experimental group shifted their preferences in favor of the nurse as a provider of many of the services formerly reserved for the physician. The quality of care and patients' satisfactions with care were higher in the experimental group.

Thus, although certain stereotyped roles exist for physicians and nurses within the minds of patients, these can be changed by experience. The fact that change is possible, as indicated by the results described above, suggests that the needs and desires of patients for certain types of therapeutic relations are greater than their needs to maintain pre-existing attitudes toward specific roles. There are significant problems in initiating interprofessional programs of patient care which can have important effects on the success of attempts to expand the role of the nurse in ambulatory care. However, when the primary focus was placed upon the needs of patients, rather than the needs and images of professionals, it apparently became easier to accomplish comprehensive care with more clearly defined guidelines for more efficient use of professional manpower.

This study supports the position that primary care provided by nurses is acceptable to at least some patients, and can be of good quality.

Lewis CE, Resnick BA: Nurse clinics and progressive ambulatory patient care. N Engl J Med 277:1236-1241, 1967

9. Children, Stress and Hospitalization

Children admitted to a hospital for tonsillectomy, with their mothers, were randomized into experimental and control groups. The experimental group members were admitted to the hospital by a specially trained nurse who attempted to create an atmosphere which would encourage the mothers to talk about their fears, anxieties and special problems, and to ask any and all questions on their minds. The information given to the mothers tried to paint an accurate picture of the reality of the situation. Mothers were told what routine events to expect and when they were likely to occur, including the actual time schedule for the operation.

9. (continued)

The investigators found that the emotional support reduced the mothers' stress and changed their definition of the hospital situation, which in turn had a beneficial effect on their children. Children in the experimental group experienced smaller changes in blood pressure, temperature and other physiological measures; they were less likely to suffer from postoperative vomiting and made a better adaptation to the hospital; and they made a more rapid recovery following hospitalization, displaying less fears, less crying, and less disturbed sleep than children in the control group.

This and related studies showed that a little sympathy, support and instruction can have great benefits. More frequently than not, those who endorse the idea that the doctor should provide sympathy and support to the patient do so on the belief that this is a noble and human thing to do. It is rarely appreciated, however, that establishing relationships with patients facilitates the informational process between doctor and patient and contributes in an important way to the management of the patient and his progress toward recovery.

Skipper JK Jr, Leonard RC: Children, stress, and hospitalization: A field experiment. J Health Social Behav 9:275-287, 1968

10. Evaluation of a Comprehensive Pediatric Care Program

In 1964, a three-year study was begun at Children's Hospital Medical Center in Boston, designed to evaluate the effect of a comprehensive, family-oriented pediatric care program on variables such as morbidity, utilization patterns, costs and patient attitudes and satisfactions. The evaluation was based on a carefully designed study in which matched experimental and control groups were measured before, during and after the experiment with respect to these variables; the experimental group families received all their pediatric care in the comprehensive program, while control group families continued to obtain pediatric care from various facilities which these low-income families used before 1964. Results have been published on utilization, patient attitudes and satisfaction.

The utilization data suggest that the families receiving comprehensive care had significantly fewer hospitalizations, fewer operations, more physician visits for health supervision, and fewer physician visits for illness, when compared with the control families. There were no changes among the mothers in such general attitudes as alienation, acceptance of the maternal role, and views on preventive health practices. Increased satisfaction with pediatric care delivered and increased preference for a primary care physician in pediatric problems was observed for the experimental group. These changes were most striking in the area of provision of pediatric care; few group members carried over these attitudinal changes and preferences to adult health care. This suggested that there will only be a major impact on the fragmented medical care of the poor if there are major changes in the services offered.

This study concerns one model of care. Its results indicate the need for greater efforts at evaluation of other proposed and working models of care.

Alpert JJ, Heagarty MC, Robertson L, et al: Effective use of comprehensive pediatric care: Utilization of health resources. Am J Dis Child 116:529-533, 1968

Alpert JJ, Kosa J, Haggerty RJ, et al: Attitudes and satisfactions of low income families receiving comprehensive pediatric care. Am J Public Health 60:499-506, 1970

11. Variations in the Incidence of Surgery

Analysis of records of the Kansas Blue Cross Association in 1965 showed three- to four-fold variations in regional rates for the performance of six common surgical procedures--

11. (continued)

tonsillectomies, appendectomies, hernia repairs, hemorrhoidectomies, cholecystectomies, and varicose vein operations. These variations characterized not only tonsillectomy, often an elective procedure, but also procedures with more definite indications for surgical intervention, such as appendectomy and herniorraphy.

The reasons for the three- to four-fold variations in common surgical procedures were difficult to explain on the basis of differences in the prevalence or incidence of disease in the population or their illness behavior. Rather, the numbers of hospital beds, board certified surgeons, and other physicians who perform surgery were found to be significant predictors of the incidence of surgery.

The author offered an interpretation of the results as supporting a medical variation of Parkinson's Law: admissions of patients for surgery expand to fill available beds, operating suites and surgeons' time. He pointed out the necessity of considering the costs of this surgery for both the services and the facilities used, and the need for further inquiries.

Lewis CE: Variations in the incidence of surgery. N Engl J Med 281:880-884, 1969

12. Surgeons and Operations: The United States and the United Kingdom Compared

The shortage of physicians' services in the United States has many causes, of which the inefficient use of the physicians' time and inequities in their geographical distribution may play greater roles than any alleged deficiency in their actual numbers. Bunker's study investigated the hypothesis that an additional cause of this shortage may be the maldistribution of physicians among the medical specialties, particularly in surgery.

In 1970, there were twice as many surgeons in proportion to population in the United States as in England and Wales, and they performed twice as many operations. Fee-for-service, solo practice and a more aggressive therapeutic approach appeared to contribute to the greater number of operations in the United States. More frequent use of consultations, closely regulated and standardized surgical practices, and restrictions in facilities and numbers of surgeons appeared to contribute to the lower rates for England and Wales.

Bunker suggested that indications for surgery were not sufficiently precise to allow determination of whether American surgeons operated too often or the English and Welsh too infrequently. He concluded that determination of the need for surgical manpower requires better information on how much operative treatment the public's health requires, and further must take into account the total medical manpower needs of the country.

Bunker JP: Surgical manpower: A comparison of operations and surgeons in the United States and in England and Wales. N Engl J Med 282:135-143, 1970

13. An Information System for Monitoring Payments and Use of Services

The impact of the introduction of utilization charges (co-payments) for physician visits under a provincial health insurance plan and the changes in fee schedules or levels of reimbursement can be assessed from a well-designed information system. The system based on the claims forms used by the Medical Care Insurance Commission of Saskatchewan is capable of producing the following kind of table relating to the use of physician services by the great majority of the population of that province.

13. (continued)

ANALYSIS OF PER CENT CHANGE IN ANNUAL GROSS PAYMENTS

Year	Gross Payments ('000's) for Medical Services	Per Cent Change Due to:							Total Per Cent Change
		Change in Population	Addition of New Types of Beneficiaries	Increase in Fees	Utilization Fees	Change in Type of Insured Service	Change in Claims Inventory	Change in Per Capita Utilization	
1963.....	$18,329	—	—	—	—	—	—	—	—
1964.....	20,439	1.92	—	—	—	4.16	−0.22	5.75	**11.61**
1965.....	20,165	0.95	—	—	—	−0.67	−4.05	2.43	**−1.34**
1966.....	22,207	0.74	3.70	—	—	−1.45	2.62	4.52	**10.13**
1967.....	23,384	1.13	1.77	0.48	—	—	−1.77	3.69	**5.30**
1968.....	24,077	0.30	0.17	9.74	−7.17	1.95	1.04	−3.07	**2.96**
1969.....	27,388	0.07	5.23	12.11	−5.57	2.88	−1.36	0.39	**13.75**
1970.....	30,554	−1.70	0.60	2.43	—	—	1.32	8.91	**11.56**
Average Annual Rate of Change 1963-70.....		0.49	1.64	3.54	−1.82	0.98	−0.35	3.23	**7.71**

Gross Payments for Medical Services:
Payments made by M.C.I.C. for medical services in each of the calendar years indicated.

Change in Population:
Increases or decreases in the number of persons covered by the Plan, not including new types of beneficiaries indicated in (3) below.

Addition of New Types of Beneficiaries:
Groups of persons added to the covered population,
(a) Saskatchewan Assistance Plan recipients—April 1, 1966
(b) War Veterans Allowance Recipients—July 1, 1968
(c) Most Indians living on reserves—January 1, 1969
(d) M.C.I.C. acts as agent for services provided to beneficiaries of the Psychiatric Services Branch. Neither payments or beneficiaries are included in this table.

Increase in Fees:
(a) From November 1, 1967 to July 31, 1968, the basis of payment for visit services was increased from 85% to 95% of the payment schedule. Some revision was also made with respect to pathology, radiology and anaesthesia services.
(b) A new payment schedule was introduced on August 1, 1968 and payments were based on 85% of that schedule until August 1, 1970 when the rate for visit services was increased to 100%.

Utilization Fees:
The amount payable by the Commission was reduced due to utilization fees introduced April 1, 1968 of $1.50 for office visits and $2.00 for home and emergency visits.

Change in Type of Insured Service:
(a) Pathology and Diagnostic radiology payments began on June 24, 1963
(b) Physiotherapy and mileage became disinsured effective July 1, 1965 but M.C.I.C. began to pay for non-emergency psychiatric care by out-of-province physicians.
(c) Refractions by physicians became insured on July 1, 1968 and refractions by Optometrists were insured on September 1, 1968.

Change in Claims Inventory:
Increases or decreases in dollar value of claims on hand waiting to be processed compared to the previous year.

Change in Per Capita Utilization:
The change in the number of services provided per beneficiary.

Total Per Cent Change:
Per cent change in the gross costs of medical services.

The data suggest that the introduction of the utilization fee in 1968 reversed a rather steady annual increase in utilization until 1970. Increases in unemployment and in the number of doctors in the province may have accounted for the change in that year. Increases in fees seem to have accounted for the majority of the total change in gross annual payments in 1968 and 1969.

Medical Care Insurance Commission of Saskatchewan: Annual Report, 1970, p. 23

14. Reimbursing Hospitals at Inclusive Rates

A pressing current problem of the American health care system is the cost of hospital services, which has been rising at the rate of 13 percent per year. One cause is the complexity and scope of the paper work involved in hospital administration. Much of that complexity may be attributed to the insurance claims function.

14. (continued)

Most hospitals use an average billing rate for some charges--room, board, general nursing, and certain other services--but the majority of ancillary services are billed "a la carte" as individual line items. An alternative is a method of billing in which all services are included in an inclusive average charge. While the possible bases for charging under an all-inclusive rate system are varied, the critical feature of any such system is that, with the exception of accommodations, the patient's charge is independent of his utilization of particular services.

A study was performed under contract with the National Center for Health Services Research and Development to ascertain whether substantial savings could be obtained by extending the averaging procedure to include all services provided by hospitals to patients. Under the traditional itemized billing concept, an average of 14 ancillary charges per patient per day must be processed; about 10 million such charge slips are generated each day in the United States. An inclusive rate by definition would appear to eliminate a significant portion of this administrative work and streamline the billing system.

A systems engineering analysis of the charging and billing functions in seven Massachusetts hospitals using the traditional "a la carte" charging procedures was conducted by the Division of Systems Engineering of the Massachusetts Hospital Association. They determined the work elements which would no longer be necessary following a conversion to inclusive charging, and computed the resulting savings. To determine the feasibility of widespread implementation of inclusive rates, an extensive program of research and field investigation was undertaken by the study group.

The study indicated that substantial savings can be achieved through use of the inclusive rate. The projected administrative cost reductions were approximately 0.5 percent of total hospital operating costs. On a national basis, the estimated annual savings would have been $83 million for 1969.

It was also determined that hospital receivables could be reduced under inclusive charging, by facilitating presentation of the patient's bill on the day of discharge, and eliminating the waiting period for late charge slips. Such savings in interest totaled 0.2 percent of total hospital operating costs, or an additional savings of $33 million for 1969.

The results of the survey indicated that there were no insuperable barriers to widespread implementation of inclusive charging. Therefore, the study group recommended to hospitals and public and private third party payers that this method of reimbursement be adopted universally.

Report of Hospital Inclusive Rates: A Report Prepared for the National Health Services Research and Development Center. The Boston Consulting Group, 1970

15. Computer-Assisted Electrocardiographic Interpretation

The electrocardiogram (EKG) is the single most useful and widespread noninvasive technique for evaluating heart disease. There are 50 million EKG's taken annually in the United States, with an annual increase of about 10 percent. The annual cost is $1 billion using 280 man-years of physician time, 1,100 man-years of EKG technician time and 700 man-years of secretarial time. A $4 million, 40 man-year effort by the Heart Disease Control Program of the National Center for Disease Control developed a system that could reduce the cost in money and manpower and improve accuracy and reliability in the reporting of EKG's. The system was complex and early attempts to replicate it failed.

A recent attempt to introduce a less complex and more accessible centralized system in Denver suggests that economies of scale might eventually justify the current Federal subsidy

15. (continued)

being provided by a contract. At present the Community Electrocardiographic Interpretation Service is reported to be processing about 110 EKG's daily. The projected volumes required to support the computer charges are shown in the following table.

Computer Costs vs. System Utilization
(Denver EKG Project)

Computer Center Charge	Volume of EKGs/Year Needed to Recover Costs
$2.00	180,000 (579/day)
$3.00	130,000 (353/day)
$4.00	85,000 (254/day)
$5.00	70,000 (198/day)
$6.00	50,000 (163/day)

In Denver approximately 120,000 EKG's were taken in 1969. Real savings are only likely to be experienced when as many as two-thirds of the Denver EKG's are handled by the new centralized system.

These relationships indicate the importance of health care services aggregated into systems that provide the volume necessary to justify the costs of health services R & D. Important savings are unlikely to be realized until large-scale systems evolve.

Demonstration of a Computer-Assisted Electrocardiographic Interpretation System. Informal Progress Report on Contract HSM 110-69-414 prepared by the Community Electrocardiographic Interpretation Service, May 1971

Health Care Technology: An Evaluative Report. Prepared for the Office of Science and Technology by the National Center for Health Services Research and Development, December 1970

16. Evaluation of Computer Development in Medicine

Enthusiasm for the transfer of computer applications found useful in business and industry, particularly the aerospace industry, to health services, is not always matched by sound judgment with respect to practical problems and priorities.

In January 1969 the Nuffield Provincial Hospitals Trust commissioned a survey of the current uses of computers in medicine in Scotland, an examination of applications that would merit priority in development over the succeeding five years, and their costs. The incisive report, published in 1970, considered such complex issues as: extent of centralization of processing, specific applications, use of integrated health records, manufacturers' equipment proposals, and type of organization and staffing required.

State of the art, economies in the capture of data, contributions to patient care, acceptability, feasibility, potential impact on health care costs and capacity to influence future developments favor applications to hospital and patient management data using batch processing. It should be noted, however, that the commission's inquiries rarely produced definite statements of economic benefits to be achieved from particular applications.

This succinct yet exhaustive analysis concluded that initial application should be concerned with patient administration and the accurate recording of admissions, discharges, transfers, operations, diagnoses, treatments and tests. Data currently collected in the Scottish Hospital

16. (continued)

Discharge Abstract Form were seen as the logical point of departure. Later applications were proposed for selective hospital service departments, bed allocation plans, patient follow-up and drug administration. The potential savings in costs and efficiency, given the present state of the art and the organization of health services, is such that further experimentation is required prior to applications to fields such as nursing and staff scheduling, menu planning and diagnosis.

Because of its thoroughness and timeliness, the report is believed to have had a substantial influence on public policy in this field in the United Kingdom.

Ockenden JM, Bodenham KE: Focus on Medical Computer Development: A Study of the Scottish Scene by Scientific Controls Systems, Ltd. London, Oxford University Press, 1970

17. Effects of Medicaid on the Medical Care Pattern of Children

Actual changes in the medical care pattern of children after enrollment in the New York Medicaid program were compared with the declared intentions of the legislators to reduce or eliminate differentials regarding access to, availability of and quality of medical care due to socioeconomic standing. The question studied was, can such goals be reached by a simple reduction of financial barriers?

The program did enroll over 90 percent of the eligible child population, but this led to only minor changes in source, frequency and reason for care. Poor families still received less care, continued to depend on public clinics and had a higher proportion of illness-related rather than preventive medical contacts. This was exactly what the consumers in earlier interviews had anticipated and what most professionals would have predicted. Of special importance was the administrative decision, after two years of operation, to cut fees for private physicians but to honor full charges from clinics. Thus the better financing of the care in the public sector led to a solidification of the two-class system of care.

In addition to the findings which have important policy implications, the study illustrated the importance and possibility for a research team to survey continuously a local health care system and evaluate the effects of new legislative programs. Several surveys by team members from the Rochester Child Health Studies were analyzed for this evaluation of the Medicaid effects. The 1970 census summary tapes were used to provide eligibility estimates. The cooperation of local Medicaid administrators was essential.

Roghmann KJ, Haggerty RJ, Lorenz R: Anticipated and actual effects of Medicaid on the medical care pattern of children. N Engl J Med 285:1053-1057, 1971

18. Acute Myocardial Infarction: Home and Hospital Treatment

A cooperative study of 1,203 episodes of acute myocardial infarction in men under 70 years of age, living in four areas of southwestern England, was recently completed. The mortality at 28 days was 15 percent. This preliminary report compared home care by the family doctor and hospital treatment, initially in an intensive care unit; 343 cases were randomly allocated to home or hospital care. (Of the remaining 760 cases, 654 were electively treated in hospital, and 106 were electively treated at home.)

The randomized groups did not differ significantly in composition with respect to age; past history of angina, infarction or hypertension; or hypotension when first examined. The mortality rates of the random groups were similar for home and hospital treatment. The group sent electively to hospital contained a higher proportion of initially hypotensive patients whose prognosis was bad wherever treated; those who were not hypotensive fared rather worse in hospital.

18. (continued)

These preliminary results indicated that for some patients with acute myocardial infarction seen by their general practitioner, home care was ethically justified. The broader issue for further consideration is the need for general admission to hospital, as opposed to home care, whatever the disease entity under consideration.

This controlled clinical trial demonstrates the feasibility of doing such a study under normal conditions of clinical practice and illustrates the need for assessing the relative costs and benefits of providing medical care in different settings, in this instance home versus hospital intensive care units, before policy decisions are made.

Mather HG et al: Acute myocardial infarction: Home and hospital treatment. British Med J 3:334-338, 1971

19. Case-Fatality of Hyperplasia of the Prostate: Teaching and Non-Teaching Hospitals Compared

Summary data on hospital discharges has shown that mortality from hyperplasia of the prostate, as in several other common conditions, is higher in the non-teaching hospitals than in the teaching hospitals of England and Wales.

The patients in the study were 932 men with simple hyperplasia of the prostate consecutively admitted to two teaching and three non-teaching hospitals in the same region between March 1964 and June 1969. There were five deaths among 556 men admitted from the waiting list, and negligible variation among the hospitals. Among the 376 unplanned emergency admissions there were 35 deaths, 26 of them in 71 men who did not have prostatectomy. Unplanned admissions, especially those not operated on, were older than the rest and mostly in acute retention; many also had cardiovascular and other diseases. Seventy-eight percent of the admissions to two of the regional non-teaching hospitals were unplanned; the operation-rate for these men was generally low and case-fatality rate was 14 percent. In contrast, only 22 percent of the admissions to the two teaching hospitals were unplanned, nearly every case was operated on, and the case-fatality rate was 4.3 percent. The two non-teaching hospitals with their relatively small resources were carrying more than their share of the most difficult cases.

On the basis of these data, the study concluded that a national survey to assess the treatment of hyperplasia of the prostate was indicated. The study also demonstrates the importance of adequate information about the workings of the health services system and the need for regular reporting and analysis of data on all hospital discharges.

Ashley JSA, Howlett A, Morris JN: Case-fatality of hyperplasia of the prostate in two teaching and three regional-board hospitals. Lancet 2:1308-1311, 1971

20. Treatment of Varicose Veins

A variation in method of medical treatment may result in substantial savings in terms of hospital resources and of time that a patient is away from his work.

A number of medical conditions have been studied by the Department of Health and Social Security in England as part of its program for health services R & D. They were chosen because they are large utilizers of hospital resources and because the opportunities for innovation in their medical management presented themselves. One such condition was varicose veins.

Varicose veins can be treated either by inpatient surgery or by an outpatient technique involving injection of fluid into the affected veins. In 1965, the treatment of varicose veins in England was responsible for 52,000 hospital admissions.

20. (continued)

The subject of varicose veins was studied from several aspects in controlled clinical trials by research teams in Wales and London. The study indicated that:

a. the results of treatment by surgery and by injection-compression methods were comparable in terms of their medical outcomes;

b. the cost of inpatient surgery was four times higher than the cost of the injection-compression method in a hospital outpatient department;

c. the number of days lost from work before, during, and after treatment was significantly less for the injection-compression patients than for those who received surgery (approximately 8 days compared to 31); and

d. the majority of patients treated for varicose veins expressed a preference for the injection-compression technique, assuming the end results were equally satisfactory.

In conclusion, this comprehensive study of two alternative methods of treatment for varicose veins indicated that the injection-compression method would have a significant advantage over the more commonly used inpatient surgical technique. It seems probable it will be advocated as the treatment of choice by the National Health Service of England and Wales.

Ford FR: Innovations in care: Treatment of hernia and varicose veins, chap. 12, Portfolio for Health, The Role and Programme of the Department of Health and Social Security in Health Services Research. London, Oxford University Press, 1971

APPENDIX E

Examples of Current Health Services R & D

The following brief abstracts of current health services R & D were selected from the reports of granting agencies in Canada, Sweden, the United Kingdom and the United States to illustrate the breadth of the problems under investigation.

1. Concepts and analytic methods of health care services and systems:

Econometric Model of the Health Care Sector — Martin S. Feldstein, Ph.D., Harvard University

Development of an operational, statistically estimated model of the health care sector which can provide a base for policy discussion and a framework for teaching and further research.

Operations Research in Health Services — J. Stringer, M.A., Institute for Operational Research, London

Among other projects, operational research studies to develop methods and techniques for comprehensive planning of health services for any given area.

Measures of Effectiveness of Health Services — D. S. Sackett, M.D., McMaster University

Development and testing, using operations research techniques, of a method for selecting the optimum set of health services programs in terms of cost and effectiveness. Ultimately, to be used by decision/policy-makers for allocation of scarce resources.

2. Organization and delivery of health services:

Assessment of New and Alternative Forms of Legal Organization for the Administration and Delivery of Health Services — William J. Curran, J.D., S.M.Hyg., Harvard University

Development of a national classification of alternative legal structures for the administration and delivery of health services in municipal hospitals, group practices, and other large health facilities. To include all forms of legal organizations which may offer alternatives, adaptations, or new ideas for health services programs.

Coordination of Ambulance Services with Hospital Emergency Department in Metropolitan Toronto — Ian H. Mitchell, University of Toronto

To indicate coordination required between ambulances and hospitals, with particular attention to communications and readiness, physical equipment and layout, training and standards, and rational dispatching.

Public Acceptance of Prepaid Group Practice — Charles A. Metzner, Ph.D., University of Michigan

Explanation of differential public acceptance of prepaid group practice medical care plans in terms of various characteristics of the plans; developing procedures to study group attributes dictating choice of plans; and determining impact of demographic variables on demand.

3. Health services planning, policies, and strategies:

Basic Guidelines for the Scope and Design of a Health Services Plan — Swedish Planning and Rationalization Institute of Health and Social Services, Stockholm

Development of a proposed planning system for county council activity, and a model program for health and medical planning over a 15-year period, identifying necessary input information, formulation of aims, and presentation of results.

Up-dating Master Plan of Hospital Facilities Including the Development of a Regional System of Hospital Care — Hospital Planning Unit, Ontario Hospital Service Commission

Development of a balanced and integrated system of hospitals and related facilities in Ontario, using statistical analysis of patient records and factors affecting hospital utilization and medical referral patterns.

4. Development and use of health information systems:

Automation of the Problem-Oriented Medical Record — Lawrence L. Weed, M.D., University of Vermont

Automation of a previously designed record system, in order to: a) develop medical record auditing procedures; b) facilitate assessment of patient management; c) build data base of problem-oriented medical information; d) aid training and education of staff and students; and e) adapt to hospital information system to enable unit cost accounting and cost-benefit analysis. Designed for eventual expansion to a regional information system.

Optimized Care Planning and Delivery Through a Patient-Oriented Information System — William A. Spencer, M.D., Texas Institute for Rehabilitation and Research

Resource utilization in a rehabilitation hospital is optimized and individualized through an integrated computer-based information system that monitors and tracks individual plans of care, admissions, patient status, resource usage, care transactions and patient outcome indicators. Responsive alterations in the care process according to patient needs are made possible by interaction between personnel and the information system. The data base affords information for institutional management maximizing resource deployment. Eventually development into an auto-evaluating care process model may be possible.

Study of Hospital Discharge Abstract Systems — Jane H. Murnaghan and Kerr L. White, M.D., Johns Hopkins University

Review and critical evaluation of major hospital discharge abstract systems, in operation or development, for the United States, Canada, and European countries. Basic data set identified, as well as areas for research and development, and prospects for implementation of coordinated abstract systems responsive to wide variety of users.

5. Measuring and improving effectiveness of health services:

Evaluation of Nurse Practitioners in Health Care — S. R. Burnip, M.D., Kaiser Foundation Research Institute, Oakland

Controlled study to evaluate the effectiveness of pediatric nurse practitioners in a large pediatric group practice, to study their impact upon other health care providers in the group, and their own job satisfaction and changing relationships with patients.

6. Quality assessment and evaluation of health services:

Medical Audit in Hospitals — Gilbert Blain, M.D., University of Montreal

To show that it is possible to estimate the value of professional activity of doctors and the quality of care they provide to hospital patients; drawing upon PAS and MAP experiments in the United States and similar experiments in Montreal.

Study of Hospital Discharge Records — David Hewitt, M.A., University of Toronto

Evaluation and development of the potential of routinely compiled hospital records for quality control and for epidemiological research purposes.

7. Improving accessibility to and equalizing distribution and utilization of health care services:

Analysis of Hospital Procedures Affecting Utilization of Services — Michael G. Saunders, M.D., Winnepeg General Hospital

Examination of hospital factors which might contribute to undue patient stay with special emphasis on laboratory processing, weekend effects, and methods of producing mathematical model of patient stay.

Economic Determinants of Geographical Distribution of Physicians — Jawed Aziz, Senior Research Economist, Health Resources Directorate, Department of National Health and Welfare, Ottawa

Measurement of influence of economic and other factors on the distribution of physicians; results will aid in policy development toward

(continued)
equitable distribution, and will point out areas for further research.

Urban Patterns of Utilization of Health Services — Edward W. Hassinger, Ph.D., University of Missouri

Determination of factors related to the decisions of urban families concerning utilization of health care services from medical and other health practitioners, recognizing that access to widely available services may be curtailed by structure. (Follows an earlier study on rural and small town utilization patterns.)

8. Improvements and innovations in health services facilities:

Experimental Construction--Children Outpatient Modules — Robert E. Cooke, M.D., Johns Hopkins University

Uses two forms of experimental construction (a multi-station clinic through which the patients move; and the more traditional series of individual physicians' offices, in which service is brought to the patient) as dependent variables in a study of efficient and acceptable outpatient care to disadvantaged children.

Model Surgical Complex Demonstrating Integrated Care — Walter Bornemeier, M.D., Illinois Masonic Hospital

Construction of model surgical complex, architecturally designed to demonstrate integrated care via physical interrelation of surgical suite, pre- and post-operative facilities, and an intensive care unit. Expectations: to improve bed utilization; to design and develop more economic and efficient systems of supply and waste dispersal.

9. Improvements in health services manpower:

Projection of Manpower in the Health Industry in Quebec — Richard Beland and Thomas J. Boudreau, University of Sherbrooke

Prediction of manpower requirements of the health sector, especially of hospitals, by professional category; using population forecasts, morbidity rates, data on hospital stay, and other functions which depend on type and size of hospital. (Similar projects in most other Canadian provinces.)

The Practicing Physician and Allied Health Personnel--A Feasibility Study of the Team Approach in the Delivery of Personal Health Care — Stanley Greenhill, M.D., University of Alberta

Determination, by time study of general practitioners, of most effective use of health care personnel; what medical problems and amount of time and responsibility can be delegated to them, while maintaining patient satisfaction and enhancing quality of care.

Training in Health Services Research

Robert C. Hardin, M.D.
University of Iowa

Development, organization and staffing of course curricula to prepare doctoral students in economics and in graduate programs in health and hospital administration to undertake substantive individual research in health care delivery.

10. Utilization of technology in health services:

Automation of Cervical Screening

O.A.N. Husain, M.D.
St. Mary Abbots Hospital
London

Evaluation of prototype equipment as a possible means of automatically scanning and classifying cervical smears.

Evaluation of Medical EDP Systems

Swedish Planning and Rationalization Institute of Health and Social Services
Stockholm

Analysis of results of developments in electronic data processing systems, with particular emphasis on those suitable for wide-scale introduction into routine work in the near future.

Hospital Communications and Laboratory Data Handling

Seymour Werthamer, M.D.
Methodist Hospital of Brooklyn

Development of an inexpensive, on-line computer system to facilitate rapid and accurate ordering, performing, reporting and retrieval of clinical laboratory tests in small hospitals.

11. Financing, costs, charges and incentives of health care services:

Average Cost Behavior in a General Hospital

Robert E. Kuenne, Ph.D.
Princeton University

To devise methods and analyze data that will make possible better cost estimates and thus more efficient hospital management. By fitting theoretical economic functions to hospital statistical data, relevant cost functions will be estimated to determine price for each "final output".

Exploratory Study of Utilization (Co-insurance) Fees in a Saskatchewan Health Center

B. L. Marshall
University of Saskatchewan

To investigate and determine the influence utilization fees exert on physician behavior; particularly, if physicians take into consideration and make exceptions for such factors as age, type of illness, number of visits, etc., when levying the fee, when the Medical Care Insurance Act does not.

HIP Incentive Reimbursement Experiment

Sam Shapiro
Health Insurance Plan of
Greater New York

Tests the premise that financial incentives paid to a prepaid group practice plan will enable the plan to use more efficiently medical manpower, hospitals, and extended care facilities for Medicare beneficiaries. Expectations: reduction in hospital admission rates and lengths of stay, unchanged physician utilization, and increased turnover in extended care facilities. (Reimbursement experiments akin to this one are going on in California and Connecticut.)

Insurance Plans and Psychiatric Care

Walter Barton, M.D.
American Psychiatric
Association, Washington, D.C.

Descriptive analysis and evaluation of the existing coverage and utilization of psychiatric care insurance; its impact on psychiatric services; actual and potential impact on community mental health centers; and development of recommendations for planning psychiatric care insurance coverage under future voluntary or governmental health insurance programs.

APPENDIX F

Potential Contributions of Technology in Health Services R & D

The Present Situation

Many companies have viewed the health services system as a potential market for new technology, and have studied the possibilities in great depth. Their market surveys have included extensive interviews with physicians, hospital administrators, and other health professionals; engineers have been assigned to work in health facilities in an attempt to evaluate the receptivity of the health system to new devices. Recently, in a period of diminishing Federal support of military-space R & D which has left the country with an unused technological capability, these sallies into the health services system have become much more commonplace.

In an informal mail survey of private industry conducted by the Panel staff, some 60 companies reported activity in health services R & D. Forty of the 60 reported major R & D interests in the area of instrument technology that were largely supported by their own funds. In addition, about 20 organizations emphasize consultation services for management, planning and research. These companies do not generally invest their own funds, but are dependent upon government contracts for pursuit of these activities. A study conducted by the Arthur D. Little Company for the National Academy of Engineering estimated that industry in 1970 had invested $100 million in R & D in the field of biomedical engineering. The results of the Panel's survey indicate that most of this investment that is related to health services ($50 million) is also equipment-related technology.

Concomitant with this limited private investment by technological industry is a rather short list of successes. There is an occasional company for which the acceptance of a new piece of equipment like the automated analyzer has led to one of the great success stories of modern technology. More often, the small company founded to manufacture an electronic stethoscope or similar device moves into bankruptcy, while the larger company withdraws into military-space business or manufacturing for other industries.

Meanwhile, national committees wrestle with the problem of what is wrong. Why is the gigantic health services field not markedly influenced by modern technology? When the costs of health care are skyrocketing and a significant fraction of the population has no access to

health care, why is technology not adopted, at least as a palliative? Why are we unable to match the under-utilized technological capability to health needs? What is the essential role of the Federal government in realizing such a match?

Prerequisites for the Application of Technology

In the light of these general considerations, what can be said about the role for technology in health care? What conditions should exist to create a promising potential for the application of technology?

1. Need for Organization of Health Services

An adequate health care system must exist as the environment into which the technology is to be injected. The fully automated clinical laboratory, for example, is logical only when associated with a hospital or health care system or organization in which it is feasible to use the equipment full-time. If a hospital is considered, this presumably means one of at least 500 beds, and consideration is then immediately restricted to only 600 of the 7,000 hospitals in the country. An alternative is a sharing of one efficiently sized laboratory by a variety of users, a situation which imposes the requirement for at least a minimal inter-institutional system to insure adequate service and standards, authority and responsibility.

The blood supply situation in this country is a national disgrace. Almost half the country's supply of plasma--one plane load a week from one million donors annually--is imported from Latin America. Any sensible steps that can be taken to aggregate the sources of supply, to reimburse donors fairly, to maintain standards for processing, storage, and distribution, and to set up equitable arrangements for payment should be encouraged. Here again, technology obviously can immediately provide a strong amelioration of present difficulties, but only if a suitable regional organization exists to capitalize on that technology while providing the services required by the medical institution, the doctor, and the patient.

2. Need for an Adequate Knowledge Base

Technology can only be applied when the appropriate base of scientific knowledge exists, although technology can also indicate dramatically where scientific research is needed. The current rapid growth of automated multiphasic health testing has been subjected to criticism from the health profession not only because frequently many of the tests made do not clearly indicate high-risk situations, but because efficacious modes of intervention do not exist, or organizational arrangements for post-testing health care and follow-up are not available. Certain tests, such as those for nutrition, cannot be made economically; other tests cannot be interpreted because the distributions and variances of the measured values in general or so-called "normal" populations are unknown.

In spite of these limitations, automated multiphasic health testing systems continue to grow rapidly. They are believed to provide unusual opportunities for initial access to the health care system for large segments of the population, and are widely accepted as an important element of preventive health care and early warning for specific diseases and difficulties. The costs and benefits of this large-scale activity have yet to be determined.

3. Need for Understanding the Health Care System

Application of technology requires at least minimal understanding of the operation of the system within which the technology is to be used. Just as in the case of automated multiphasic screening systems, attempts to innovate with technology often indicate precisely the areas in which the system's operation is not adequately understood and where directed research should be done.

The recent history of the automation of hospital information systems is an excellent example. The computer is clearly and immediately applicable to the routine, management data processing (billing, accounting, payroll, inventory records and purchasing). There are successes in automated monitoring and record keeping for routine tasks of medical care personnel. When the computer is applied to either the patient's medical care records or to high-level management decisions, however, enormous gaps in understanding the detailed operations of the system and their desired characteristics become apparent. There are

substantial deficiencies in knowledge not only in the medical area but also in the economic and behavioral aspects of health care institutions and systems.

4. Need for Consumer Protection

The application of technology requires that mechanisms be developed to protect the consumer from its misapplication. The full impact of the benefits of biomedical research and medical technology can only be realized if instruments, equipment and test reagents representative of that technology are widely available to the providers of health care and if, in turn, those providers are competent in their use. How can such devices for detecting, diagnosing, monitoring, and treating disease be made widely available, meeting the standards of efficacy, safety and reliability of which technology is capable? How can the providers of health care be trained in the use of such devices? How can needed standards of device quality and user training be maintained continuously?

An unknown number of tests are performed annually for ambulatory patients, and over half a billion tests for hospitalized patients. It is estimated that perhaps as many as a quarter of all practicing physicians employ no tests, that probably a quarter of tests done are insufficiently accurate, that an unknown proportion of tests may be inappropriate or useless, and that a few may be either harmful or unduly hazardous. Similar under-application and misapplication of technology in therapeutic procedures is believed to be likely.

Additional laboratory applications for technology are ready for widespread development or use. These involve "dip-sticks" and test "kits" that use reagents and sometimes instruments for physicians' offices, and "do-it-yourself" specimen kits for cervical cytology, sputum cytology and pregnancy testing.

A program to develop needed standards was recommended in the report of the Cooper Committee in 1970.* The Food and Drug Administration is currently taking preliminary experimental steps in accordance with those recommendations. To have a significant impact on the nation's health services within the next five years, these efforts to develop

* Study Group on Medical Devices: Medical Devices: A Legislative Plan. Washington, D.C., Department of Health, Education, and Welfare, September 1970 (mimeographed)

standards must be very substantially expanded. The National Bureau of Standards and the Center for Disease Control are other Federal agencies which could be helpful in developing standards. A major effort by such agencies, supported by academic institutions and industry, is warranted to establish the needed standards program.

5. Need for Public Support

Successful development of technology for health care depends upon the intensive involvement of industrial, non-profit, and governmental capabilities. The principal development effort in this country has always resided in industry. The involvement of industry requires the existence of either an aggregated and discernible market, and a reasonably short time span between investment and sales, or direct governmental support of the development and production engineering. Further, it requires an attractive patent policy and a mechanism and motivation for encouraging innovation in health care.

It should be noted that the above statements do not imply the necessity to focus only on large markets. Technology can be developed successfully for quite limited markets (for example, the blind or the child with dyslexia), provided only that society is willing to invest in the costs of new devices and systems for the benefit of those who will be affected. In other words, success in technological innovation in health care depends on political acceptance of the priority of this problem and a health care system able to accept the change--not a priori on the size of the market or the number of people directly affected. In this sense, successful technological innovation depends upon health education of the public in the highest sense of public relations.

Conclusions

In spite of the potential contributions of the scope suggested above, little apparent progress has been made by technology in alleviating problems in health services in the past decade. Clearly, there are several reasons:

1. National priorities for the use of technological capabilities have been on space-military missions, such as Apollo, rather than on health missions.

2. There has been difficulty in establishing national priorities within the health field. As a consequence, the engineer, as an outsider looking at the health services system, receives the impression that care of critical problems and end-stage disease is the most important issue. Thus, emphasis is placed on glamorous developments such as the artificial heart, intensive care units and the like, to the detriment of any technological contributions in other areas of the health care system.

3. Because of the difficulty in establishing national priorities in health and maintaining them long enough to allow technological progress in the field, the research effort is seriously diffused, with too few resources committed to any one area to allow significant results.

4. Inadequate data inhibit evaluation on the basis of either health care quality or cost-effectiveness.

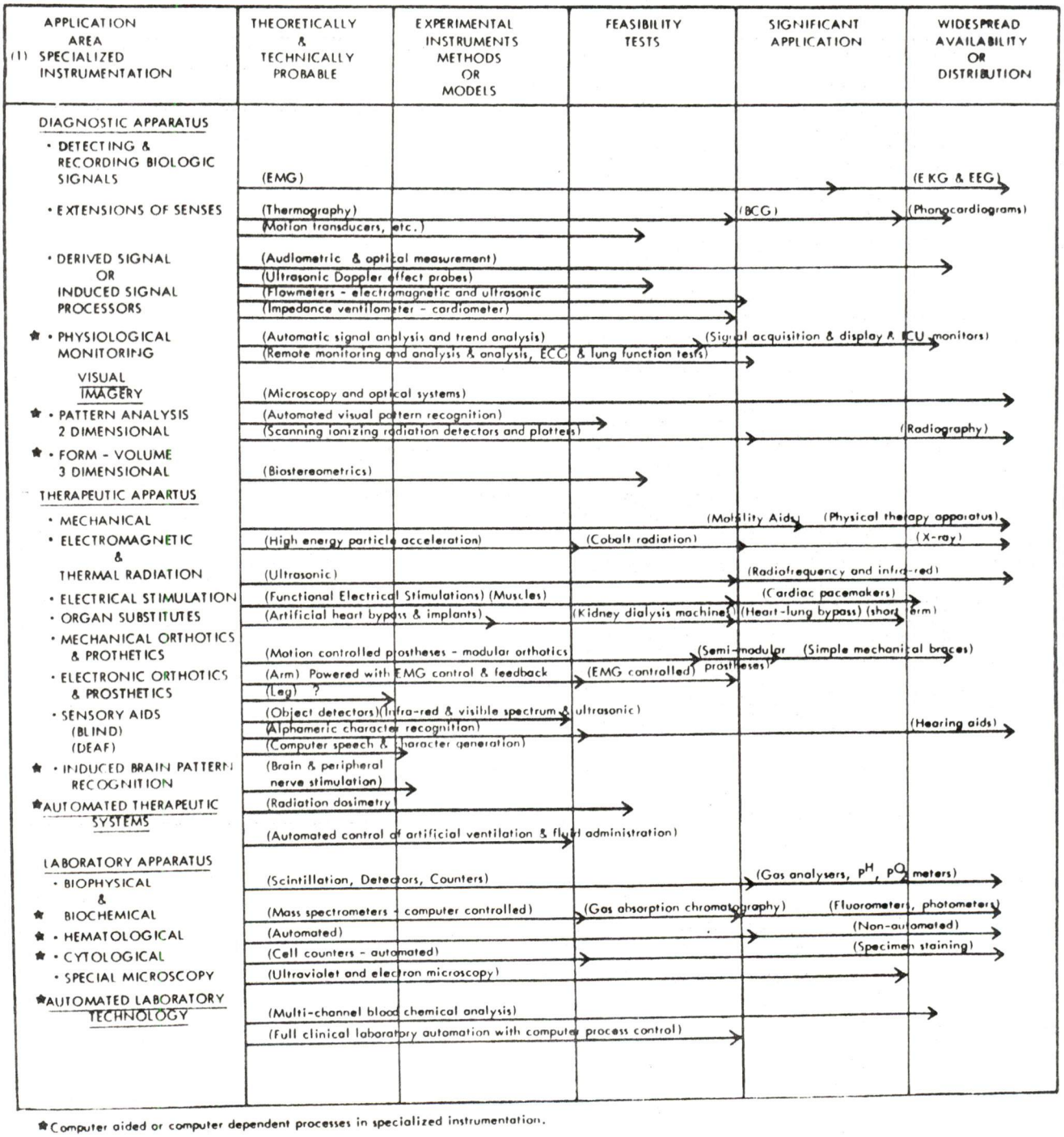
5. A definable market to encourage industrial investments in development is lacking in the health services field. An electronics company is not accustomed to allocating the large fraction of cost to marketing that is found in the pharmaceutical industry. The Federal government has been unable to utilize its several hundred VA and DOD hospitals to provide a market base.

6. Government agencies have failed to support device and subsystem development. An essential characteristic of such support would be the provision of incentives to industry to involve its best engineering capability.

7. There are great difficulties in effecting changes in any on-going social system, such as that of health care and health services, without waiting for an entirely new generation of professionals to be trained.

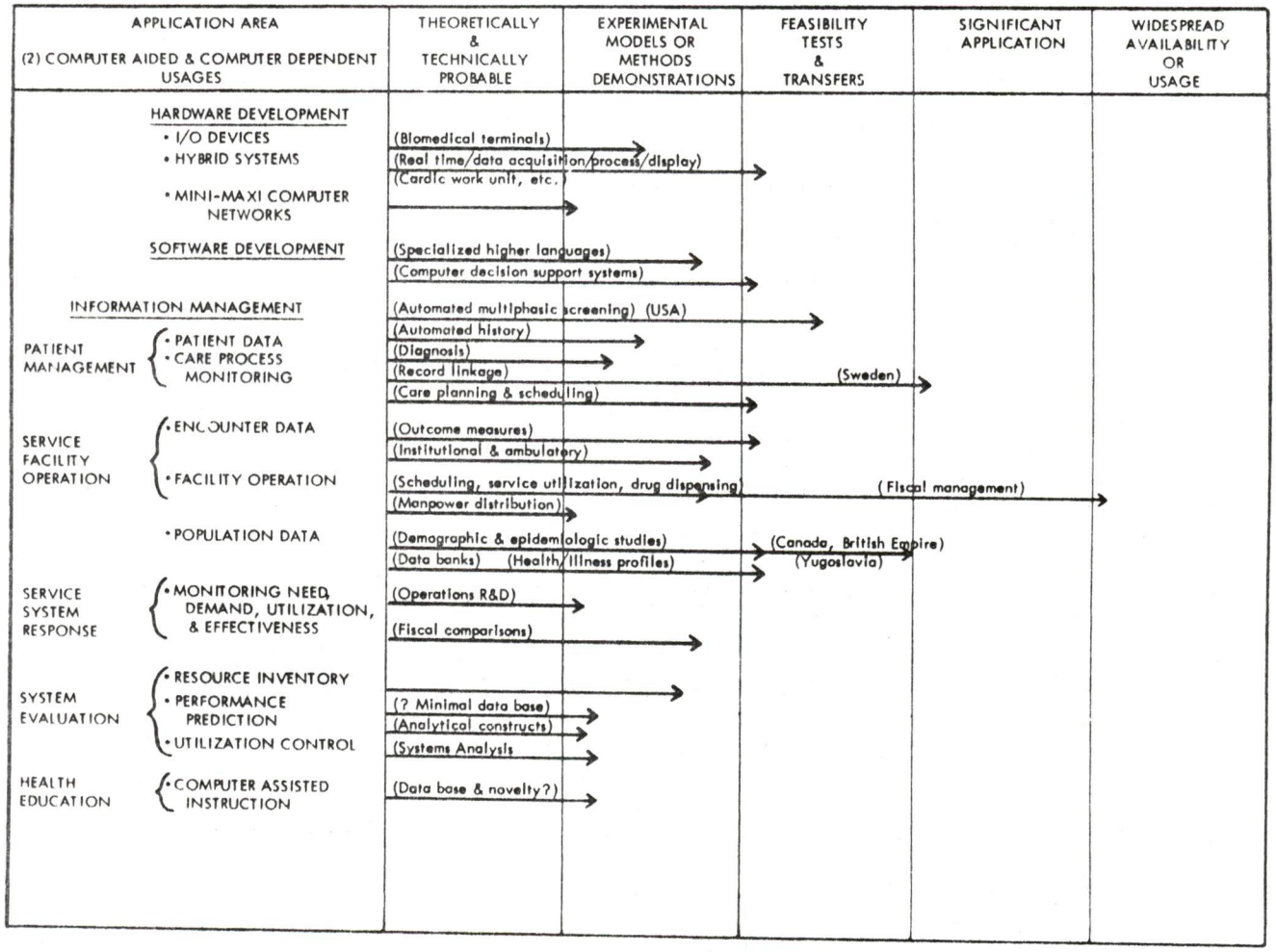
Finally, although the field is ripe with possibilities, technology can contribute to significant changes in health services only with a long-term, popular political commitment to health and health care as a major national goal. Once such a goal is accepted, technological research is required, development must be supported, and programs must be initiated with adequate provisions for testing and evaluation.

Figure 1. DEVELOPMENTAL LEVEL OF APPLICATIONS OF TECHNOLOGY IN HEALTH SERVICES



*Computer aided or computer dependent processes in specialized instrumentation.

Figure 1. (continued)



APPENDIX G

Major Disciplines Required for Health Services R & D

Fundamental and Applied Research

Health services R & D is a multidisciplinary field. To a large extent it is undertaken by those who enter it partially, temporarily or permanently from other fields. The major professions that contribute to health services R & D are those discussed below.

Economists

Health economists are concerned with explaining and predicting the behavior of physicians, patients, administrators and other participants in the health care system, especially in response to changes in income, insurance coverage, wages, prices of services and other economic variables. They seek to discover the relationship between costs and scale of operation, the role of medical care and socioeconomic variables in the production of health, the reasons for apparent shortages or surpluses of various types of health personnel and services, and the cost-benefit ratios of different service programs. Economists have typically relied on secondary analysis of data collected for administrative and other purposes, but a few are beginning to experiment with more direct observation of health-related activities.

Because the health services system involves the allocation of scarce resources among competing goals and has become a major industry, it will be necessary to increase the number of economists working on health problems and to improve the institutional arrangements to facilitate research.

Engineers

There has been little formal training available for engineers in the health care field. Biomedical engineering is perhaps the best developed area, but here the efforts are modest compared to the needs. Operations research has also been developed to a limited extent. Industrial engineering perhaps is in greatest need of development, particularly with respect to the design of subsystems for larger health care systems and institutions.

The possibility of providing short courses (six months to one year) for engineers in the substantive problems of health services organizations should be explored. Just as it takes

time for engineers to become familiar with the aerospace, transportation and communications industries, so it takes time and experience to learn the intricacies of the vastly more capricious, ill-defined and poorly organized field of health care.

Epidemiologists

Epidemiology, the study of "that which is upon the people", is the basic science of population and community medicine. Familiarity with the concepts, principles, methods and accomplishments, as well as awareness of its pitfalls and limitations, is essential for those assuming responsibility for health services development and evaluation. Competence in the use of this discipline's methods is essential for many of those who undertake fundamental or applied research in health services. Many epidemiologists will be concerned with the study of communicable and chronic diseases, their incidence and prevalence, the circumstances and conditions under which they arise and spread, and the factors that foster their control and eradication. Other epidemiologists will be concerned with identification of those populations at risk of succumbing to these health problems and with evaluation of the impact of health services on the problems. Epidemiologists are needed for the conduct of controlled clinical trials, for the critical evaluation of the efficacy, toxicity and hazards of drugs, procedures, instruments, devices and even of administrative practices, but especially for evaluation of the impact of health services on the health of populations.

Physicians

The largest group of professionals in health services research have their primary training in medicine. They should be better prepared to work comfortably in teams and formal organizations, and to support or themselves conduct clinical trials and evaluative research in the field of health services. All of this implies the need for change in medical education and broader exposure of medical students and clinicians to health services R & D and to the nature and problems of health care organizations. The same is true for nurses and the allied health professions.

Sociologists

Medical sociologists deal with such issues as the effects of varying forms of organizational and professional patterns; consumer expectations and response; intraorganizational coordination; the effects of culture and social setting on health and illness behavior; and the impact of social patterns on the occurrence of disease and disability. If new kinds of organizational arrangements, new types of health manpower and new kinds of management are to be introduced in the health care field, it is essential that sociologists study the attitudes and behavior of consumers and professionals and examine the factors that impede and accelerate the introduction and acceptance of these innovations. Sociologists are also largely responsible for the development of survey methods and statistical analysis essential to many aspects of fundamental and applied health services R & D, and these methods need to be more widely known and practiced.

Statisticians

Health statisticians at Federal, state and local levels will be needed to design and operate the information systems required for the management of health care organizations at all levels. They are also essential for analysis and evaluation of health services. In recent years most of the departments of biostatistics in schools of public health have emphasized the training of biomathematicians. The need now is for statisticians trained in health statistics who are able to design surveys, controlled clinical trials, information systems and evaluation schemes, and related quantitative approaches for the health care field.

Development, Administration and Management

The problem of training health care administrators is so crucial, not only for health services R & D but also for the whole future of the health care system and the prospects for change and improvement, that it deserves special comment.

Health Care Administrators

Traditional public health administration and hospital administration need to be supplanted by a new discipline of health care administration or perhaps of administrative medicine. Both physician and non-physician candidates should receive rigorous graduate education in a one-

or two-year program, including epidemiology, health statistics, health economics, behavioral sciences, industrial management, accounting, public finance, health care organization and administration, health services research methods, and the history of health institutions and professions.

There are few health services administrators and managers today with the necessary background to appreciate the need for research, to formulate problems, or to ask researchable questions. It is estimated that Federal, state and local health departments employ about 5,000 "public health administrators", "program analysts", and "program representatives". The major professional category consists of physicians who, in accordance with programs developed fifty years ago, have received one year of vocational training in a school of public health, leading to a Master of Public Health degree and reclassification as "health officers". This figure probably includes a few individuals with advanced degrees and the 400 epidemiologists and 800 health statisticians currently employed.

In addition, it is estimated that there are about 17,200 "hospital administrators" and their managerial assistants. Formal training in hospital administration has been under way for only 20 years and the total number of graduates over the years probably does not exceed 2,500, or less than 15 percent of those administering the nation's 7,000 hospitals. It would appear that the vast proportion of administrators of the national hospital system have had primarily on-the-job training.

Current graduates who might be expected to assume administrative responsibilities in the future number annually about 500 from university programs in hospital administration and about 200 from related graduate programs in schools of public health.

While it is clear that the total number of persons receiving any kind of formal training as preparation for running the country's $75 billion health care industry is quite inadequate, serious questions may also be raised about the quality of the candidates being attracted and the nature of the training available. Views on such issues are bound to be subjective and difficult to document objectively. First there appears to be disenchantment on the part of private foundations with the vitality and utility of the education afforded by schools of public health

and, to a lesser extent, by university programs in hospital administration. Secondly, the view is widely expressed in schools of medicine, as well as in the university departments of economics, sociology and operations research, for example, that courses in schools of public health and in university hospital administration programs are of limited value. Finally Federal, state and local governments, hospitals, fiscal intermediaries, health care plans and systems, and universities all seem to experience great difficulty in finding first-rate candidates for vacancies in administrative and managerial positions.

Schools of business administration and of industrial management are becoming increasingly interested in the health care field and their expertise in the management of large-scale organizations is urgently needed in health care. Similarly the expertise of schools of public health in epidemiology and health statistics is needed, as is the substantive familiarity with the hospital industry that characterizes the university programs in hospital administration.

Few if any educational institutions combine competence and concern with respect to the problems of providing personal health services for general populations in addition to the problems of day-to-day operation of hospitals, clinics or health departments; the nature of clinical medicine, its potentials and limitations for modifying health and disease in individuals and populations; and expertise in the basic disciplines of epidemiology, statistics, sociology, economics, operations research, accounting, industrial management and systems analysis.

The manpower issue in health care administration is in many ways as acute as it is for R & D. There is an urgent need for increased numbers and improved quality of both health services administrators and investigators. The latter are needed to carry out the research, development and evaluation, and the former to collaborate and cooperate in the conceptualization of problems, the provision of information and the adoption of useful measures and innovations that result from research, development and evaluation, as well as to develop and manage the country's new health care systems. These relationships argue persuasively for the development of training programs for health care administrators in the same environments and institutions that provide training for health services investigators. Both should take place where organized health care systems exist and where health services R & D is being

actively pursued.

The Panel believes that support of training for administration and management should be the primary responsibility of the Bureau of Health Manpower Education. The level of support for institutional or university graduate programs in health care administration should be increased substantially. University health care centers, schools of medicine, schools of public health and university programs in hospital administration, either alone or in collaboration with schools of industrial management, schools of public administration, or schools of business administration, should be able to mount programs that address the contemporary problems of health care, attract first-rate faculty and appeal to capable candidates. Large-scale support designed to reorient the present training programs, particularly in schools of public health, should be a major approach to the problem. New legislation similar to that provided through the Hill-Rhodes Act, accompanied by adequate funding, could have the necessary impact.

APPENDIX H

Technical Notes

TABLE 1 Estimates made by NCHSR&D staff.

TABLE 2, 3 Special Analyses, Budget of the United States Government, Fiscal Year 1972, pp. 149-173 (Section K). The figures for health services R & D are those given in the category labelled "improving the organization and delivery of health services"; those for biomedical research are those given in the category labelled "health research". All figures for 1971 and 1972 are estimates.

TABLE 4 Federal Government: Special Analyses, Budget of the United States Government, Fiscal Year 1972, pp. 149-173 (Section K).

State and Local Governments: National Science Foundation: Research and Development in Local Governments, Fiscal Years 1968 & 1969 (NSF 71-6). The assumptions are that state and local governments spend about twice as much as the Federal government on health services R & D in proportion to their expenditures for biomedical research, and that total outlays increased by one-eighth in fiscal years 1970 and 1971.

Universities and Colleges: According to a staff study for President's Science Advisory Committee Panel on Health Services Research and Development, universities received $33 million in grant money from HEW specifically for health services R & D in fiscal year 1970. The assumptions are that 10 percent of this amount is matched by university funds (excluding foundation grants included below), and that there was no increase in fiscal year 1971.

Private Foundations: Survey by Dr. David Z. Robinson, member of President's Science Advisory Committee Panel on Health Services Research and Development, for fiscal year 1970.

Other: Staff estimate of amounts spent on health services R & D by the Blue Cross Association, AMA, AHA and other professional organizations.

Industry: A study by Arthur D. Little, Inc., for NAE in September 1970 estimated that industry was investing about $100 million in R & D in the field of biomedical

engineering, with an annual growth factor of 10 percent. The assumption is that half of this effort can be considered health services R & D and that this represents or approximates industry's total investment.

TABLE 5 Special Analyses, Budget of the United States Government, Fiscal Year 1972, pp. 149-173 (Section K), and staff analysis of unpublished figures provided by the Office of Management and Budget.

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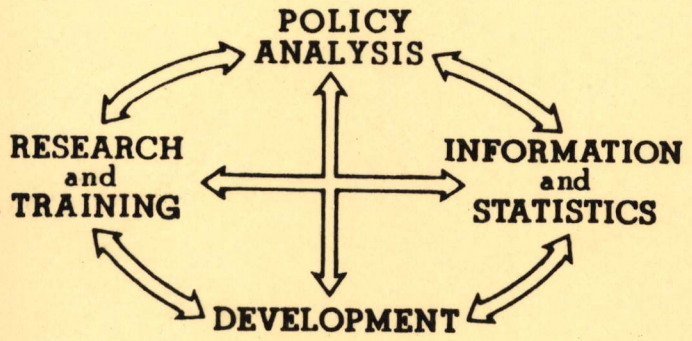

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PANEL ON HEALTH SERVICES RESEARCH AND DEVELOPMENT

PRESIDENT'S SCIENCE ADVISORY COMMITTEE

February 1972

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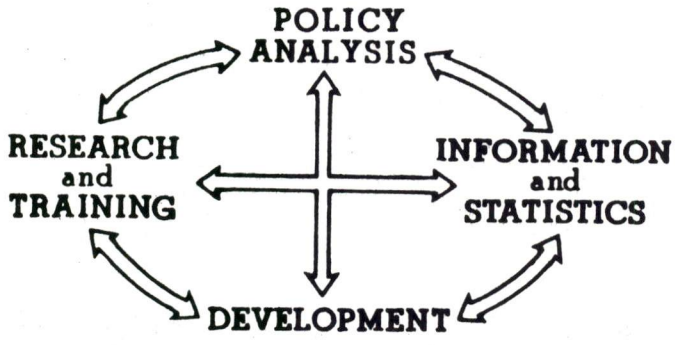

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PANEL ON HEALTH SERVICES RESEARCH AND DEVELOPMENT

PRESIDENT'S SCIENCE ADVISORY COMMITTEE

February 1972

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Edward J. Connors, M.H.A.	Director, University of Michigan Hospital
Paul M. Densen, Sc.D.	Director, Center for Community Health and Medical Care, Harvard University
Victor R. Fuchs, Ph.D.	Professor of Economics and of Community Medicine, Graduate Center and Mount Sinai School of Medicine, City University of New York
Robert J. Haggerty, M.D.	Professor of Pediatrics, University of Rochester
Jean L. Harris, M.D.	Executive Director, National Medical Association Foundation, Inc.
Theodore P. Heuchling, S.M.	Vice President, Arthur D. Little, Inc.
Leonard Laster, M.D., ex officio	Assistant Director for Human Resources, Office of Science and Technology
William R. Marshall, Ph.D.	Dean, College of Engineering, University of Wisconsin
Baldwin Maull, LL.B.	Former Chairman, Marine Midland Banks, Inc.
David Mechanic, Ph.D.	Professor of Sociology and Director, Center for Medical Sociology and Health Services Research, University of Wisconsin
Edmund D. Pellegrino, M.D.	Vice President for the Health Sciences, State University of New York at Stony Brook
David Z. Robinson, Ph.D.	Vice President, Carnegie Corporation of New York
Lloyd H. Smith, M.D.	Professor of Medicine, University of California at San Francisco
William A. Spencer, M.D.	Director, Texas Institute for Rehabilitation and Research and Professor of Rehabilitation, Baylor College of Medicine
John G. Truxal, D.Sc.	Vice President, Polytechnic Institute of Brooklyn
Kerr L. White, M.D., Chairman	Professor of Medical Care and Hospitals, Johns Hopkins University

Staff

Jane H. Murnaghan, Research Associate
Clifton R. Gaus, Sc.D., Assistant Professor
Allyson D. Avery, Research Assistant

Department of Medical Care and Hospitals, Johns Hopkins University

IMPROVING HEALTH CARE THROUGH RESEARCH AND DEVELOPMENT

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IMPROVING HEALTH CARE THROUGH RESEARCH AND DEVELOPMENT

Report of the
President's Science Advisory Committee Panel on
Health Services Research and Development

I. SUMMARY

The day is not far off when the President of the United States will be held as responsible for the health of the nation as he is for its economy. The Executive branch of our government must have the capacity to anticipate problems in the provision of health services, to formulate coherent and coordinated policies and standards for our pluralistic health care system, and to stimulate the development, testing and evaluation of new forms of organization and technology that will improve the health care system and the health status of the population in the future. To accomplish this, we must have a strong Federal framework for health services R & D, experienced professionals committed to the field, and a broad foundation of information, knowledge, and ideas.

Little disagreement exists about the reasons why change must occur in the health care systems of the country. As summarized in the President's Health Message of February 1971, the problems center around maldistribution of resources, inequities in accessibility and availability of care, wide variations in quality, and the rapidly increasing burden of medical costs. There is, however, wide divergence of opinion about how things should change. The purpose of health services R & D is to provide workable alternatives and solutions to these problems.

The charge of the Panel on Health Services Research and Development was to examine critically the current contributions and future potential of health services

R & D in improving the health status of the nation and to recommend ways in which to use this R & D resource more effectively. In the past eight months, we have reviewed extensively the current status of the field and on-going efforts in government, industry, universities, non-profit organizations and foundations. We have met with representatives from the government agencies responsible for major health programs and have examined their current activities and plans for the near future. We have consulted a variety of persons with experience in the field, both in the United States and abroad, have reviewed the reports of other major panels, scientific groups, and individual investigators, as well as materials from the National Academy of Sciences, the National Academy of Engineering and other organizations. We have given special attention to the problems that arise in applying the traditional R & D approach of science and technology--the type of effort that has been eminently successful in the fields of defense, space and nuclear energy--to what is essentially a large and complex social system and a service industry.

Our general conclusion is that we have made substantial progress in the United States in developing our capacity for health services R & D. But we are fast being overtaken by social and political forces and will have to move promptly to keep up with the growing public and private demand for better information about the health care system and for effective measures to correct its inequities and inadequacies.

In the view of the Panel, the present movement to reorganize and improve our health care system requires a major commitment to health services R & D. It is important that we concentrate our available talents and resources for health services R & D on the key issues, and we have outlined in the first section of our report the opportunities as we see them, with examples of the types of questions that need

to be asked and answered. The heart of the problem, however, is not the current content or focus of health services R & D, but the need to promote a better understanding of this process itself, its uses and limitations, and to strengthen this process so that the Federal government has a powerful tool for dealing with health policy issues and can provide a strong measure of leadership for the country's health care system.

The major challenge as the Panel sees it is to use both human and financial resources more effectively. In meeting this challenge, the essential needs are clarification and restructuring of the different tasks involved, stronger Federal leadership and coordination, and greater emphasis on expanding the information base, the intellectual content, and the professional capability.

We have therefore built our recommendations around an analysis of the four primary functions involved in health services R & D: policy analysis, information and statistics, development, and research and research training. First responsibility for each of these functions must be fixed and strong organizational settings provided for them in the Federal government. Then we must devise constructive methods of coordinating the four functions. Finally, we must widen the debate on the problems and issues in the provision of health care so that both the private and public sectors are more responsive to health services R & D and the process of change. If these steps are taken to strengthen the continuing process of health services R & D, we will have a far more effective capability for dealing with the country's health care problems. We believe our strategy for change is practical and administratively feasible; it does not depend upon major Federal reorganization or large amounts of new Federal funds.

Recommendations

1. The Panel recommends that a strong POLICY ANALYSIS GROUP of permanent civil servants with professional training be created in the Office of the Secretary of Health, Education, and Welfare, and that one or more extramural INSTITUTES FOR HEALTH POLICY STUDIES be established.

If national decision-making in health areas is to be informed and the costs of "fire fighting" and "muddling through" avoided, it is essential to maintain a policy group that anticipates important issues, studies alternatives, and stimulates long-range analytical studies. In our review, it became clear that the Federal government needs more resources to support the decision-making process. We propose that a permanent, nonpartisan group of civil servants with professional training be created to assist the Secretary of Health, Education, and Welfare and his assistants in dealing with problems affecting the nation's health care system.

Such a group, to be effective, must have a long-range policy analysis component that is immune from short-term operational and political considerations and can provide the intellectual climate for thorough consideration of alternatives and the development of sound policies in health. The proposed Policy Analysis Group should, therefore, have one division for long-term analysis.

In addition, we recommend the establishment of at least one free-standing Institute for Health Policy Studies largely supported with Federal funds. This Institute, although primarily responsive to the needs of the Secretary of Health, Education, and Welfare, should have an independent board and the freedom to initiate its own analyses. One location for such a unit might be the newly established Institute of Medicine of the National Academy of Sciences. Foundations and other

institutions should be encouraged to develop additional policy study groups around the country.

2. The Panel recommends that a BUREAU OF HEALTH STATISTICS, with a COMMISSIONER appointed by the President, be created in the Office of the Secretary of Health, Education, and Welfare and that the Secretary immediately establish a TASK FORCE to define the Bureau's specific responsibilities and functions and its relations to other units of the Department and to other Federal agencies, and to determine its initial staffing needs and budget.

The evolution, implementation, and evaluation of policies to improve the nation's health care require sophisticated information and statistical systems that provide national and regional data on important health indicators, distribution of manpower, facilities, services and costs, and a variety of other factors relevant to the workings of health services systems. The existing information systems are neither sufficiently developed nor adequately responsive to major health policy issues. Moreover, it was evident to the Panel that efforts to develop the health information system are fragmented among different agencies with insufficient communication or collaboration. Data-gathering efforts even within single agencies are not well coordinated, and the lack of uniform definitions and methods make it virtually impossible to make useful comparisons and evaluations.

We propose that responsibility for Federal health statistics be both centralized and elevated in a new Bureau of Health Statistics, with a presidentially appointed Commissioner. The new Bureau should be given broad authority to collect its own statistics, to set standards for data collection by operating health programs and institutions, to develop new information systems, and to coordinate

the health statistical resources of the Federal government. Because the creation of this new Bureau will affect in varying degrees the existing statistical components of a number of departments and agencies, we propose that a Task Force be set up to define its specific responsibilities, to work out its new relationships, and to establish its initial budget.

3. The Panel recommends UNIFYING LEGISLATION AND APPROPRIATIONS to support the newly created DIVISION OF HEALTH CARE DEVELOPMENT within the Health Services and Mental Health Administration of the Department of Health, Education, and Welfare.

Until recently, health care development activities have been highly fragmented among the units of the Health Services and Mental Health Administration as well as among other agencies. There has been little collaboration among the different categorical programs, and the net effect has been a piecemeal attack upon the complex problems of bringing about changes and improvements in our highly diversified health care system. The new direction in national health policy calls for an integrated approach to problems of providing health care. The Panel enthusiastically supports the movement towards consolidation of resources and talents in the new Division of Health Care Development in keeping with this new approach. We believe that a greater return on our investment in health services development can be realized if we coordinate the activities of special projects like the consumer-oriented Comprehensive Health Planning Agencies and the provider-oriented Regional Medical Programs. We recommend unifying legislation and appropriations to support strong management of the Division.

Some of the work of the Division should be conducted through closely

affiliated but decentralized Health Care Development Units under Federal contract. Such units should be directly connected with operating institutions, agencies or organizations and have the capacity to modify service arrangements in order to develop, test and evaluate new systems of health care.

4. The Panel recommends that a NATIONAL HEALTH CARE RESEARCH INSTITUTE be created within the Health Services and Mental Health Administration of the Department of Health, Education, and Welfare.

With the current ferment in health services, we must not lose sight of the fact that we are critically short of first-rate professionals in the field of health services R & D and that existing analytical concepts, indicators and methods are not sufficiently developed to answer many important questions bearing on the future of health care organization. In giving attention to immediate public concerns, and in using the knowledge we now have as effectively as possible, it would be unfortunate to neglect the basic resources essential to the long-range vitality of our evolving health services system. It is the Panel's conclusion that the present mode of funding basic research and research training by the National Center for Health Services Research and Development and by the Health Services and Mental Health Administration does not adequately protect these long-range interests from immediate pressures and demands. We recommend that a separate Institute be established for research and the related function of training new research professionals, analogous to the successful model used in the biomedical field by the National Institutes of Health for thirty years.

We further recommend that decentralized, independent Health Care Research Centers be set up in universities and other environments to expand the methodology

for health services research and to study on a long-term basis such issues as the best measures for improving health maintenance and education, accessibility of care and manpower distribution, financing and quality. These centers, depending on their mission, would not necessarily be tied directly to health care delivery systems. They would provide settings for interdisciplinary research and the training of professional investigators.

5. The Panel recommends that the EXECUTIVE OFFICE OF THE PRESIDENT assume responsibility for COORDINATION of the Federal government's investment in health services R & D through administrative and budgetary mechanisms.

Our Panel encountered major failures in communication and coordination among various agencies in the Department of Health, Education, and Welfare and among the Federal departments concerned with health services, such as the Office of Economic Opportunity, the Department of Defense, and the Veterans Administration. In our view, these failures in communication and coordination constitute a central weakness in the health services R & D effort. Our previous recommendations provide workable structures for the four major functions of health services R & D; it is essential that these functions be coordinated at policy-making levels to insure that the R & D process as a whole works effectively. Similarly, it is essential that units with related functions in Federal agencies share their experiences and coordinate their efforts if we are to make the most of our national investment in health services R & D.

On the Federal level, we recommend that the Executive Office of the President assume responsibility for interagency coordination and suggest a number of alternative ways for carrying out this responsibility. For the Department of Health,

Education, and Welfare, we recommend a special R & D coordinating committee chaired by the Secretary.

6. The Panel recommends, as a means of enhancing the potential of health services R & D, that an independent NATIONAL COMMISSION ON HEALTH SERVICES be established and funded by a consortium of PRIVATE FOUNDATIONS to consider organizational, administrative, and educational arrangements, incentives, and support mechanisms that will encourage and assist universities, health care institutions, professions, government, and industry in improving the health care system and the health services of the country.

The Panel has devoted much of its attention in this report to the Federal government's role in health services R & D, because the Federal government controls most of the money for this purpose, and because it is in the strongest position to exercise leadership. We recognize, however, that responsibility for the provision of health services and for the conduct of health services R & D resides primarily in the private sector. We believe that there is an urgent need for further steps to make the private sector more receptive to the process of change and to involve it more deeply in this process. In the long run, success of the health services R & D effort depends upon the active collaboration of universities, health care institutions, professions, state and local governments and industry in clarifying the public issues in health care, in establishing the objectives for health services R & D, and in introducing improvements in the health care system.

We recommend that a consortium of private foundations set up a national commission to examine the entire field of health services, not isolated components like medical education, financing, group practice or manpower. Within this

broad context, the Commission should consider specific steps that will encourage health services institutions, educational centers, agencies and organizations to be more responsive to the present and future health care needs of the country.

II. OPPORTUNITIES FOR HEALTH SERVICES R & D

Successful application of science and technology has helped the United States to achieve major national goals like the exploration of outer space and the exploitation of nuclear energy--accomplishments made possible as a result of the nation's considerable investment in research and development. Now public concern is focused on the adequacy of our social systems. The expectation is that R & D can contribute substantially to improvements in the quality of our domestic life. Prominent among the areas of concern is health and the health services system.

1. Process of Health Services R & D

Health services R & D is an iterative process designed to influence a complex social system. It encompasses a wide range of activities and methods from fundamental research, the collection of statistical information, applied research, development, testing and evaluation, to policy analysis and long-range planning. Its overall objectives are to improve the provision of personal health services and to make more efficient use of scarce resources. Usually personal health services are differentiated from environmental health services, the distinction being that the latter generally do not involve direct contact between health professionals and individuals. Included in personal health services is the full spectrum of health care, from preventive measures through arrangements for treatment, to restoration of function and social rehabilitation.

To be most useful the process of health services R & D must be responsive to present and future policy issues and have access to the necessary data and, in many instances, to operating health care programs, institutions or systems. It should not be expected that R & D will always provide information of specific

value to policy-makers in choosing among competing options. Rather it should be expected that R & D will alter the climate of decision-making and the manner in which the issues and problems are conceptualized by decision-makers.

No definitive list of problems for research and development can be prepared in the abstract. Political, social and operational realities govern precise choices and priorities. Nevertheless, a classification scheme for health services R & D is possible (Appendix C) and the Panel can identify certain problem areas requiring research and development in the immediate future. The following sections illustrate these areas with representative examples of the questions that need to be answered.

2. Problems of Consumer Behavior

a. How do different deductible and co-payment provisions in health insurance plans influence the use of preventive, curative and rehabilitative services?

b. To what extent do the attitudes and expectations of patients influence the use of services and the outcomes of the services? What determines compliance with therapeutic regimens?

c. How much and in what ways does health education modify the need for and use of health services?

d. What are the precise factors that give rise to the widespread national concern about the accessibility of medical care? Are they related to problems of organization (e.g., office hours, night calls, house calls and weekend coverage); distribution (e.g., travel times and availability of ambulance services); appropriateness of the care (e.g., expensive

super-specialty care provided for primary care problems and the need for repetitive self-referrals); financing (e.g., costs of care and complexities of insurance coverage and claims processing); or communications (e.g., language and social barriers between patients and health professionals)? Which of these problems is important to whom? What can be done about them?

e. What is meant by consumer participation? How should it be recognized and exercised? What is the impact of varying arrangements for consumer participation on the efficiency and responsiveness of health care organizations and use of services?

3. Problems of Provider Behavior

a. How do different types of organizational arrangements affect the productivity and efficiency of physicians, dentists, nurses, and other health workers (e.g., solo, partnership and team practice, multi-specialty groups, single-specialty groups, and rotating assignments to satellite clinics)?

b. What are the effects on their productivity and efficiency of different mechanisms for paying physicians (e.g., fee-for-service, capitation, sessional stipend and salary) and different incentives (increments for volume of services provided, referrals generated, night, weekend and "shift" work, and pooled bonuses)?

c. Does the threat of malpractice litigation (the "defensive" practice of medicine) influence the volume, frequency and nature of services provided?

d. Does peer review and other forms of quality assessment result in changes in the clinical performance of physicians? Does it improve the end results of care?

4. Problems of Organization

a. What alternative organizational arrangements are possible and what would be required to assure everyone a feasible point of entry into a responsive health care system and prompt access to a full range of services?

b. Which services are best organized on the basis of populations defined by geography or political subdivisions (e.g., blood banks, emergency care services and rehabilitation services)? Which are best organized on the basis of populations defined by enrollment and contractual arrangements (e.g., prepaid comprehensive care through group practices and health maintenance organizations)?

c. What is the most appropriate way to meet basic mental health care needs in patients seeking primary care?

d. How do mental health centers, alcoholism and drug addiction centers relate to other parts of the health care system?

e. How do staff ratios of physicians, nurses and aides per hospital bed vary with numbers of patients treated per bed per year (i.e., "throughput", one of the few readily available measures of hospital productivity)?

f. What are the optimal sizes for hospitals? How should the location of hospitals be determined in relation, for example, to populations, to providers, to other hospitals or to market areas? Should single-specialty hospitals be built (e.g., mental health, cancer, rehabilitation and veterans hospitals)?

g. What do hospitals actually accomplish? What are the ranges, variances, and medians among hospitals and nursing homes of different case-fatality rates (i.e., number of deaths per thousand patients treated by diagnosis, age and sex); operative rates (i.e., number of patients operated on per thousand patients by diagnosis, age and sex); procedure rates (i.e., major procedures performed by diagnosis, age and sex)? How do charges vary by episode of illness or admission, by diagnosis, age and sex among hospitals within a community and between communities?

h. To what extent are hospital beds used inappropriately? What are alternative solutions to the use of hospital beds? Is home care a useful form of service; if so, how useful, under what circumstances and auspices and for whom?

i. How should potential savings in operating and capital costs for hospital beds be attributed to various projections in the growth of health maintenance organizations? What is the optimal enrollment for a health maintenance organization or a health care corporation? How is competition among providers of care best encouraged and required?

5. Problems of Efficacy

a. What would be the benefits of preventive health care (e.g., health maintenance systems versus complaint response systems) on the health status of populations and the future requirements for health services?

b. What are the relative costs and benefits of identifying and intervening with curative or restorative care at different stages of selected medical problems such as chronic mental disease, chronic lung disease,

diabetes mellitus, rheumatoid arthritis or childhood behavioral disorders?

c. What are the relative costs and benefits of different treatment plans or patient management regimens for major chronic and social disease categories such as cardiac failure, essential hypertension, chronic renal failure, drug abuse, alcoholism or child learning disabilities?

d. What is meant by the term "quality of care"? What are its individual and collective dimensions? What are its qualitative and quantitative aspects? How can social components be distinguished from psychological and biological components?

e. How can the outcome of health care be measured and evaluated for individual patients, for institutions, for professionals, for administrators, and for the public? Is the slow development of useful measures due to lack of interest, lack of information, lack of analytical capability or lack of problem definition? What standards should be employed? Who should establish and enforce them?

f. What are the costs to individuals and society of inappropriate care, (e.g., elaborate diagnostic exercises for trivial complaints, or repetitive patient self-referral)? To what extent does patient dissatisfaction contribute to unnecessary or excessive utilization of physicians, hospital outpatient departments and emergency rooms?

g. How can the health status of individuals and populations be measured? Can a single reliable index of health status or several indices and profiles useful for purposes of health care planning and evaluation be

developed? Can measures of health, rather than traditional measures of ill-health, be used in measuring health status? Can a general unit be used to combine a number of highly diverse components in the way that monetary units are used in economics? Is the use of duration of disability or some related unit of functional impairment as a common unit for this purpose a possibility in health?

h. What is known about standards for the efficacy, reliability, safety, calibration and maintenance of therapeutic and diagnostic instruments, materials and devices? To what extent can or should national standards for diagnostic and therapeutic care, equipment, devices, facilities, products and drugs be promulgated and enforced?

6. Problems of Manpower

a. What do doctors do in their offices and clinics? What could be done by other health workers? What kinds of problems are brought to primary care physicians? What resources are needed to manage these problems? How do patients move through health care systems?

b. What can be learned from schools of osteopathy about the preparation of family physicians, since most of their graduates enter this specialty?

c. How is the use of physician extenders likely to affect the costs and quality of health care? In what organizational settings and for what populations are these effects optimized?

d. What incentives are effective in changing the geographic and specialty distributions of physicians?

e. What position should be taken towards chiropractors' services in public programs in relation to past history and present acceptance? (New York Medicaid spent over $1 million on chiropractic services in 1971.)

f. What kinds of people with what kinds of training are required to plan, manage, monitor and evaluate health care systems and institutions of different kinds? How many are needed? How and in what institutions should they be trained? How should their training be supported?

g. How are knowledge, skills and attitudes acquired through formal education related to clinical behavior and competency? What learning modalities and environments are most effective? What knowledge is essential for various types of clinical practice?

7. Problems of Financing

a. What is known about financial mechanisms that encourage prompt, prudent and responsible use and responsive provision of care at the time of earliest need and maximum benefit?

b. How should costs, charges, services and outcomes or end results of care be linked so that meaningful cost-benefit analyses can be conducted?

c. What are the requirements for capital financing of health care institutions and systems? What are the effects of equity versus debt capitalization?

d. How does the mode of hospital ownership (e.g., profit, not-for-profit or non-profit), form of control (e.g., voluntary, public, proprietary or religious), organization pattern (e.g., solitary, merger, chain or satellite relationship) influence use of services, productivity and end results of patient care? How should the boards of hospitals and health care systems be chosen? To whom are the boards accountable?

e. What is the impact of ownership of facilities versus contractual arrangements on the use, costs and quality of services provided by group practices and health maintenance organizations?

f. What economies are associated with merger, shared services, and leasing versus purchasing of equipment and services?

g. What are the appropriate methods for costing the various proposals for national health insurance? What are the costs of these proposals under certain assumptions regarding the growth of health maintenance organizations, changes in the supply of manpower and continuing price controls?

h. How should private and voluntary health insurance be regulated? How should premiums, benefits and services be linked?

8. Conditions for Health Services R & D

Few of these questions can be answered easily. For many the data are not currently available, but the capability and the need exist for developing the necessary information systems. Other studies require control of the physical resources in ways that will permit variations in their use and staffing patterns and even in their physical configurations as a basis for experimentation and evaluation. In these instances the costs and time requirements will be much greater than is currently realized. Funds judiciously employed, however, to establish experimental settings where new developments can be initiated and evaluated offer great promise for supporting the pluralism and diversity that characterizes health care in the United States. They offer also the future prospect of constructive change, scientifically supported, carefully tested and critically evaluated.

It is the purpose of this report to determine how we can best encourage and support the study of some of these questions and help to resolve the problems that generate them.

III. BACKGROUND OF THE RECOMMENDATIONS

1. Need for Health Services R & D

Health care has grown to be a major national enterprise. It is the country's third largest industry, employing about four million people. National expenditures for health care are now greater than those for education. In 1971, they reached $75 billion, or 7.4 percent of the gross national product, and it is predicted that by 1974 annual expenditures will exceed $105 billion, or 7.8 percent of the gross national product. There is a growing consensus that all is not well with the health care system, that the nation as a whole is not spending its money wisely, and that more equitable, more effective, and more efficient methods can be found to provide health care. Increasingly the public is looking to the Federal government for leadership in financing health services, in developing new patterns of care, and in setting standards, regulating, and monitoring the health care system. The day may be approaching rapidly when the President of the country is held accountable for its health care, as he is now for its economy. The unwritten social contract that governs the relationship between the health care establishment and the people it serves is undergoing a period of major renegotiation through both the political process and the market place.

The initial question that arises is whether R & D can materially assist the public and private sectors in improving our health services system. To date, the contributions of R & D have been important but modest in contrast to the promises implied and the expectations aroused. In must be recognized, however, that health services R & D is a relatively new pursuit in the United States and abroad. Its potential was first recognized in the late 1950's by a handful of investigators.

Time is required to build the core group of professionals, the institutional settings, the techniques and methods, and the constituency for a new field of research. Health services R & D is still a newcomer in academic circles, in schools of medicine and public health, in hospitals and health departments, in industry and the Federal government.

Furthermore, it should be recognized that health care itself is a complex social system involving many individuals, institutions, and deep-seated traditions and patterns of behavior. The cost-benefit of a specific R & D project in the health field can seldom be measured with precision. Under the most favorable circumstances R & D has uncertain outcomes; some investments are successful, others are not. Payoff is most likely when knowledge of needs, creative ideas and the resources to implement the results of R & D exist in a common setting. The Department of Defense (DOD), the National Aeronautics and Space Administration (NASA) and the Atomic Energy Commission (AEC) are at once the consumers, producers and financers of the technologies they research and develop. They experience the needs, they have the access to sources of ideas, and they have control of substantial resources to implement them. Industry is typically a financing and producing entity in which uncertainty as to consumer needs adds to uncertainty in R & D payoff. In the health services enterprise, uncertainty about the benefits of R & D is aggravated by the fact that consumers, providers and financers are all diffuse and disaggregated. Only the Federal government, in its expanding role as financer, is a large enough factor in the health services enterprise to modulate the forces on it, potentially in the public interest. With all the

uncertainties as to its outcome, R & D remains the only instrument by which that modulation process may be made more rational and more likely to serve the public interest.

Given these limiting conditions, the Panel is favorably impressed with the accomplishments to date of health services R & D. Representative examples of useful and potentially influential research are described in Appendix D, and of current research in Appendix E.

We believe that a strong focus on health services R & D is essential in the years to come. The sheer size of the nation's investment in its health services system requires a vigorous R & D component. We need the information and capability in the Federal government to anticipate the "crises" that constantly arise on the health scene. We need the organizational framework to conduct experiments and demonstrations in advance of major commitments of private and public funds. We also need the ability to learn as we go by evaluating the impact of the different major health programs like Medicaid that have been enacted. There is little prospect of realizing the national goals embodied in the President's Health Message of February 1971 and in current Congressional and administrative proposals unless a substantial effort is made to expand our basic knowledge about providers and consumers and to develop, test and evaluate new approaches to health care. To invest increasing amounts of public and private funds in health services without sufficient attention to monitoring, evaluating and improving the efficiency and effectiveness of the entire system is wasteful.

Will a major commitment to health services R & D improve the nation's health status? Here the connection between cause and effect is more tenuous. It is

frequently assumed that the status of the nation's health is related to the quality and quantity of its health care, and that sooner or later improvements in health care will lead to measurable improvements in its health status. However, many other factors are involved--the extent to which biomedical research has produced useful means of controlling, ameliorating and curing disease, the social and economic status of the population, cultural and personal habits, and the quality of the environment, to name the most obvious. It is doubtful whether there is any personal health service for which it could be stated with confidence that increased investment would produce measurable improvement in health; this statement could also be made about some environmental factors. It is unrealistic, therefore, to expect that health services R & D will have an immediate payoff in terms of better health, although it may have a direct impact on the accessibility and quality of health care, on the productivity of the health care industry, and on the public's satisfaction with its health services. The challenge for health services R & D is to design more efficient, more effective and more acceptable methods of providing services. In addition, health services R & D has the important mission of developing measures of health status and of demonstrating the relative importance of different factors, including changes in the health services system, in improving health status.

2. Health Services Research and Biomedical Research

The focus in health services R & D is on making biomedical knowledge available to treat, control and eliminate disease and to restore function or minimize disability, rather than on the development of that knowledge. Therefore biomedical research and health services research are complementary, although at times the

boundaries between them are blurred. The success of the former implies the need for the latter. If we fail to invest adequately in health services research to improve the availability of knowledge developed in the laboratory, we cannot realize the full benefits of our investment in biomedical research.

The example of the coronary care unit will help to illustrate the kind of contribution that health services R & D can make and the interdependence of health services R & D and biomedical research. Biomedical research establishes the significance of the physiological alterations associated with cardiac arrhythmias and failure and the theoretical bases for treatment. Biomedical engineering designs the diagnostic and therapeutic equipment used in coronary care units. The contribution of health services R & D is first to determine in geographically defined populations the prevalence of chest pain and electrocardiographic abnormalities, the prevalence of death from heart attacks, and the frequency with which patients from either group are treated by physicians or admitted to hospitals--in other words, the need and demand from the community's point of view for the type of treatment that might be provided in coronary care units. If there is a need that coronary care units appear able to satisfy, prototype units are developed, and controlled clinical trials are conducted to determine whether or not such units are more beneficial than traditional hospital care, and if so, how beneficial and for which types of patients. In such trials, the clinician is primarily interested in efficacy; the special role of health services R & D at this stage is to include consideration of cost, staffing and acceptability. On the basis of this kind of research and controlled trial, decisions are made about widespread installation of coronary care units. Once such units have been shown to be useful, health services research is concerned with planning

their location in relation to the needs of the population, with developing on-going methods of evaluation and quality control, and with comparing the performance of different coronary care units. In actuality this has not been the sequence of events that has occurred in the United States in the case of coronary care units. These units were widely introduced before their efficacy and costs had been demonstrated. Available evidence now raises serious questions about how beneficial they actually are.* At this stage it is virtually impossible to retreat, and it may be that the public and its hospitals are saddled with an expensive and yet frequently inappropriate mode of treatment. Greater awareness of the potential of health services R & D and the conditions necessary for the evaluation of new health care arrangements could preclude this type of premature national investment in expensive facilities on a widespread scale.

A second example of health services research is the field testing of the Salk polio vaccine in 1954. About 400,000 children participated in what was the largest public health experiment in this country's history. The value of epidemiological and statistical concepts and methods in enhancing and complementing basic biomedical research on tissue culture and applied research in developing and producing the vaccine were clearly demonstrated. Without this critical field trial, urged by knowledgeable epidemiologists and health statisticians, the fruits of laboratory research might not have been made available so rapidly and widely. The trial illustrates the need for large numbers, adequate time, precise planning, and careful organization in the conduct of much useful health services research.

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* Mather HG et al: Acute myocardial infarction: Home and hospital treatment. British Med J 3:334-338, 1971 (see Appendix D-12)

3. Technology and Health Care

Health services R & D relies heavily upon the resources and methods of technology, especially in the areas of communications science, automation, electronics, biomedical engineering, operations research, and systems design and analysis. Much attention has been devoted recently by government committees and independent groups of experts to the possibilities for expanding the use of technology in improving the country's health care system.

Discussions of the possible role of technology in health care, however, are too frequently simplistic and emphatic in one of several directions:

a. Technology holds the potential for solution of many specific problems or deficiencies in the provision of health services; all that is necessary is to release the nation's fantastic technological capabilities.

b. Technology alone can control or even decrease costs of health care; the only missing element is an incentive structure which drives hospitals and doctors to adopt the automation of information services and of routine health care tasks.

c. Technology will destroy the individuality and personal nature of health care; when the physician is supplanted by a machine, the patient or consumer will be at the mercy of an automated monster whose decisions he cannot influence.

d. Technology, widely applied, will tend to equalize the quality of health care at a mediocre level.

Such arguments are commonplace when policy advisors consider the diversion of national technological capabilities from defense and aerospace goals to societal systems (whether health or education, urban housing or mass transportation).

A thoughtful evaluation of the potential role for technology in health care must be based upon the recognition that medical care is a personal service and health care organizations are social systems. Such social systems are inherently complex, they are not subject to simple optimization, and they cannot readily be described in terms of discreet goals, mathematically related to external factors. Indeed, computer simulation of complex societal systems has demonstrated that their behavior can defy intuitive prediction in the sense that the long-term results of particular policies may be exactly opposite to those anticipated.

The needs and demands of people, not the availability of technology, should determine policies, priorities and objectives. When technological innovations have been introduced widely and prematurely in the health services system in the absence of clearly demonstrated need and effectiveness, the results may be to increase the cost and complexity of the health care process without necessarily leading to better outcomes for patients. Examples are the coronary care unit discussed above, indiscriminate use of automated laboratory screening tests, and total computerized hospital information systems. It is of utmost importance, therefore, that those concerned with technological innovations in health services do not work in isolation and that they be an integral part of the R & D effort. Health services R & D seeks to combine the talents of administrators, economists, engineers, epidemiologists, physicians, social scientists, statisticians and others. If successfully pursued, health services R & D can provide the framework for intelligent use of the country's extensive technological capacity in the interests of improving the productivity and effectiveness of the health care system. The opportunities and problems surrounding the use of technology are discussed in greater detail in Appendix F.

4. Policy, Organization and Research

The President's Health Message of February 1971, the May 1971 White Paper of the Department of Health, Education, and Welfare (HEW), the current proposals for health maintenance organizations and national health insurance and other health bills before Congress reflect a growing national commitment in the field of health and a significant redirection of this commitment. The government's role in the years immediately following World War II was to bolster the private sector in dealing with special problems or special groups. Federal funds were earmarked for the construction of hospitals and other facilities, for control of venereal disease, tuberculosis and other communicable diseases, and for health services for special groups such as babies and mothers, the Indian population, veterans, and the urban poor. At the same time, the Federal government entered the field of biomedical research in a major way with the establishment of the National Institutes of Health (NIH), which reinforced the categorical approach to health problems by creating separate organizations and constituencies for each group of diseases. Although the categorical approach may be useful and pragmatic for biomedical research and under some circumstances for health services, there is growing awareness of the need for integration and rationalization of the country's health care system. The Administration has stated its commitment to assure that all members of the community have access to medical services, to moderate costs by more efficient use of resources, to provide comprehensive and continuous services rather than categorical and episodic services, and to reduce financial barriers. The fulfillment of this commitment requires an integrated approach to care.

The Hill-Burton Act of 1946 contained the germ of the new comprehensive approach to health problems in its provisions for planning and regionalization of health services, although not much attention was paid to these questions in the early years. The major shifts in Federal policy came with the introduction of Medicare and Medicaid in 1965, and the Partnership for Health legislation in 1966 and 1967, which established the concept of comprehensive health planning. In 1967 the National Center for Health Services Research and Development (NCHSR&D) was established, creating for the first time a focus for the efforts of the growing body of investigators interested not only in the problems of special diseases or groups of patients, but in the health care delivery system as a whole, its components and their organization, financing, efficiency and effectiveness.

The gradual evolution in national health policy from the categorical approach to more comprehensive or broader concern for the country's entire health care system has profound implications for health services R & D. Descriptive research was possible and limited analyses were feasible under the circumstances that have prevailed in the past, but planned experiments and critical tests and evaluations are extraordinarily difficult in the absence of aggregations of resources into health care systems that have specified objectives and that serve defined groups of people. As more structured systems evolve, it becomes possible, for example, to introduce information systems for management and evaluation, and to develop, test and compare different ways of organizing, staffing and financing services. With the development of systems of care, it also becomes economically feasible to introduce and evaluate technological innovations. These developments in national policy make health services R & D more useful and more effective.

With this need in mind, the Panel's first step was to survey the current status of health services R & D in the United States. Our purpose was to identify problem areas, so that constructive measures can be taken to meet the new and rapidly growing demands placed upon health services R & D.

5. Impediments to the Conduct of Health Services R & D

The impediments we have identified in our discussions with government officials and other consultants, in extensive readings, and in special studies and surveys can be summarized briefly under the following headings. They are discussed in more detail in the context of our recommendations for improvement.

a. Need for wider appreciation of the contributions and limitations of health services R & D

The field of health services R & D has not received wide support from universities, foundations, and industry, and it has not yet attracted sufficient numbers of first-rate professionals from certain disciplines like economics and engineering. Specifically, the traditions, organizational patterns and attitudes of universities, schools of medicine and schools of public health have made them slow to respond to needs and opportunities for improving health care through changes in education and research. In the Federal government, which provides most of the financing and leadership in the field, the Panel has encountered both a lack of enthusiasm or interest in health services R & D, and a lack of appreciation of the time, money and difficulties involved. A case in point is the fact that NCHSR&D was not assigned a prominent position in the hierarchy of HEW, it was given little new money and personnel, and it inherited a large number of grants not strictly germane to health services R & D. Even

now, it controls only a fraction of the government funds available for health services R & D. For these reasons it is not in a good position to provide strong leadership for the government and the entire health care community.

At the same time, there appear to be unwarranted expectations in some quarters that R & D can provide clear-cut solutions to complex political questions; that demonstrations and experiments can be carried out despite the fact that the conditions rarely exist in which we can control or manipulate the actions and attitudes of providers and consumers; or that the ills of the health care system can be solved simply by applying the methods of industrial technology, as discussed above. There are strong pressures on Federal agencies to use their R & D funds for short-term projects, not for long-term investment in research and the training of research professionals.

The field is new and needs time to develop, and the nature of the political process makes it difficult to sustain Federal programs with only long-term rather than short-term benefits. We lack a strong commitment on the part of the leadership in the Federal government to build up the field of health services R & D and to protect its basic research component--the kind of commitment that has led to the flowering of biomedical research.

b. Need for clearly defined Federal health policies and priorities

The broad goals stated in the President's Health Message of February 1971 of equity, accessibility, and quality constitute a landmark in the evolution of national health policy. However, these goals must be made "operational"--they must be translated into specific policies and programs, and priorities must be established--in order to serve as guidelines for an effective and

coordinated development effort in health services. In contrast to basic research, development requires clear specification of objectives. It is unrealistic to expect major contributions from the developmental effort in the absence of clearly established policy directives. The history of the Regional Medical Programs illustrates the difficulties that arise in making effective use of funds for health services development when the goals of the program are not consistent and clear and its relationship to other Federal health services programs has not been stated explicitly.

The Federal government is the principal source of funds for directed research, development, testing, and evaluation of new methods for financing, organizing, staffing, and monitoring health services, and it is, therefore, largely responsible for establishing policy directives and relating development projects to these directives. So far as the Panel can determine, the process of translating national health strategy into operational objectives and priorities does not work smoothly and consistently in HEW, and there is little evidence of interagency coordination of development projects. We have the impression that decisions are often made precipitously, frequently on the basis of incomplete analyses and in response to external events and pressures. These conditions make it difficult for the Federal government to use its health services development money wisely and efficiently.

c. Need for clarification and restructuring of the different tasks involved in health services R & D

In its analysis of the opportunities for health services R & D, the Panel has identified four major components or functions: policy analysis; the

collection and diffusion of information and statistics; development, testing and evaluation of new health services systems and processes; and research and the related activity of training new investigators for the field. The Panel notes that there is considerable confusion in the minds of many about the potentials and limitations of these four activities and the relationships between them in the continuum of health services R & D. Each has different responsibilities, organizational requirements, staffing patterns, timing requirements and funding needs. Failure to take into account these differences weakens the total thrust of health services R & D and leads to unrealistic expectations. Therefore, the Panel has built its recommendations around a separate consideration of each function, concluding with proposals for coordination.

The need for adequate analytical capability for health affairs in the upper echelons of HEW emerges clearly from this analysis. The function of supporting the Secretary in making decisions requires ability to respond on short notice and acute awareness of the political process; this function should not be confused with program development or research. There is no permanent staff for policy analysis analogous to that in the Office of Management and Budget, and there has been a constant turnover of policy analysts in the Office of the Secretary in recent years. This lack of stability and continuity in the professional staff at the policy-making level in health can only be regarded as a major impediment to any attempt at national development of resources or discernment of priorities. It is not realistic to expect NCHSR&D to perform this as well as all the other functions involved in health services R & D; it is part of one of the operating or line divisions of HEW, and the staff role of policy analysis is not compatible with its other assignments.

d. Need for expansion and coordination of the statistical system for health and health services

The Panel believes that major improvements should be made in the scope, refinement and comparability of our health statistical system. We are more advanced in counting livestock and produce than in measuring the parameters of health services and health status, and we lag behind many other countries in the development of our health statistical system. The general-purpose data currently available are not sufficiently sophisticated and detailed to support the needs of policy-makers, administrators and investigators. The wealth of information generated by operating programs, institutions and organizations is largely untapped and inaccessible, and there are few areas in the spectrum of health services where uniform definitions and classifications are used so that simple comparisons and evaluations can be made. Federal responsibility and funds for the collection and dissemination of health statistics are divided between the Departments of Commerce, Labor, and HEW, and are further subdivided within the latter department between the National Center for Health Statistics (NCHS), the Social Security Administration (SSA), the Social and Rehabilitation Service (SRS), and other operating units. The Regional Medical Programs, Comprehensive Health Planning Service and NCHSR&D all sponsor data gathering and information systems that are uncoordinated with each other. The various Federal agencies that provide or finance health services--for example, VA, OEO, and DOD--use their own methods and forms. The problem of piecing together health information from various sources and reconciling the differences in definitions, even within the Federal government, are insuperable under the current arrangements.

e. Need for more and better educated professionals in the field of health services R & D

Health services research and development draws upon a wide variety of knowledge and skills, including familiarity with complex social relationships and structures, economic concepts, epidemiological and statistical methods and ideas, medical science and technology. It is clear from the Panel's review that we have not yet succeeded in building up the "critical mass" of educated professionals required to meet current and projected needs, and that much more attention must be given to the content of educational programs and the settings in which professionals can best be prepared to enter the field.

f. Need for prompt communication of the results of health services R & D

No central national reference unit covering all aspects of the field has been developed. Abstract periodicals like Excerpta Medica's Health Economics, and Public Health, Social Medicine and Hygiene; Medical Care Review; Medical Socioeconomic Research Sources; Abstracts of Hospital Management Studies; and Hospital Abstracts each covers only a part of the published literature. The unpublished reports of projects and grants, which may be of considerable value to those involved in research as well as development, seldom receive distribution outside the agency that provides the funds. There is a distinct lack of good annotated bibliographies and of analytical studies of the state of the art in the critical areas of health services R & D.

g. Need for coordination of Federal health services R & D

The perennial problem of communication and coordination in a government structure as large and complex as ours assumes major proportions in the case

of health programs and health services R & D. In addition to the HEW, DOD, VA, OEO, the Department of Housing and Urban Development (HUD), the Department of Labor and more recently, NASA, have substantial interests in health services and contribute in varying degrees to the Federal health services R & D effort and to the fund of information and experience about health and health services. In HEW itself, there are numerous health programs that are largely autonomous and frequently overlapping.

The Panel views health services R & D as a dynamic process in which there is a constant flow of information between the four functions of policy analysis, information and statistics, development, and research and research training. We believe that much better use can be made of available resources if the different Federal units and agencies that contribute to this process can pool their efforts and experience.

h. Need for broad understanding of the basic issues and options in the health care system

Health services R & D makes its greatest contribution in a climate of understanding and appreciation of the problems that confront the health care system. We have yet to draw together the many institutions, agencies and professional interests in a common debate of the issues and the opportunities for constructive change. There have been many Presidential commissions, Federal panels, and committees sponsored by private and professional groups that have addressed facets of the nation's health care system in recent years. Although they have contributed to the agenda of problems for discussion, few have been entirely free from association with special interests or political

events, and few have been in a position to view their concerns in the context of the system as a whole. For example, basic decisions about numbers, kinds and training of health manpower depend upon equally basic decisions about the way in which health care will be organized and financed in the future. Until we develop a broader base of understanding, health services R & D will not reflect the needs of the overall system, and it will continue to encounter apathy and resistance to change in many circles.

It is of utmost importance that private interests join with the public in clarification of the issues that underlie the current dissatisfaction with the health care system. The Federal government can establish policies and priorities and can exert considerable leverage on the system through the power of the purse, but the system itself is largely owned and run by the private sector. To realize the potential of health services R & D and to gain acceptance for the ideas it generates, the private sector must be an active partner with the Federal government in the process of change. This partnership must encompass the entire spectrum of health care providers, consumers, financial intermediaries, regulatory bodies, and educational institutions.

IV. RECOMMENDATIONS

1. The Panel recommends that a strong POLICY ANALYSIS GROUP of permanent civil servants with professional training be created in the Office of the Secretary of Health, Education, and Welfare, and that one or more extramural INSTITUTES FOR HEALTH POLICY STUDIES be established.

Because of the growing responsibility of HEW for leadership in improvement of the country's health care system, there is an urgent need for a permanent Policy Analysis Group to provide professional continuity and to support the policy-making process. The Group should logically be located in the upper echelons of HEW where policy options are developed and decisions are being made.

On the basis of the Panel's information, this is one aspect of health services R & D that requires aggressive development. In the words of one consultant to the Panel, there is no "institutional memory" within the Office of the Secretary; the focus of responsibility is not clear and currently staff members do not come with the expectation of serving more than a few years. NCHSR&D has been expected by some to provide this service, but the mandate has never been made explicit. In any event, NCHSR&D is several administrative levels removed from the site of major decision-making, it lacks the professional staff for this function, and it has other responsibilities that are not necessarily compatible. Under the present arrangements, it appears that policy-makers in HEW are forced to cope on an ad hoc basis with the issues as they arise. There are no well-established channels for translating the accumulated knowledge and experience of health services R & D into action. The effectiveness of health services R & D depends in large measure on these channels of communication.

The functions of the proposed Policy Analysis Group would be to provide the Office of the Secretary with the best available information, derived from R & D and from statistical sources, to analyze policy proposals, and to develop policy options. It should also be expected to play an important role in guiding the development and directed research conducted and sponsored by the Department so that these activities can reflect the policy priorities of the Department. Other countries with sophisticated health care systems have found it necessary and useful to set up permanent units for planning and policy analysis in their Ministries of Health, and it seems equally important for our Department of Health, Education, and Welfare to have such support.

The professionals in the Policy Analysis Group should have backgrounds in economics, medicine, sociology, statistics, political science, law, public administration and health care administration. In addition, most should have substantive training or experience with health services institutions, professions, policies and information, and be familiar with the history and patterns of health services both in the United States and in other countries. The size of the Group is much less important than its quality, its demonstrated performance, its nonpartisan character, and its long-term continuity. This unit would do a great deal to create a new esprit de corps in the health sector of the Department and to establish standards and goals for the kinds of health professionals now being attracted to the Department.

Many of the assignments of the Policy Analysis Group will be short-term and in response to immediate needs; therefore, special provision must be made to support the complementary function of long-term analysis and planning. Leadership

and responsibility for health services in the United States have been widely dispersed among government agencies, professional groups, non-profit and not-for-profit institutions, and other organizations, and there has been little incentive for research institutes and investigators to consider overall national strategies and long-term policies in the health care field. In view of the emerging role of the Federal government as a catalyst in the integration and improvement of health services, we must learn to look more critically at the total impact of national health policies and the direction in which we are headed.

There are several ways in which a long-range analytical capability can be structured. At the very least, there is a need for a "think-tank" division within the proposed Policy Analysis Group. The difficulty is to protect such a division from the "quick-response" syndrome that inevitably permeates the political arena but the effort should be made. In addition, the Panel recommends that one or more federally funded extramural institutes be established.

The mission of the external Institute for Health Policy Studies would be to act as a clearinghouse for ideas, an originator of ideas, and an independent site for objective analyses of the possibilities for administrative action on health matters. Although primarily responsive to the needs of the Policy Analysis Group in the Office of the Secretary of HEW, the Institute should also be expected to initiate studies of its own. It should have a substantial full-time professional staff, as well as authority to subcontract with other agencies and institutions. A self-perpetuating, nonpartisan board of distinguished citizens experienced in and concerned with social policy issues, public administration, and health care problems should oversee its activities; they should not be formal representatives of

special interests, professions or institutions.

The government should be expected to contribute about three-quarters of the necessary financial support for the extramural policy research Institute. It would be desirable if private foundations could provide the remainder, as much on the grounds of maintaining the independence of the Institute and supporting the public interest as on the grounds of financial need.

Precedents for federally funded R & D organizations where policy analysis is a major concern are the Institute for Defense Analyses (IDA), and the Institute for Research on Poverty at the University of Wisconsin, supported largely by single departments, and the Urban Institute, funded by several departments. Examples of two different kinds of centers supported primarily by private sources are the Brookings Institution and the Institute for Policy Studies. The Institute of Medicine of the National Academy of Sciences is a possible locus of health policy analysis, as well as the Urban Institute or the Brookings Institution. We believe, however, that there is considerable merit in having at least one institute devoted primarily if not solely to the problems of health services, because the problems are sufficiently complex to merit a concerted effort. This effort should be reasonably well isolated from the pressure of daily decision-making, although not from political realities and social forces. The important point is to build up our resources for long-term as well as short-term analyses, evaluation, and planning of health policies and strategies.

Establishment of the Policy Analysis Group will be difficult in view of recent traditions and current staffing patterns in the higher echelons of HEW. It is of utmost importance that the budget of the Group be treated as a regular line item;

otherwise it will be extremely difficult to assure its continuity and nonpartisan nature. Possibly the necessary funds can be found in the existing budget of the Office of the Secretary to start up this group; if not, a new appropriation should be sought. We suggest that about 0.2 percent of the Department's health services R & D budget be devoted to this function.

The necessary level of support for external institutes can be assessed on the basis of demand and performance, but the Panel suggests that about 0.8 percent of HEW's health services R & D budget be allocated for this purpose. It may prove desirable for HEW to support more than one extramural institute for policy analysis; however, the experience of the Office of Education with Educational Policy Research Centers, which we believe have been unduly fragmented, suggests that it would be preferable to start with one first-rate institute. New legislative authority may be necessary to guarantee the permanence and independence of the proposed Institute.

In addition, private foundations and other organizations should be encouraged to develop and support independent non-profit or not-for-profit institutes or operating foundations for health policy analysis. These institutes can look to the Federal government and particularly HEW, for some funds, but should have more independence and flexibility than an institute supported entirely by Federal funds. Examples of such organizations include the Battelle Memorial Institute and the Stanford Research Institute. The new Institute of Medicine of the National Academy of Sciences is an example of a different type of independent body. Indeed, there is no intrinsic reason why profit-making organizations should not be supported or commissioned to conduct policy analysis on a continuing basis.

There is a great potential for constructive analyses in the health care field and diversity should be encouraged. Much of the existing national and international data and information from health services R & D has yet to be evaluated adequately, aggregated, and digested, and much more will become available as the field gains in productivity and stature. In our view, a vastly increased commitment to policy analysis is imperative to sift the flow of information in the context of changing social pressures and political events and to synthesize it into feasible policy options.

2. The Panel recommends that a BUREAU OF HEALTH STATISTICS, with a COMMISSIONER appointed by the President, be created in the Office of the Secretary of Health, Education, and Welfare and that the Secretary immediately establish a TASK FORCE to define the Bureau's specific responsibilities and functions and its relations to other units of the Department and to other Federal agencies, and to determine its initial staffing needs and budget.

The Panel believes that a great virtue of the American pluralistic system is the opportunity it affords for innovations and comparisons of diverse health care arrangements over time and among populations. Comparisons, however, can only be made when the data for evaluation are available and comparable.

A review of the present health statistical capacity in the United States shows considerable room for improvement. There is as yet no nationwide system for reporting information about the use of all hospitals in relation to discharges, diagnoses, procedures performed, lengths of stay and charges. Such information is essential to examine differences in the efficiency and effectiveness of the nation's hospitals. There is no established system for obtaining national data about the

content of ambulatory medical practice, and little information is available about the problems patients bring to sources of primary medical care, the distribution of these problems in the population, what is done about them, and what it costs the consumer. We need this information to plan and evaluate new arrangements for primary care and to make important decisions about the education of physicians and other health manpower. Useful measurements and indicators of health status are virtually nonexistent and need to be developed and related to health services statistics locally and nationally. Few if any decentralized health services information systems, linked to persons and populations so that they are useful for planning, have been set up for regional, state and local jurisdictions.

There is an urgent need for a central focus for health statistics that will provide leadership and coordination within the Federal government. NCHS, SRS, SSA, NCHSR&D, the Center for Disease Control, OEO and VA all have their own definitions, terms, classification schemes, sampling frames, population bases and categories for the health statistics they collect. Much variability in these parameters also exists among regional, state and local agencies, professional associations, and other organizations and institutions. Reported prevalence rates for crippled children, for example, vary as much as 100 percent among states because uniform definitions of crippling conditions are not used. These variations not only make it difficult to aggregate or compare data across agencies or geographic areas but also result in duplication of effort and inefficient use of basic records and statistical resources.

Considering that justification for public support of the nation's costly health services is based largely on the available statistical intelligence about its health

problems, the amount of money devoted to providing statistics and improving their value is modest indeed. In its analysis of Federal statistical programs, the Office of Management and Budget shows budget obligations for health, vital and environmental statistics of $35 million in fiscal year 1972. This amounts to about fifteen hundredths of one percent of total Federal appropriations for health. NCHS is receiving $15.3 million, or less than half the total appropriation for health, vital and environmental statistics. Other agencies outside HEW that share these funds and collect and process health statistics are the Bureau of Labor Statistics and the Manpower Administration in the Department of Labor, and the Bureau of the Census in the Department of Commerce. Undoubtedly more funds could be profitably invested in developing the statistical system for health and health services, but the main point that emerges from analysis of these figures is the need for convergence of authority and responsibility.

To provide the needed focus for the Federal health statistical function, the Panel recommends that responsibility for health statistics be centralized and elevated in a new Bureau of Health Statistics within HEW. This Bureau should have a Commissioner appointed by the President as in the case of the Commissioner of Labor Statistics and the Director of the Bureau of the Census. The Commissioner should report directly to the Secretary or to his designee in a staff relationship. Such an arrangement will provide the necessary leverage for adequate coordination.

Establishment of this new Bureau will require careful organizational planning within HEW, and the Panel therefore recommends that a Task Force composed of Federal representatives and professionals outside government be established

promptly to detail its responsibilities, functions, organizational relationships, staffing and financial requirements. Since the Bureau would assume responsibility for certain statistical functions of existing health programs, the Task Force should examine the current practices of all Federal agencies collecting health statistics in an effort to consolidate and coordinate as many functions as possible in the Bureau. The Task Force should also examine the need for new legislation to support the work of the Bureau and assist in drafting it.

In designing the new Bureau the Task Force should consider carefully the recommendations of the President's Commission on Federal Statistics and the July 15, 1971 memorandum from the Director of the Office of Management and Budget on "Reorganization of Federal Statistical Activities". The Panel believes the detailed responsibilities of the Bureau should be worked out by the Task Force, but suggests certain general functions that the Bureau undertake:

a. Determination of need and broad, general specifications for statistical and informational programs for the Department's activities in health.

b. Planning, analysis, collection, prompt dissemination and publication of general-purpose health and health services statistics derived from surveys and records, and development of more useful analytical statistical measures, indicators and indices of the type currently provided by the present NCHS. This work should be conducted in an Office of Data Analysis.

c. Approval of the design for basic data collection, tabulation and analysis systems and development of pertinent standards,

common terms, definitions and classification schemes for operating Federal health programs, such as federally financed insurance plans, federally operated direct health services plans and other Federal programs for financing or regulating health care, health manpower and health institutions.

d. Approval of the methods for data collection and analysis to be used in program evaluation by all Federal health agencies.

e. Development and promulgation of recommended standards, common terms, definitions and classification schemes for use in the collection, aggregation, tabulation and analysis of health and health services data by state and local governments, institutions and health care systems.

f. Provision of financial support and technical assistance for the creation of State Centers for Health Statistics and Federal-state-local cooperative health statistics systems.

g. Research and development of indices to measure the health status of individuals and populations.

h. Contracting with Federal agencies to design and collect data for special-purpose projects they may wish to conduct in relation to their operating programs.

i. Provision of centralized facilities for collecting and processing statistical data bearing on health in a service-oriented Office of Data Processing.

j. Promotion of better methods for communicating health and health

services statistical information promptly. There are many constituencies, both Federal and non-Federal, for health statistics and many needs to meet. The Bureau will require adequate funds to support an active program for publishing and distributing its material.

The precise budget for the new Bureau cannot be prepared until its tasks are defined, but the Panel foresees that a considerable increase in funds will be needed. Transfer and coordination of existing appropriations will not be sufficient to support adequately the activities outlined about. Funds for the new Bureau might constitute 8 percent of HEW's budget for health services R & D. Although a substantial increase in the present level of investment for health statistics, this amount will be quite modest in comparison to total national health expenditures.

We believe that top priority should be given to expanding and coordinating the nation's health information system, because this system is a basic requirement for all health services activities, both public and private--policy-making, legislation, administration, planning, institutional management, quality control and evaluation.

3. The Panel recommends UNIFYING LEGISLATION AND APPROPRIATIONS to support the newly created DIVISION OF HEALTH CARE DEVELOPMENT within the Health Services and Mental Health Administration of the Department of Health, Education, and Welfare.

The development of new arrangements for organizing, financing and providing health care is complicated and costly. Long-standing traditions constrain the attitudes, behavior and relationships of patients, physicians and institutions. Strong prejudices about the best mechanisms for controlling the flow of money from

the people who pay to the people who are paid obscure the issues.

Establishing the guidelines for institutional reform is an entirely different process from accomplishing it. Here administrative, managerial, political and social skills, to say nothing of the need for great sensitivity with respect to interpersonal relations, are required. Not only does this kind of social change require people with different talents from those who undertake research, generate information or develop policy options, but the scale of operations is frequently much greater and most projects involve working directly in new or existing health care institutions and systems. It takes a sustained effort to introduce new ideas and evaluate their impact. Because of the many social and political variables, the timetables and outcomes in developmental projects are less predictable than in basic research. For the same reasons, developing social systems and organizations, particularly those that involve established professions and institutions, differs from developing weapons systems and space exploration systems. In the former, technology is used to support interpersonal transactions; in the latter people are used to support technological transactions.

In the past, public and private agencies have devoted their resources for health care to needs of special groups like children, the urban poor, the elderly, migrant workers or Indians, those with chronic diseases such as heart disease, kidney disease, stroke, or cancer, or those with social diseases such as tuberculosis or venereal disease. HEW has been "balkanized" into categorical programs, each vigorously defended by special interest groups. There has been little evidence until recently of coordination or collaboration; for the most part, various programs have operated independently, not only in financing and providing

health services but in introducing new kinds of health centers, manpower, information systems, and other innovations. Valid comparisons and evaluations have been difficult to make, and the net effect has been to attack the complex problem of social and institutional change in an unsystematic, piecemeal, and largely ineffectual way.

In addition, the funds to construct facilities, develop plans for services and to pay for care flow through different channels. Each program has its own benefits, its own eligibility requirements, its own funding cycle, application date, review mechanism and administrative arrangements. Medicare and Medicaid are two major examples, but others are Maternal and Child Health Programs, Children and Youth Comprehensive Health Services, Comprehensive Health Centers, Comprehensive Mental Health Centers, Neighborhood Health Centers, migrant labor health programs, health maintenance organizations and the Regional Medical Programs. The Panel recognizes that there may always be a need for some categorically funded programs--often on a temporary basis--to deal with new, unusual health problems or special populations of great public concern. But to organize and fund a major part of the country's health services through these separate mechanisms is wasteful in the face of contemporary needs and knowledge.

Not all of these programs can or should be amalgamated, but the concern now is for the health care of entire general populations, including both those who seek or need care and those who do not. This is a profound shift in posture and priorities; it requires new and different organizations and management and greater coordination of the flow of funds from the Federal government.

The Panel wholeheartedly supports concentrating current developmental programs of HSMHA in the functional and flexible new Division of Health Care Development. We emphasize the additional need for consolidation of its funding under new unifying legislation and appropriations. Organizational and institutional changes in our health care system will be easier to achieve if the Division's funds are also coordinated.

The components of the new Division are the provider-oriented Regional Medical Programs Service, the consumer-oriented Comprehensive Health Planning Service, the Hill-Burton program for construction of health care facilities, the Health Maintenance Organization Service, and NCHSR&D. According to the Panel's proposals, only those sections of the present NCHSR&D directly concerned with development should be included in this Division; the research and training activities would be the responsibility of a separate entity, the new National Health Care Research Institute discussed in the next section. Although the Division must have a first-rate professional staff to manage creatively its complex program and large budget, the bulk of the development work will be done extramurally.

Some seven Health Services Research and Development Centers associated with universities and health care programs currently receive their primary support from NCHSR&D, and about another seven are receiving some Federal funds. The purposes, activities, accomplishments and relationships of the Centers to health care facilities and health services vary widely. As in other aspects of this new field, there is confusion between basic research, applied research, development, testing and evaluation. In some cases these R & D centers are being called upon to perform tasks for which they are not well suited, and their sponsors do not

always appreciate the time and continuity of support required to build up multi-disciplinary research teams and produce visible results.

The distinguishing feature of several of these independent Health Services Research and Development Centers is their direct involvement with or responsibility for the provision of patient care. The expectation is that they will be able to observe and modify the care process so that meaningful developmental research, experiments and evaluation can be carried out.

Evidence from the directors of these centers suggests that they are beset by budgetary and staffing problems. They have no assurance for more than a few months or a year in advance that support will be continued. Consequently, they are unable to recruit and retain first-rate staff who can be integrated into the patient care arrangements--a slow process that involves professional acceptance, education and attitudinal changes on the part of all concerned. As a result, meaningful demonstrations are extremely difficult to plan or carry out. There is little likelihood that substantial organizational or institutional changes in medicine can be accomplished under the present conditions of uncertain and insufficient funding.

On the basis of this experience, the Panel believes that the Division of Health Care Development should concentrate its support on a limited number of free-standing Health Care Development Units that are so related to patient care institutions, organizations, agencies and resources that they can change, manipulate and evaluate the health care system or the medical care processes with which they are concerned. The Division should be prepared to make long-term commitments to these Units. A few strong units capable of developing, demonstrating, testing and

evaluating new ideas or methods on behalf of the Division of Health Care Development would be preferable to many more limited and diffuse centers with inadequate funds and staff.

A close relationship should exist between the Division of Health Care Development and the proposed Units. This will require understanding, commitment, flexibility, and imagination on the part of the project officers in the Federal government and the administrators in the institutions and agencies involved.

Units might be established in collaboration with university health centers, medical society foundations, hospital chains or corporations, or prepaid group practices; with state, local and regional health planning agencies; or with governmental offices responsible for emergency medical care services, community crisis control and information centers or blood banks. The central requirement for each Unit is that the principals be in a position to introduce or materially influence changes in health care arrangements in order to develop, test and evaluate new ideas, methods or systems.

There are many current developmental activities that could be pursued more vigorously and new ones that could be initiated if the Division pools and concentrates its substantial resources and funds. Among the major initiatives that could be tackled by the Division and undertaken in concert with one or more Health Care Units, the Panel recommends that consideration be given to the following areas:

a. Development of <u>standards</u> for instruments, processes and ingredients of medical care, including development of the kinds of information required to assess them.

We believe there is a clear need to develop and regulate standards

of quality for technological applications in health care. Such quality standards must assure the efficacy and the reliability of instruments, equipment and reagents used in diagnostic, therapeutic, monitoring and test procedures. They must also balance the desire to stimulate technological innovation with the hazards of misapplication.

The Food and Drug Administration (FDA), the National Bureau of Standards (NBS) and the Center for Disease Control (CDC) are working on the problems of standards for medical devices, equipment, reagents and tests. Congress has evidenced interest, and institutional and professional associations have recognized the need. However, the impact of this interest is not yet discernible, and this effort should be accelerated and expanded substantially.

Leadership in this area appears to rest with FDA. However, the Units associated with the Division of Health Care Development would be appropriate settings for developing procedures, training personnel in the use of instruments and equipment, providing calibration and maintenance services, and for generally facilitating the introduction and use of technology in health services. In any event, the Division of Health Care Development should take a vigorous interest in seeing that the need for quality standards in technological equipment and methods is satisfied. To accomplish this the Division should consider developing plans for an Office of Health Care Technology.

b. Development of methods for <u>evaluating</u> patient care, including the problems of quality assurance and objective assessment of the end

results and outcomes of the medical care process.

This is a complex task involving measurement of functional capacity and disability and the development of information systems to monitor changes. These activities are best undertaken in actual practice settings where enrolled populations can be observed over extended periods. Individuals must be trained to use these methods and to install the systems in uniform fashion so that comparable results can be obtained; again this is best accomplished in clinical settings.

c. Development of new types of health manpower or reassignment of current manpower tasks, including new approaches to the central problem of providing primary care through physicians and physician extenders.

Much developmental work is needed in this area in order to guide our practical policy decisions about the training of family physicians or middle-level personnel. For example, we need more sophisticated functional analyses of the tasks performed by physicians and nurses in their work settings in relation to the problems brought to them by patients. The needs are greatest at the level of primary care, but redistribution of work assignments at the levels of secondary care (community hospitals) and tertiary care (major medical centers) also offers considerable scope for better deployment of scarce manpower. Several Health Care Development Units should be concerned with these problems and the related aspects of training the prototypes of

new kinds of health manpower and evaluating their work in practice situations.

d. Development of new community health care systems for populations defined by geography or political subdivisions, e.g., emergency medical care systems, community crisis control and information centers, community blood bank systems or rehabilitation services.

For example, coordinated emergency medical services should be developed for both urban and rural settings. A complete system would include a centralized communication service for reporting emergencies; automated dispatching of ambulances, with consideration of the standards for their equipment and personnel; automated routing of ambulances through congested city streets, using the same system developed for fire and police vehicles; and automated selection of emergency care facilities. Technology can provide logically designed and engineered ambulances to replace today's converted hearses.

Discussions of such coordinated emergency medical care systems customarily focus either on such glamorous innovations as the use of helicopters to transport accident victims to hospitals in the military pattern, or on the political problem of authority for the system in a particular community. While the helicopter concept is appealing in certain suburban or rural areas, it represents a "high" technology effort where "low" technology would permit major improvements for large numbers of people. With respect to the political problem, introduction of such a system would certainly require public education

and support as well as clear designation of the responsible agency or authority, and in all probability new state or local legislative action. In the current emphasis of Federal agencies on encouraging local action for social and technological developments, this application in health care would seem to be a natural priority item. The availability of adequate Federal funds should encourage resolution of the control and authority problems.

e. Development of new health care systems for populations defined by enrollment, e.g., health maintenance organizations, health care corporations, health care networks and prepaid group practices.

The current emphasis on health maintenance organizations offers great possibilities for constructive change in the health services system. In one sense the entire program is experimental, but there should be some assurance that there are feasible opportunities for testing and evaluating, for example, new staffing patterns, technological devices, health services information systems, support and supply systems or accounting systems. Accordingly, several Health Care Development Units should be integral parts of health maintenance organizations.

f. Development of measures for helping special populations, including the handicapped and the aged.

For example, development of orthotics (braces) and prosthetics (devices) for either missing sensation or impaired movement is a health technology field ready for exploitation. Many rehabilitation

products are not available to those who need them. There are almost four million persons with severe motor handicaps from neurological diseases alone, and an equal number of totally blind or deaf persons. Devices are an essential part of the program of restorative care for the physically handicapped, enabling them to achieve independence in daily living. Their availability is limited by lack of purchasing power on the part of the handicapped population, lack of venture capital by industry, and lack of trained professionals to prescribe the devices and instruct patients in their use.

Developmental areas include methods for early identification of the physically handicapped who could benefit from restorative services; application of services and systems to support or substitute for motor function; use of visual and acoustic sensory prosthetic devices for the blind; and use of typewriter (teletype) communication systems for the totally deaf and movement-handicapped. These and many other developmental efforts could stem from a new merger of engineering technology and medicine, and a national program to stimulate industrial production and improve availability and accessibility through proper prescription and usage.

Similarly, the rapid growth of the aged population emphasizes another potential role for technology. Possibilities range from those indirectly related to health problems to those obviously health-related. Transportation and mobility aids, such as escalators which decrease

agility demands on the user, buses with floors at curb level, and more easily moved doors at building entrances, illustrate the former possibilities. Medically related technological possibilities range from numerous devices, such as those designed to simplify the lives of patients with urine incontinence, to the broader issues of computer-controlled systems for individualized recreation and of nursing home redesign.

Rehabilitation engineering centers that are related to the service units for the handicapped currently being developed by SRS in HEW need support. The involvement of industry with these rehabilitation engineering centers should be encouraged through provision of practical information about the specifications and standards for devices. Regional service centers for the handicapped (in conjunction with hospitals and rehabilitation facilities) to evaluate, prescribe, fit and train handicapped persons in the use of devices and to maintain and repair them should be developed. Incentives or subsidies are needed to insure adequate supplies and widespread distribution of effective devices. In addition, controlled field trials are needed to measure the cost-benefit of expanding insurance coverage to include orthotic and prosthetic devices.

g. Development of new <u>health care facilities and equipment</u>, including automation, renovation, consolidation, mergers, shared services and regionalization of facilities.

For example, the field of instrumentation is an area in which major attempts were made during the 1960's to influence health care. The

Kaiser-Permanente automated multiphasic screening clinic led to a large number of off-shoots, both federally sponsored and privately funded. A major problem was the frequent inadequacy of medical and health data to permit evaluation of the efficacy and yields of the tests, or of the effects of screening on health care, even in such standard tests as those for glaucoma, gout, anemia or cervical cancer.

Pattern recognition for some elements of laboratory analysis and medical diagnosis has now passed through the period of vague promise into the era when serious workers are developing algorithms for actual clinical problems. In at least scattered cases, automated results approach the human capabilities with respect to rates for yields, false positives, and false negatives.

Recent studies of voluntary supervisory control of the human autonomic system suggest significant opportunities for the use of instrumentation in learning to effect this control and potential health benefits from exercising it.

There are many specific possibilities, each of which requires an as-yet unmounted development effort; they include fiber optics for detection of intrauterine deformities and for other internal examinations, non-insertive flow meters, and instrumentation for bedside blood tests in hospitals, as well as more tangential efforts such as alcoholism tests before being able to start an automobile.

h. Development of new methods, or adaptation of current methods for planning health services for general populations living

within political subdivisions, e.g., cities, standard metropolitan statistical areas, counties, states and regions, and the country as a whole.

For example, there are a number of countries that have active health services planning units employing relatively sophisticated methods. It would be desirable to examine their methods and information systems and to consider adapting those that are suitable for development in this country. Several Health Care Development Units could be attached to state, regional or local health planning agencies and have as their primary mission the development of the proposed Federal-state-local statistical systems that relate planning and evaluation to the needs of general populations.

Similarly, formulation and implementation of national health policy involves many decisions about the allocation of resources. To develop informed policies and to protect them from irresponsible attack will require effective programs of market and opinion research, and of public information and education. In the end, health policy must be supported by an enthusiastic and well-informed constituency. At least one Unit should be concerned with these problems.

i. Development of new approaches to <u>health education</u>.

There seems to be general agreement that the "wired city" with cables into each home will be a fact by the end of this century. Since these systems can provide 20 to 40 television channels, a significant number will be available for community, social, and educational purposes.

Two-way communications between home and the central station will be possible through use of the telephone. In all probability, modest amounts of computer storage and data processing will be economically available through the home television receiver.

The potential impact of such technology on mass communication may be large as was the transition from radio to television. These new mediums could be exploited in a major effort to bring into the health care system the third of the public now said to be separated from it. Such exploitation will demand national efforts to develop, test and evaluate educational and informational materials, simply because of the need for economies of scale in relation to costs.

The relatively large sums of money available through present programs within the Division of Health Care Development, each supported by separate legislation appropriations, and independent professional and political constituencies, need to be consolidated. The current efforts at conjoint funding employed by HSMHA are imaginative and constructive, but they should now be ratified formally by one consolidated act and appropriation that identifies health care development as a major Federal responsibility. We recognize the political complexities of implementing this proposal, but the need is urgent and early action is required.

In allocating its resources, the new Division should weigh such factors as the likely availability of solutions to problems under consideration; the likely cost of developing and implementing those solutions; the number of people potentially benefited; and the extent to which they would be benefited.

The Panel recommends that about 65 percent of the health services R & D

budget of HEW be allocated for the new Division of Health Care Development and 10 percent for the extramural Health Care Development Units, making a total of 75 percent for developmental activities. Better use can undoubtedly be made of current appropriation levels if the confusing disarray of categorical programs is integrated in the new Division. Large amounts of money will be needed to plan and staff the extramural units, to set up adequate information systems and to underwrite the substantial risks involved in developmental programs. Direct costs of patient care services can be paid for from other financing and insurance sources.

4. The Panel recommends that a NATIONAL HEALTH CARE RESEARCH INSTITUTE be created within the Health Services and Mental Health Administration of the Department of Health, Education, and Welfare.

Effective development of health care systems requires knowledge, based on research and information, to determine the areas most susceptible to intervention and change. Research provides the intellectual "capital" for the entire R & D effort and the environment for training new research professionals. It is as necessary to the evolution of an efficient health care system as is biomedical research to the understanding of disease processes and the development of new treatments. Health services R & D draws upon a wide range of knowledge and skills, including familiarity with complex social relationships and organizational structures, economic and fiscal concepts, epidemiological and statistical methods and ideas, medical science, and technology. Special conditions are necessary to recruit and retain professionals from established disciplines like economics and sociology, to promote cross-disciplinary research, and to educate new kinds of professionals for the multidisciplinary field of health services R & D. A special network of

communications is also necessary to coordinate and consolidate the efforts of diverse disciplines.

Bearing in mind that the division between research and development is highly arbitrary at best, the Panel nevertheless believes that the research component of health services R & D, and the related activity of training for research, need a certain amount of separation and protection from the development component. Similarly, development needs to be free from some of the traditional academic constraints on research. Organizational separation should be regarded as a mechanism for promoting the core function of each mission. Communication and exchange of personnel between the research and the development components are essential bridges and should be encouraged.

In order to foster creativity in basic research, there must be ample opportunity for investigators to define their own perspectives, conceptual approaches and areas of study, frequently in response to fundamental considerations rather than administrative definitions. Directed research employing a "customer-contractor relationship" is useful for the conduct of developmental activities, particularly in "undernourished" areas of the health care system.* On the other hand, it is also essential to trust individual investigators in the pursuit of untargeted research that has no prospect of immediate payoff. For example, an investigator studying the organization of community hospitals should not have to demonstrate at the outset that his findings will please all the diverse interests affected, any more than another investigator studying the growth of cancer cells should have to

* A Framework for Government Research and Development. London, Her Majesty's Stationery Office, Comnd. 4814, 1971 (Rothschild and Dainton Reports)

establish the utility of his findings for the practice of medicine.

Academic settings are more likely to attract some of the different disciplines involved in health care research than are operating health services institutions like hospitals and prepaid group practices. Stable support through the grant mechanism is necessary to build up sound research and research teaching programs, and the nature of many research issues relevant to health services requires a long-term commitment. Industry reckons that it takes seven to ten years for a new research group to start making a contribution to profits; health services R & D may well be no different.

Development, in contrast to research, is directed towards accomplishing specific objectives and must be carried on in the midst of the health care delivery system. Far greater sums of money must be invested in development than in research in order to achieve measurable changes and improvements in the health care system. Some development activities may also require long periods of time, but they can often be conducted in stages and the funds effectively handled through the use of contracts. These differences are important and are not fully appreciated by all in authority within the Federal government and in the health care industry as a whole. Relatively few administrators and others in positions of leadership have had opportunities to familiarize themselves with the field of health services R & D, to work in health care institutions, or to practice clinical medicine.

Under present arrangements, both components of R & D are the responsibility of NCHSR&D. Quite predictably, the long-term research and training activities have been overshadowed by the more immediate demands placed on NCHSR&D to develop and demonstrate new methods of improving health services. There is

constant pressure to curtail research training programs and to use grant money to accomplish specific service demonstrations rather than to support basic research.

The Panel proposes that a separate organization be established for health services research and research training. We have debated at some length the relative merits of locating this organization in NIH, but conclude that this would lead to more isolation of research from development than is desirable, and that health services research probably has more in common with the activities of HSMHA, which includes the National Institute of Mental Health (NIMH), than it does with the biologically oriented institutes that comprise NIH. We therefore recommend that the proposed National Health Care Research Institute be located in HSMHA, to maintain and protect its interaction with the Division of Health Care Development and the programs in HSMHA providing direct services. In essence this proposal means converting NCHSR&D into the proposed National Health Care Research Institute, strengthening its grant programs for research and research training, and transferring its present developmental responsibilities to the Division of Health Care Development.

The Panel recommends that training in the areas that contribute directly to health services research should be funded by the new Institute. This includes primarily training in epidemiology, health economics, health statistics, medical sociology, biomedical engineering, biostatistics and health services research per se. Probably limited training in other fields such as systems analysis, operations research, industrial management, accounting, architecture, law, political science and psychology, as applied to health services, should be supported also. We recognize that an argument can be made for funding these training programs

through the Bureau of Health Manpower Education in NIH, but we believe that the specialized nature and the urgency of the mission associated with the National Health Care Research Institute, the proportionately smaller numbers of health services investigators required, and the need for direct working relationships between those conducting health services research and those responsible for research training argue persuasively for placing this training responsibility with the new Institute.

On the other hand, we believe that training programs for health personnel who provide services rather than conduct research, including new types of physicians' assistants whose effectiveness has been carefully evaluated, are more logically located in the Bureau of Health Manpower Education. The Bureau should also be responsible for the training of health services administrators and managerial professionals; however, their adequate exposure to the concepts of health services R & D is of utmost importance to the field, and the new National Health Care Research Institute should cooperate with the Bureau of Health Manpower Education in improving the content of such training programs. The lack of familiarity on the part of administrators and managers with health services R & D is a major obstacle, and there is much overlap between the interests and activities of health services investigators and administrators. The categories of professionals for research, for which the new Institute would be responsible, and the training needs of administrators, for which the Bureau of Health Manpower Education would be responsible, are described in Appendix G.

The Panel further recommends that the National Health Care Research Institute support a number of independent Health Care Research Centers. These free-standing

Centers should usually be distinguished from the Health Care Development Units described above that are involved directly or indirectly in the provision of personal health services, but in a few cases it may prove desirable to combine them. The Health Care Research Centers should be largely funded by the National Health Care Research Institute but managed by universities (individually or through consortia), non-profit, not-for-profit organizations, industries, and professional or institutional associations. Their concerns could include fundamental and applied research and many would undertake interdisciplinary research, but they might have different response times and priorities than are customary for most university departments and research institutes.

While general Health Care Research Centers might exist, specialization is also needed. The areas to be studied include, for example: organizational, administrative and managerial problems; manpower problems; economic, fiscal and accounting problems; attitudinal and behavioral problems of providers and consumers; health care technology; information handling problems; biomedical engineering; quality assessment problems; and licensure, medical ethics, malpractice, and other medico-legal problems.

It is by no means easy to attract first-rate economists, epidemiologists, engineers, clinicians, sociologists and other needed professionals into the field of health services research. These Centers can be instrumental in overcoming this problem if they are closely related to universities so that the professionals can maintain their ties with their primary disciplines. If the proposed National Health Care Research Institute can develop close working relationships with the Centers, they may also become an important channel for communication and exchange

of personnel between the government sector and the academic community. In this connection, a variant of the Clinical Associates Program successfully pioneered by NIH should be introduced.

To accomplish its mission the new Institute will need to develop and retain a strong staff of professionals who themselves conduct research. In the experience of NIH, the presence of active investigators provides administrators and managers of grants with professional colleagues and intellectual stimulation. This enhances the entire enterprise and keeps the research and research training programs in close touch with the field. Most of the research conducted by the staff of the Institute would be concerned with analyses of secondary data, but some research, including primary data collection, might be conducted in collaboration with extramural colleagues in universities and other research organizations.

In addition to promoting basic research and the training of research personnel, the new National Health Care Research Institute would also be responsible for facilitating communication of the results of health services R & D. The special needs of these three functions, and the types of support mechanisms they require, are summarized in the following sections.

a. Research

There is a dearth of trained and experienced health professionals who who appreciate the value of health services research and who have the experience to design and direct useful research projects and evaluation. The gradual dismantling of the Public Health Service, the realignment of the Commissioned Corps, the frequent reorganizations in HEW and the slow pace with which schools of public health and schools of medicine have changed their curricula

to meet contemporary health problems have all contributed to this state of affairs.

In understanding health services research, it it important to distinguish between problems that can be the object of research and those that involve policy decisions or demonstrations. It is also important to appreciate that some problems are not feasible to tackle until the necessary information base or organizational setting has been developed. There is, in addition, a need to understand time factors in the conduct of health services R & D. Analysis of secondary data, readily available in tabulated form, has a quite different time frame from that required for a household survey to determine, for example, reasons for non-enrollment in a new health care plan. Both are short-term projects in relation to the time required for planning and starting a prototype health care system for 100,000 people that will permit comparative studies of new manpower to be made. Simulation of the cost-effectiveness of a new emergency bed-allocation system for a metropolitan area can be accomplished in weeks if the data are available; comparisons of the impact on utilization of co-payments in government health insurance programs in several different countries may take years.

The contributions that can be expected from different kinds of research need to be understood. Each has its place but no one approach is suitable for all forms of health services research. For example:

1) Controlled clinical trials of therapeutic regimens, administrative practices, and organizational patterns can be used to assess their relative efficacy and costs, provided the cooperation of the medical

profession and patients can be secured.

2) Analyses of comparable data, properly standardized, derived from operating institutions and health care systems can be used for evaluating services and policies.

3) Extrapolations and projections derived from secondary analyses of data arising from experiences that are not strictly comparable but nevertheless provide useful information can contribute to conceptualizing and planning services or demonstrations.

4) Scholarship based on historical accounts of experiences with health care organizations, manpower, financing and evaluation in the United States and in other countries can be used as a basis for developing policy options.

Perhaps the least well-understood function in health services R & D is the process of evaluating health services, institutions and systems and the conditions that are necessary and sufficient. The crux of the problem is often to define precisely the goals and priorities of an institution or system. In the case of neighborhood health centers, for example, is the primary object to provide a point of entry into the established medical care system, to provide a full range of health and social services, or to provide a focus for community action and job opportunities? What is the "neighborhood" or target population? These questions must be settled before suitable measures of outcome can be devised; the measures of outcome in turn determine the collection of data for evaluation.

b. Training

The rule of thumb in the experience of NIH and the National Academy of Engineering is that an annual investment of $80,000 to $100,000 is required for each academic investigator, and industry estimates that it requires $30,000 to $50,000 to support an R & D engineer. Using these guides, annual national expenditures on health services R & D of about $315 million would be expected to support at least 3,200 professionals and as many as 10,000. The best estimate available from NCHSR&D suggests that no more than 400 persons with professional training for the field, principally Ph.D.'s and M.D.'s with some Masters-level technicians, are currently engaged to any substantial extent in health services R & D. NCHSR&D projections of the minimal national requirements for full-time professionals in the field of health services R & D are shown on Table 1.

Table 1

PROJECTED CUMULATIVE NATIONAL NEEDS FOR MANPOWER IN HEALTH SERVICES R & D
1972-77

Category	Fiscal Year 1972	1974	1977
Basic Disciplines Related to Health Services R & D (Ph.D.'s): Economics, Sociology, Operations Research, Biomedical Engineering, Industrial Engineering, Systems Analysis and Statistics	500	750	1,000
Physicians with Health Services R & D Capabilities (M.D.'s plus M.Sc., Ph.D., or D.Sc.): Epidemiologists and Health Services Investigators	250	500	1,000
TOTAL	750	1,250	2,000

Source: See Appendix H

The needs for adequately prepared manpower at all levels should be related to the national investment in health care. Comparisons with other social systems or with industry do not seem helpful. From the information presented to the Panel by its consultants and from its review of the documents available to it, as well as the general semblance of disarray that characterizes the health care field generally, the Panel concludes that there is an urgent need for improvement in both numbers and quality.

c. Communications

The new Institute should establish a major unit responsible for the timely and enlightened communication of ideas, concepts, methods, data sources, research-in-progress, results, findings and implications from health services R & D nationally and internationally. New information should be disseminated rapidly, with maximum effort directed at prompt diffusion through the health care industry, including Federal agencies responsible for health services. A variety of media should be used, including computerized storage and retrieval systems, microfiches and suitable periodicals and other publications. The unit should publish or support a monthly journal, abstracting national and international literature bearing on health services. The best model is Hospital Abstracts, a monthly survey of world literature, prepared by the Department of Health and Social Security of the United Kingdom. The proposed new publication, however, should be broader in scope and coverage and might be called Health Services Abstracts.

A second responsibility is to establish a first-rate, timely publication service for research reports, monographs, state of the art papers and related

material in the field. This could be done through special arrangements with the Government Printing Office or through contracts with private publishers. Current periodicals, and possibly new ones, should be subsidized so that more frequent and larger issues can be produced and subscription rates reduced. Aspects of the publication programs of CDC, the former Hill-Burton Program, NIMH, NCHS, SRS and SSA are helpful in presenting information, research findings, discussions of problems and descriptions of programs. The current publication program of the Nuffield Provincial Hospitals Trust in the United Kingdom is a particularly useful model to emulate.

d. Support Mechanisms

The mechanism for the support of research and research training are well founded on experiences in NIH and similar units elsewhere in HEW. Several types of support seem especially useful at the present time in order to increase the country's capability in health services R & D.

To attract capable individuals to a new field, long-term stable support should exist. Accountability, performance and periodic peer review are essential, and a climate of trust and cooperation should characterize the relationship between the funding agency and the professional or student.

The prospects for careers in government at all levels and in universities, as well as opportunities in the health care industry generally, including health maintenance organizations, health care systems, hospitals and clinics, fiscal intermediaries, and industries concerned with technology in the health care field, should be examined and publicized by the National Health Care Research Institute.

1) Research Program and Project Grants

Research training can only take place in the presence of active research being undertaken by first-rate investigators who teach as they learn. Proximity to or involvement with health professionals and institutions is usually desirable and frequently essential. When economists, engineers, epidemiologists, sociologists and statisticians are given substantive experience with health services and health services information, even if it is secondary data, the prospects of their entering the field and contributing are likely to be enhanced. There is, therefore, a continuing need to support the underpinning of the entire health services R & D enterprise with stable, long-term research support for groups, departments, units, institutes or centers affiliated with universities, non-profit, not-for-profit and for-profit organizations.

2) Research Training Grants

Training grants that provide stability and continuity of support for faculty and students are essential to increase the flow of well-trained professionals competent to conceptualize the problems and undertake health services research, development and evaluation, as well as to develop statistical and information systems and to conduct policy analysis.

Support can be provided either for entire institutions or for departments and should be available for those disciplines that are both fundamental to health services research, such as epidemiology, economics, engineering, sociology and statistics, and for those that are concerned

with the more applied aspects of health services R & D.

3) Research Career Development Awards

The Research Career Development Awards program should be reinstated and vigorously pursued with more generous funding. Such a program of career awards in health services R & D was announced in 1969. It offered continuing, stable support, initially for five years but renewable for successive five-year periods, for investigators from any suitable discipline who were prepared to make full-time commitments to health services research. Only six candidates were funded and the program was discontinued because of lack of money. The negative impact of this kind of "on-again-off-again" policy on a new field when competent people are extremely scarce cannot be overemphasized.

4) Industrial Grants

The exclusion of profit-making organizations from receipt of grants from HEW does not appear to be in the best interests of the country or the field. Policies in this regard should be reviewed and revised to encourage greater participation by the private sector.

Finally, the Panel recommends that the new National Health Care Research Institute use peer review as a basis for decision-making and rely primarily on the grant mechanism, with judicious use of contracts when the program needs warrant them and when the Institute has the professional competence to undertake substantive research efforts in collaboration with colleagues in external institutions. Forward funding or other types of long-term, stable support for investigators with demonstrated competence should be provided in order to retain them in the field

and to encourage others to enter it.

About 16 percent of the Federal health services R & D budget of HEW should be devoted to the work of the National Health Care Research Institute, with at least one-third allocated for training new research professionals.

5. The Panel recommends that the EXECUTIVE OFFICE OF THE PRESIDENT assume responsibility for COORDINATION of the Federal government's investment in health services R & D through administrative and budgetary mechanisms.

The first four recommendations are based on the Panel's conclusion that realignment and consolidation of the different functions of health services R & D will make better use of available funds and professional personnel in HEW and will generally strengthen the field. The proposed Policy Analysis Group, the Bureau of Health Statistics, and the Division of Health Care Development will give distinct emphases to three major activities presently located at different organizational levels and in different administrative enclaves that now appear to be successfully isolated from purposeful collaboration. The proposed National Health Care Research Institute is a somewhat different situation; here the problem is to give stability, visibility and independence to a necessary function that has little immediate payoff and is therefore especially vulnerable in the political arena. Coordination of these four functions within the Department is essential if their collective potential is to be realized.

The problem of intra-governmental coordination is even greater than that of coordination in HEW. In particular, the Panel recognizes substantial opportunities for developing, testing and evaluating new health care arrangements by VA and DOD, both of which have clearly defined populations that are prerequisites for

much work in health services R & D. Similarly there are experiences and programs that can be exchanged among departments and agencies, and experiments and demonstrations of mutual value that can be undertaken. OEO currently organizes health centers and "networks" that are uncoordinated with those supported by HEW. SSA, SRS, VA, and DOD use different terms, definitions, classification schemes and data aggregation policies. Useful experience is lost insofar as simple comparisons and standardization of experience is concerned, and opportunities are missed for record-linkage as a means of reducing unnecessary utilization or of studying the natural history of disease. Given the high costs of data acquisition, this lack of coordination and failure to maximize resources can only be regarded as extremely wasteful. Most of the professionals in health services R & D in the Federal government recognize the need for coordination and are interested in working more closely together; however, it requires strong commitment and leadership to overcome the organizational barriers between Federal departments, agencies and units.

The Panel has considered a variety of coordinating mechanisms. Some of these are intra-governmental and others involve only HEW. The problems, issues and expenditures on health are certainly of sufficient magnitude to command attention comparable to that assigned to the space program or to large-scale technological initiatives. For example, the problem might be addressed by a special Cabinet Committee or by the Domestic Council or a subcommittee reporting to it. For really effective coordination the budgetary review process in the Office of Management and Budget should be involved. This process might include close consultation with a Federal Health Services Council established by the Office of

Science and Technology for this purpose. This body would be analogous to the Federal Council on Science and Technology, chaired by the President's Science Advisor, and would consist of senior representatives of those Federal departments and agencies involved in the provision, regulation or support of health services and health services R & D. It could be augmented by extra-governmental consultants as circumstances warranted.

An annual report by the Council, summarizing the country's major health problems and needs and the progress of health services R & D in meeting these needs, should prove a useful contribution to public awareness of the issues and alternatives for progress. The efforts of all Federal agencies concerned with the nation's health care could be identified and related to expenditures in a coherent fashion. The advantages of both diversity in health services R & D and purposeful coordination with prudent use of scarce resources could be pursued.

Within HEW, we recommend a strong committee chaired by the Secretary to coordinate the four functions of health services R & D that we have identified and the activities of the organizational structures we propose. This committee should be composed of the heads of the four health services R & D units and the administrators of FDA, SRS, SSA and HSMHA; it would also be desirable to include representatives of DOD, OEO, and VA.

The Panel sees considerable merit in establishing an extramural advisory panel, perhaps analogous to the former National Advisory Health Council, to perform an additional coordinating function and recommends that this method be adopted also. The extramural advisory panel should be composed of representatives of consumers (the public) and providers (professional, institutional and fiscal

interests). It should be chaired by the Secretary of HEW, or his designee, and should have a permanent secretariat based in the Policy Analysis Group. The flow of political and social concerns, information, the results of R & D efforts and of policy analysis options could be reviewed and debated by this panel. The definition of problems and the assignment of R & D tasks and responsibilities is more likely to proceed in an orderly fashion if periodic accountability to an external advisory body is a regular expectation.

6. The Panel recommends, as a means of enhancing the potential of health services R & D, that an independent NATIONAL COMMISSION ON HEALTH SERVICES be established and funded by a consortium of PRIVATE FOUNDATIONS to consider organizational, administrative, and educational arrangements, incentives, and support mechanisms that will encourage and assist universities, health care institutions, professions, government, and industry in improving the health care system and the health services of the country.*

The Panel's charge was limited to the problems of health services R & D and its potential for improving the country's health care system and its health status. For two reasons much of our discussion and most of our recommendations focus on the Federal government's opportunities for furthering these goals: first, most of the money for health services R & D flows through the Federal government, and second, most of the policy issues that require or are susceptible to resolution with respect to the furtherance of health services R & D lie within the province of the Federal government. However, although Federal spending and Federal

* Dr. Robinson was not present during the discussion of this recommendation and abstains.

initiatives in policy analysis, information and statistics, development, research and research training are necessary conditions for constructive health services R & D, they are not sufficient conditions. The great bulk of the country's health services are provided outside the Federal establishment and the great bulk of health services R & D is conducted in non-governmental institutions, agencies and organizations.

To exploit the potential and reap the benefits of health services R & D, the Panel recognizes that the health care establishment and the health services industry of the country must be responsive to change and to the ideas that we have advanced. Without greater appreciation and understanding of health care problems, issues and options on the part of universities, health care institutions, professional associations, state and local health departments, health planning agencies and industry, our recommendations for the vigorous pursuit of health services R & D will have limited prospects for implementation. Effective participation by the non-Federal sector is of special importance in the case of our recommendations for establishing extramural Institutes for Health Policy Studies, Health Care Development Units, Health Care Research Centers, State and Local Health Statistics Centers, and for broadening the base of research and research training.

In addition, there is the pressing problem of relating the education of health professionals--general physicians, specialists and super-specialists, nurses, dentists, physicians' assistants, health care administrators and managers and other professional and technical personnel--to the changes occurring in the country's health care arrangements. Millis in his report to the Board of Directors

of the National Fund for Medical Education* has called for establishment of a national commission on medical education. The drawback with a commission of this kind is that it cannot arrive at sound conclusions about medical education and its financing without considering the larger issue of the context in which health care is to be organized, health professionals educated and medicine practiced. The medical profession shares the responsibility with other professions and with the consumers for establishing the nature and objectives of the health care system and the relations of those who work in it to each other. We believe that the problems themselves, and the roles and contributions of the different institutions, agencies and organizations in the health field, are sufficiently interdependent to warrant a commission with a broader mandate.

Defining the problems, debating the issues and specifying the options will help to create the climate for constructive change in the private sector and will give a new sense of direction to the R & D effort. Examples of some of the major issues that we believe the proposed Commission on Health Services should address and that should, in turn, be the subject of health services R & D are:

a. Medical Manpower

Who is to provide primary medical care? How are the professional and other personnel to be trained? How many should be trained? How do they relate to one another? Where should they work? How do they relate to other levels of patient care?

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* Millis JS: A Rational Policy for Medical Education and its Financing. New York, The National Fund for Medical Education, 1971

What types and how many physicians should be trained for practice in different medical specialties? Should training programs be determined by the service needs of current institutional commitments, by the numbers of residencies approved for training in each of the twenty medical specialties, or by epidemiological estimates of the prevalence of conditions that can be managed effectively by each specialty? How can obsolescence of specialties and of knowledge, on the one hand, and prompt introduction of unforeseen scientific and technological advances, on the other, be taken into account in long-range plans for medical education?

There is much interest in the "health care team", in new kinds of middle-level health personnel, and in redefinition of traditional roles of physicians, nurses and other health personnel. How should health manpower be deployed to meet the needs of the system as a whole and to increase productivity? What is an effective functioning team? How should tasks be assigned or delegated? What kinds of people should be trained to undertake what functions? Should training take place in isolated schools and programs or under some form of consolidated and coordinated auspices? The proposed Commission can serve an especially useful role by bringing together the different professional groups to reconsider their functions and relationships in the context of the changing health care system.

b. Health Care Administration

What kinds of administrators do we need for our health care systems, institutions, and agencies? Can traditional training programs in public health administration and hospital administration be expanded to meet this

need? How should these individuals be trained to manage and monitor the health care systems of the country?

c. Technological Innovation

The continuum from discovery or invention through the construction of prototype devices, instruments and systems, to the phases of testing and evaluation for efficacy, field trials of cost-effectiveness, production, marketing and achievement of widespread acceptance and use is an unusually lengthy and complicated sequence. Universities, industries, health care institutions, systems and professions are all involved in the process and affected in varying degrees by patent policies, government funding, market characteristics, standards, controls and incentives. How can useful knowledge derived from biomedical and bioengineering research be translated into services promptly and efficiently at the lowest cost? Coupling of the various components in this chain of events is essential if the potential of technology is to be realized in a complex, pluralistic social system such as health care.

d. Health Departments and Planning Agencies

Federal health legislation in the past decade has to a large extent circumvented state and local health departments and the Federal bureaucracies that have administered traditional categorical services programs. In an era when the major priorities were basic environmental sanitation, control of infectious diseases, the operation of acute and custodial hospitals, the collection of vital statistics, and the administration of categorical programs for the poor, the public health departments did an

excellent job. In western industrialized countries, however, the problems have become more complex and diverse. With rare exceptions, health departments have not changed substantially with the times. Public health is an integral component of medicine and the health care enterprise; it too is now called upon to change. What is the future of state and local health departments? What part should they play in improving the country's health care system? What should be their relation to the new health planning agencies and the proposed state and local health information systems? Who should be responsible for franchising and monitoring the personal and environmental health services for a state or locality and for seeing that the needs of populations within given geographic or political areas are met?

e. Schools of Public Health

Schools of public health should be a major national source of ideas, methods, skills and perspectives on the problems of health care organization and one of the major sources of trained personnel to study the problems, develop and manage the systems, administer the health departments and planning agencies, generate statistics and information that are needed to monitor the health needs and health services of communities, conduct health services R & D, and initiate and analyze policy options. All too frequently these schools participate in dysfunctional competition with schools of medicine to the detriment of both and the neglect of pressing national problems. How can these institutions be encouraged and supported to become more responsive to contemporary health care problems? How can they be integrated into the mainstream of the health care enterprise in university medical centers?

What kinds of health professionals should they seek to educate? The Panel believes that the future of schools of public health is sufficiently critical to the nation's health services R & D effort to merit special attention by the proposed National Commission on Health Services.

f. University Health Sciences Centers

Health services R & D is particularly dependent on the talents that currently reside not only in schools of public health and schools of medicine and their teaching hospitals, but also in schools of engineering, schools of allied health professions, schools of nursing, departments of economics, operations research and sociology and, to a lesser extent, in schools of dentistry, schools of law, schools of architecture, and other primary university departments. The problems of coordination in the Federal government are only exceeded in complexity by those in the universities. Large organizations, particularly when bureaucratized, change slowly. When creative individuals wish to merge their efforts in interdisciplinary groups to establish new disciplines or professions or to tackle new problems, the traditional departmental and school structures of the university are subjected to major stresses. How can university health sciences centers respond more effectively to the problems of the health care system? What organizational patterns will provide the greatest support and flexibility for interdisciplinary health services R & D and the training of new investigators?

The Panel recommends that a consortium of private foundations establish and fund the proposed National Commission on Health Services on a continuing basis. A wide variety of groups, professions and institutions, to say nothing of the public, have a vested interest in the deliberations and recommendations of such a commis-

sion. Presidential commissions are frequently constrained by political timetables and events. Provider-sponsored boards of inquiry under such auspices as the Association of American Medical Colleges, the American Medical Association, or the American Hospital Association have difficulty persuading others of their objectivity, and consumer groups rarely have the resources to mount the kind of inquiry needed.

What the Panel envisages is not a commission on health care costs, not a commission on health insurance, or one on efficiency, facilities or manpower, not one on medical education or nursing education, or on hospitals or group practice or technology in health care, not one on licensure, malpractice or accreditation problems, but a National Commission on Health Services with a broad mandate to look at the interplay of these and other elements of our health care system. A small body of distinguished citizens above the fray should hear arguments, review briefs, weigh the evidence and suggest measures that would strengthen the entire health care enterprise in the United States.

Only an independent Commission is likely to have the objectivity and credibility to educate and persuade health care providers, teachers, administrators, and politicians that improved mechanisms for change must be established both within and between the component health professions and organizations that participate in our pluralistic system. Federal funds and administrative leadership are necessary ingredients but they are not sufficient. Intellectual stimulation is also essential. The National Commission on Health Services should propose measures that will encourage further evolution and desirable change in the future, and through a substantially augmented R & D effort, help all citizens reap the the benefits of biomedical research.

V. FUNDING

The nation's investment in biomedical research since World War II has been remarkably successful. As a result, medical care now has efficacious preventive and therapeutic knowledge that the majority of Americans believe can and should be effectively and efficiently applied. This view is reflected in the changing balance in recent years between Federal investment in biomedical research and investment in health services R & D (Table 2). Because the definition of the latter has varied over time and in different agencies of the Federal government, in part due to lack of familiarity with the field and in part associated with the desirability of demonstrating interest or of obscuring activity, the figures for these expenditures can only be regarded as approximations.

Table 2

FEDERAL EXPENDITURES FOR HEALTH SERVICES R & D AND BIOMEDICAL RESEARCH IN RELATION TO NATIONAL AND FEDERAL HEALTH EXPENDITURES
1967-72 (millions of dollars)

Expenditures	Fiscal Year					
	1967	1968	1969	1970	1971	1972
National Health Expenditures	47,900	53,600	59,900	67,200	75,000	81,000
Federal Health Expenditures	10,801	14,132	16,556	18,072	20,698	22,247
Health Services R & D						
Amount	82	100	166	179	222	238
Percent of National Health Expenditures	0.2	0.2	0.3	0.3	0.3	0.3
Percent of Federal Health Expenditures	0.8	0.7	1.0	1.0	1.1	1.1
Biomedical Research						
Amount	1,364	1,547	1,528	1,582	1,747	1,878
Percent of National Health Expenditures	2.9	2.9	2.6	2.4	2.3	2.3
Percent of Federal Health Expenditures	13	11	9	9	8	8

Source: See Appendix H

Although Federal expenditures on health services R & D trebled between 1967 and 1972, increases in the percentage invested in relation to national and Federal health expenditures were more modest, particularly in terms of constant dollars. The former increased from 0.2 to 0.3 percent and the latter from 0.8 to 1.1 percent. On the other hand, the percentage invested by HEW in health services R & D was slightly larger; in 1970 it was 1.2 percent of HEW's health budget and in 1971 it was 1.3 percent (Table 3).

Table 3

HEW EXPENDITURES FOR HEALTH SERVICES R & D
IN RELATION TO HEW EXPENDITURES FOR HEALTH
1970-71 (millions of dollars)

Expenditures	Fiscal Year	
	1970	1971
HEW Health Expenditures	13,034	14,977
HEW Health Services R & D		
Amount	161	189
Percent of HEW Health Expenditures	1.2	1.3

Source: See Appendix H

The Federal government now provides about 70 percent of the national investment in health services R & D and industry about 20 percent (Table 4). The extent to which the public and private sectors should share responsibility for the nation's health services R & D is a matter of debate, but there can be little doubt that the benefits accrue to the entire population and that Federal investment is fully justified in the public interest. In addition, it seems reasonable to expect that the larger the Federal component of the nation's health expenditures, the larger should be the

Federal government's investment in R & D in order to achieve effective and efficient use of the resources it is providing.

The amount of support that can be anticipated from non-governmental sources, particularly industry, will depend to a considerable degree on the extent to which health care is organized, markets are identified and aggregated, incentives created and disincentives minimized.

In light of the urgent need to reform the health care system, its professions and institutions, the opportunities for substantial leverage on the system through imaginative investments by private foundations should be recognized; their current contribution of only five percent of the national support for health services R & D hardly seems to be in keeping with the pluralistic traditions of the health care arrangements in the United States.

Table 4

ESTIMATES OF NATIONAL FINANCIAL SUPPORT FOR HEALTH SERVICES R & D
1970-71 (millions of dollars)

Source of Funds	Fiscal Year	
	1970	1971
Federal Government	$178.9	$222.4
State Governments	4.5	5.0
Local Governments	0.9	1.0
Universities and Colleges	3.3	3.3
Private Foundations	17.2	17.2
Other Non-profit Institutions	10.0	10.0
Industry	50.0	55.0
TOTAL	$264.8	$313.9

Source: See Appendix H

The present level of Federal investment in health services R & D of one percent of Federal health expenditures includes health services R & D conducted by VA, OEO and other Federal agencies, as well as the one percent of selected Federal programs currently set aside for their evaluation. The general division of funds is shown in Table 5. Again it should be mentioned that the figures are derived from categories used in preparing the Federal budget, and are not sufficiently refined to single out all health services R & D. It seems clear that the NIMH and the Maternal and Child Health Service of HSMHA both support health services R & D and yet the funds are not so identified in the records of the Office of Management and Budget.

Table 5

DIVISION OF FEDERAL EXPENDITURES FOR HEALTH SERVICES R & D
1970-71 (millions of dollars)

Agency	Fiscal Year 1970		Fiscal Year 1971	
Department of Health, Education, and Welfare		$161.4		$189.1
Health Services & Mental Health Administration	135.1		160.2	
Regional Medical Programs	66.6		74.7	
NCHSR&D	25.5		37.3	
Community Health Planning	16.7		20.4	
National Center for Health Statistics	8.2		9.2	
Direct Patient Services	7.5		7.6	
Disease Control	6.1		7.3	
Office of the Administrator	2.5		2.7	
Medical Facilities Construction	2.0		1.0	
National Institutes of Health	26.3		28.9	
Veterans Administration		14.1		16.2
Department of Housing and Urban Development		1.4		8.8
Office of Economic Opportunity		1.3		8.0
Other Agencies		0.7		0.3
TOTAL		$178.9		$222.4

Source: See Appendix H

About 70 percent of these funds ($160 million in 1971) were spent by HSMHA. In addition, it is worth noting that NCHSR&D, from which so much has been expected, controlled only about one-fourth of the health services R & D budget in HSMHA and about one-sixth of total Federal expenditures in this field in 1971.

There are no clear guidelines for the levels of support that should be provided for health services research, development and evaluation. Industry spends an average of four percent of gross annual sales on R & D, but there are wide variations. Another rule of thumb states that for every dollar spent by industry on successful fundamental research, $10 is spent on development and $100 on all tasks involved in the introduction and marketing of the new idea or product.

The Panel is of the opinion that effective coordination and realignment of tasks could make much better use of the resources currently available. Money alone will not solve the problems identified, but its thoughtful, coordinated deployment can make it maximally effective. Increased flow of dollars for health services R & D must go hand in hand with measures to redirect and coordinate the entire effort within the Federal establishment, and with measures to develop the professional manpower, the information base and other essential resources for these activities. Increased funding for health services R & D should not be undertaken at the expense of basic investigation into the causes and treatments of diseases. Without aggressive investment in biomedical research, health services have little to contribute. At the same time, it should be recognized that access to the fruits of biomedical research depends in large measure upon the organization and financing of effective and efficient health services. The Federal government is currently spending one-eighth as much on health services R & D as on biomedical research (Table 2), and

this is probably a fair estimate of the ratio of spending for the country as a whole. Given the traditions of Federal R & D investment in the defense, space and nuclear energy fields, as well as the investment in biomedical research, it can scarcely be argued that health services R & D is over-funded in relation to either Federal or national expenditures on health. Indeed, it is more reasonably argued that in view of the size of the health care "crisis", the Federal government's stated objectives, and the public's expectations, we should increase the percentage of Federal funds invested in improving the efficiency, availability and quality of health services at this point in time.

The Panel suggests, however, that an overall national investment in health services R & D of about one percent of total national health expenditures should be adequate to support a flourishing and effective R & D effort in this field. It also appears reasonable to apply approximately the same percentage to the Federal budget for health, including Medicare and Medicaid, in determining the Federal government's level of support for health services R & D. Depending upon the nature and extent of its responsibilities for financing health care, perhaps through national health insurance, annual health expenditures by HEW in fiscal year 1974 could amount to $35 billion or more. One percent applied to this base in 1974 would generate a potential health services R & D budget of $350 million annually, which is substantially more than the present level of Federal funding and should be enough to support the activities discussed in the Panel's recommendations. Within this range, it should be possible to develop and defend a health services R & D budget for HEW that addresses many of the immediate health care problems discussed in this review and at the same time provide resources for ideas and proposals that are

new and different and that arise from the creative involvement of those concerned with improving health care.

The Panel suggests that the health services R & D budget of HEW might be distributed among the major areas of policy analysis, information and statistics, development, research and research training, in accordance with Table 6.

Table 6

PROPOSED PERCENTAGE DISTRIBUTION OF HEW EXPENDITURES ON HEALTH SERVICES R & D

Function	Percentage	
Policy Analysis		
Policy Analysis Group, Office of the Secretary, HEW	0.2	
Long-range Health Policy Studies, Intra-governmental or Extra-governmental	0.8	
		1.0
Information and Statistics		
Bureau of Health Statistics, Office of the Secretary, HEW		8.0
Development		
Division of Health Care Development, HSMHA	65.0	
Health Care Development Units, HSMHA	10.0	
		75.0
Research and Research Training		
National Health Care Research Institute, HSMHA		
Research	10.0	
Research Training	6.0	
		16.0
TOTAL		100.0

Apart from investment in health services R & D, the Panel underscores the need for a major investment, accompanied by a reorientation of educational programs, in training programs for health care administration and management. The dimensions of this problem have been discussed previously; clearly additional funds for this purpose should be provided through the Bureau of Health Manpower Education in NIH.

Undoubtedly state and local governments, private foundations and industry should all assume responsibility for larger proportions of the total investment in health services R & D. The extent to which this can be accomplished will depend in large measure upon Federal leadership in establishing and supporting the field, but there is also much room for creative innovation from the private sector.

VI. IMPLEMENTATION

The redistribution of tasks and responsibilities in health services R & D recommended by the Panel should not be difficult to implement since no major reorganization within the Federal government is proposed. Most of our recommendations appear to be consistent with the thinking and indeed with recent organizational changes in HEW. Our sixth recommendation does involve a deliberate initiative from the private sector. The following steps are required for implementation.

Policy Analysis Group: Presumably no new legislation is required to establish this group, but a new line item in the HEW budget may be needed. The problem will be to give credibility to the idea of a permanent, non-partisan staff of trained civil servants, to recruit first-rate professionals from the Department and from industry and academic circles, and to provide more visibility to the opportunities for meaningful careers in health care administration and policy analysis.

The creation of one or more free-standing, federally funded Institutes for Health Policy Studies might require additional legislation, although they could probably be initiated and supported through long-term contracts. If the Institute of Medicine or some other established institute were to undertake this responsibility, the task would be simplified considerably.

Bureau of Health Statistics: NCHS is now attached in a staff relationship to the Office of the Administrator of HSMHA. It already enjoys close working relationships with the Office of Research and Statistics in SSA and with those responsible for designing information systems in NCHSR&D. It should be the responsibility of the Task Force we have proposed to examine the need for new

legislation to set up the Bureau headed by a Commissioner, and to develop a budget as the basis for requesting new and specific appropriations. There are certain risks involved in consolidating funds and responsibility for health statistics and information now dispersed among a number of departments and agencies, but we believe these risks are offset by advantages in having the country's health information system examined as a whole by Congressional committees and by the Executive branch of the government.

Division of Health Care Development: A new Division of Health Care Development has already been established in HSMHA. Whether or not specific components like the Regional Medical Programs Service and the Comprehensive Health Planning Service retain a measure of separate identity, new legislation is needed to consolidate the existing legislation and appropriations. The current procedures encourage fragmentation, fiscal gerrymandering, confusion in the eyes of providers and consumers, administrative waste and counterproductive bureaucratic rivalry. We recognize that unifying legislation will not be easy to achieve, but we believe that it is urgently needed and should be actively pursued by HEW and Congressional supporters of health services R & D.

Undoubtedly the Division of Health Care Development will require the lion's share of health services R & D funds, but its prospects for real impact will depend upon support and direction from the Policy Analysis Group, the enunciation of national health policies, an effective information system and adequate numbers of trained professionals.

National Health Care Research Institute: Essentially the Panel's recommendation is that NCHSR&D be converted to the new Institute, that its responsibilities

for development be assigned to the Division of Health Care Development and that its responsibilities for establishing definitions, terms, classification schemes and information systems be assigned to the Bureau of Health Statistics. In turn, its responsibilities and its funds for fundamental and applied research and for research training should be increased substantially. To this end, separate legislation creating the National Health Care Research Institute may be desirable, although the existing authority for NCHSR&D may be adequate.

Coordination: The realities of the situation are that coordination is a frustrating assignment and difficult to accomplish in the Federal government. Appropriate models exist for the kinds of Federal and departmental coordination we believe to be central to the entire health services R & D effort. What we need are one or two strong advocates who can give health services R & D the necessary leadership and see to it that the Federal government makes a coordinated and concerted effort to improve the country's health care system.

National Commission on Health Services: The need is great and the opportunity unique for a consortium of private foundations to make a substantial contribution to the American health care system. Open and dispassionate discussion of the issues in our pluralistic society should help to guide decision-making and to assure the prudent use of health services R & D in the public's interest.

APPENDIX A

Individuals Consulted by the Panel at its Meetings

Stuart Altman, Ph.D.	Deputy Assistant Secretary for Health Planning and Evaluation, Department of Health, Education, and Welfare
Colonel William S. Augerson	Military Assistant for Medical and Life Sciences, Office of the Director of Defense Research and Engineering, Department of Defense
Lewis M. Branscomb, Ph.D.	Director, National Bureau of Standards, Department of Commerce
J.H.U. Brown, Ph.D.	Interim Associate Deputy Administrator for Development, Health Services and Mental Health Administration
Howard R. Davis, Ph.D.	Chief, Mental Health Services Research and Development Branch, Division of Mental Health Services Programs, National Institute of Mental Health, Health Services and Mental Health Administration
James F. Dickson, M.D.	Program Director, Engineering in Biology and Medicine, National Institute of General Medical Sciences, National Institutes of Health
H. Bruce Dull, M.D.	Assistant Director, Epidemiological Intelligence Service, Center for Disease Control, Health Services and Mental Health Administration
Merlin K. DuVal, M.D.	Assistant Secretary for Health and Scientific Affairs, Department of Health, Education, and Welfare
Benny B. Hall	Deputy Administrator, Health Services and Mental Health Administration
Brig. General George J. Hayes	Principal Deputy Assistant Secretary of Defense (Health and Environment), Department of Defense
Emanuel Horowitz, Ph.D.	Deputy Director, Institute for Materials Research, National Bureau of Standards, Department of Commerce
Robert M. Krughoff, J.D.	Director, Office of Research and Development Planning, Office of the Assistant Secretary for Planning and Evaluation, Department of Health, Education, and Welfare
S. Ake Lindgren, M.D.	Deputy Chief Medical Officer and Director, Health Planning Department, Swedish Board of Health and Welfare, Stockholm
Harold Margulies, M.D.	Director, Regional Medical Programs Service, Health Services and Mental Health Administration
Gordon McLachlan	Secretary, Nuffield Provincial Hospitals Trust, London
A. Wendell Musser, M.D.	Assistant Chief Medical Director for Planning and Evaluation, Veterans Administration

Marc J. Musser, M.D.	Chief Medical Director, Veterans Administration
Dorothy P. Rice	Chief, Health Insurance Research Branch, Social Security Administration
Gerald R. Riso	Interim Deputy Administrator for Development, Health Services and Mental Health Administration
H. Rocke Robertson, M.D.	Leader, Health Sciences Study, Science Council of Canada, Ottawa
Joseph M. Rule, Ph.D.	Development Department, E. I. du Pont de Nemours, Inc., Wilmington
Paul J. Sanazaro, M.D.	Director, National Center for Health Services Research and Development, Health Services and Mental Health Administration
Carl A. Smith, M.D.	Associate Director for Health Affairs, Office of Economic Opportunity
DeWitt Stetten, Jr., M.D.	Director, National Institute of General Medical Sciences, National Institutes of Health
Milton Turen	Assistant Chief (Health and Medical), Office of Management and Budget
Robert van Hoek, M.D.	Interim Deputy Administrator for Health Services, Health Services and Mental Health Administration
Keith Weikel, Ph.D.	Director, Division of Health Evaluation, Office of the Assistant Secretary for Planning and Evaluation, Department of Health, Education, and Welfare
Howard West, M.P.H.	Director, Division of Health Insurance Studies, Social Security Administration
Vernon Wilson, M.D.	Administrator, Health Services and Mental Health Administration
Theodore D. Woolsey	Director, National Center for Health Statistics, Health Services and Mental Health Administration

Individuals Contributing Written Comments on Health Services R & D

Joel J. Alpert, M.D.	Director, Family Health Care Program, Children's Hospital Medical Center, Harvard University
Donald O. Anderson, M.D.	Professor of Health Care and Epidemiology, University of British Columbia
Odin W. Anderson, Ph.D.	Professor and Associate Director, Center for Health Administration Studies, University of Chicago
G. Octo Barnett, M.D.	Director, Laboratory of Computer Science, Massachusetts General Hospital

Lester P. Breslow, M.D.	Director, Center for Health Services Research and Development, University of California at Los Angeles
Gordon Chase	Administrator, Health Services Administration, City of New York
Rodney M. Coe, Ph.D.	Executive Director, Medical Care Research Center, Jewish Hospital, St. Louis
Morris F. Collen, M.D.	Director, Medical Methods Research, Permanente Medical Group, Oakland
Eugene A. Confrey, Ph.D.	Associate Director for Program Planning and Evaluation, Bureau of Health Manpower Education, National Institutes of Health
Sam A. Edwards, Ph.D.	Director, Health Services Research Center, Hospital Research and Educational Trust and Northwestern University
Jack Elinson, Ph.D.	Professor, Division of Sociomedical Sciences, School of Public Health and Administrative Medicine, Columbia University
Paul M. Elwood, Jr., M.D.	Executive Director, Institute for Interdisciplinary Studies, Minneapolis
Kenneth M. Endicott, M.D.	Director, Bureau of Health Manpower Education, National Institutes of Health
Martin S. Feldstein, Ph.D.	Professor of Economics, Harvard University
Merwyn R. Greenlick, Ph.D.	Director, Health Services Research Center, Kaiser Foundation Hospitals, Oakland
William J. Horvath, Ph.D.	Assistant Director, Mental Health Research Institute, University of Michigan
Sidney Katz, M.D.	Professor and Director, Office of Health Services Education and Research, Michigan State University
Maurice LeClair, M.D.	Deputy Minister of Welfare, Department of National Health and Welfare, Ottawa
Charles E. Lewis, M.D.	Professor and Head, Division of Health Administration, University of California at Los Angeles
Robert Q. Marston, M.D.	Director, National Institutes of Health
Walter J. McNerney	President, Blue Cross Association
Howard N. Newman, J.D.	Commissioner, Medical Services Administration, Social and Rehabilitation Service
George G. Reader, M.D.	Professor of Medicine, New York Hospital-Cornell Medical Center

Marshall A. Rockwell, M.D.	Health Research Program Manager, RAND Corporation
Milton I. Roemer, M.D.	Professor of Health Administration, University of California at Los Angeles
Irwin M. Rosenstock, Ph.D.	Professor of Public Health Administration, School of Public Health, University of Michigan
Edwin F. Rosinski	Vice Chancellor, University of California at San Francisco
Sam Shapiro	Director, Research and Statistics, Health Insurance Plan of Greater New York
Cecil G. Sheps, M.D.	Director, Health Services Research Center, University of North Carolina
Robert M. Sigmond, M.A.	Executive Vice President, Albert Einstein Medical Center, Philadelphia
George A. Silver, M.D.	Professor of Epidemiology and Public Health, Yale University
Rosemary A. Stevens, Ph.D.	Associate Professor of Epidemiology and Public Health, Yale University
Harry P. Sultz, D.D.S.	Professor and Director, Community Services Research and Development Program, State University of New York at Buffalo
Samuel J. Tibbitts	President, Lutheran Hospital Society of Southern California, Los Angeles
Trygve W. Tuve, Ph.D.	Associate Director for Manpower, National Institute of General Medical Sciences, National Institutes of Health
Vernon E. Weckwerth, Ph.D.	President, Minnesota Systems Research, Inc.
Burton A. Weisbrod, Ph.D.	Professor of Economics, University of Wisconsin
Norman A. Weissman, Ph.D.	Assistant to the Deputy Administrator, Health Services and Mental Health Administration
Samuel Wolfe, M.D., Dr.P.H.	Director, Center for Health Care Research, Meharry Medical College
Charles R. Wright, Ph.D.	Professor of Communications and Sociology, University of Pennsylvania
Alonzo S. Yerby, M.D., M.P.H.	Professor and Head, Department of Health Services Administration, School of Public Health, Harvard University

APPENDIX B

Selected References Consulted by the Panel

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APPENDIX C

Descriptive Classification of Health Services R & D

The field of health services R & D can be classified in different ways. The following arrangement, agreed upon by the staffs of the Office of Management and Budget and the Office of Science and Technology, identifies most of the important areas.

1. Concepts and analytic methods of health care services and systems, including:

   Ethical, legal, and political issues
   Human behavior in illness
   Social organization of medical care systems
   Cost-effectiveness analysis
   Simulation and modeling
   Economic analysis, econometrics
   Comparative studies, national and international
   Operations research methods
   Systems analysis methods
   Epidemiological methods
   Social analysis methods
   Health statistics
   Health intelligence systems

2. Organization and delivery of health services, including:

   Integration of health services
   Coordination of health services; mergers; shared support systems
   Regionalization of health services
   Polyclinics; hospital outpatient departments
   Ambulatory care facilities, offices, clinics
   Model health care organizations
   Home care services
   Emergency medical care services
   Health care systems
   Rehabilitation services

3. Health services planning, policies and strategies, including:

   Health policy formulation
   Authority, control and ownership; responsibility and accountability
   Health legislation; regulation
   Nationwide health care planning
   Mechanisms for effecting change in health services
   Control and regulation of health services

4. Development and use of health information systems, including:

   Hospital information systems
   Health management information systems
   Medical data systems
   Care process surveillance systems
   Health statistics
   Health costs and charges reporting systems
   Hospital admission/discharge and insurance claims reporting systems
   Patient record systems

5. Measuring and improving effectiveness of health services, including:

   Determining health care requirements and needs
   Public and professional responses to health services
   Efficiency of health services systems
   Social and economic impact of health services
   Patient acceptance, compliance and satisfaction

6. Quality assessment and evaluation of health services, including:

   Standards for health care: structure and process
   Indices of health service outputs
   Changes in status of health and health care
   Economic costs of disease
   Licensure and accreditation

7. Improving accessibility to and equalizing distribution and utilization of health care services, including:

   Utilization of health services
   Demand for health services
   Admission, discharge, transfer and referral policies
   Location of health care facilities
   Transportation to, from and within health care facilities and systems
   Impediments to receiving adequate health care
   Qualifications for receiving health care
   Communications systems

8. Improvements and innovations in health services facilities, including:

   Design
   Utilization and location of facilities
   New construction techniques
   Use of new materials
   Plant layout and work methods improvement

9. Improvements in health services manpower, including:

   Licensing and regulation of manpower
   Training, recruitment, and occupational upgrading
   Measuring and forecasting requirements for health personnel
   Use of paramedical and ancillary personnel
   Measurement of productivity and manpower trade-offs
   Health care teams and personnel configurations
   Distribution and utilization of personnel
   Factors affecting supply of health services manpower
   Mid-level health workers, pediatric nurse practitioners, midwives, helping sisters, feldschers, emergency care personnel
   Turnover and occupational persistence

10. Utilization of technology in health services, including:

Automated information systems
Automated clinical laboratory systems
Patient physiological monitoring
Automated patient interviewing and diagnostic systems
Medical data systems
Advanced management techniques
Manpower savings through automation
Standards for facilities, equipment and devices
Identification and aggregation of markets

11. Financing, costs, charges and incentives of health care services, including:

Cost reduction
Accounting methods
Cost containment
Cost trends
Prices for delivery of health services
Impact of actuarial practices
Health insurance plans
Methods of payment by consumer
Methods of payment for providers and health care personnel
Deductibles and co-insurance
Ownership of facilities, contractural arrangements
Capital formation, debt, equity
Profit and non-profit institutions and systems

APPENDIX D

Examples of Completed Health Services R & D

The Panel, with the assistance of some 40 investigators who were canvassed, identified representative examples of health services research that could potentially contribute to improvements in patient care or to improvements in the provision of health services. Descriptions of selected projects follow.

1. Case-Fatality in Teaching and Non-Teaching Hospitals

In an initial study, standardized case-fatality rates for several different conditions in teaching and non-teaching hospitals of the National Health Service in England and Wales, calculated for the period 1951-55, were compared. A second comparison was made for 1956-59. In each case, calculations were based upon data collected in the joint General Register Office-Ministry of Health national Hospital In-Patient Enquiry. Hospitals participating in the hospital discharge abstract system reported a random 10 percent sample of discharges; the proportion of beds included in the study increased from 79 percent of teaching hospital beds and 67 percent of non-teaching hospital beds in 1956 to 95 percent and 97 percent respectively by 1959.

Comparison indicated higher case-fatality rates from appendicitis, perforated peptic ulcers, hyperplasia of prostate, diabetic coma and other conditions in non-teaching hospitals than in teaching hospitals. Similar results were obtained in the second comparison, with little evidence that earlier differences had diminished, much less disappeared.

Two main lines of explanation were proposed. First, it is possible that the difference in case-fatality rates represented superior treatment in the teaching hospitals. Second, non-teaching hospital patients may have been socially or otherwise at an initial disadvantage. It had been already shown that, proportionate to the number of beds, teaching hospitals had more consultants and other staff. At the time of the final analysis, in 1959, little published evidence was available concerning the social differences among patients in the two types of hospitals, and further study in this area was indicated.

These pioneering studies illustrate the power of information about the use and end results of medical care institutions to suggest the nature and site of problems for more detailed study.

Lee JAH, Morrison SL, Morris JN: Fatality from three common surgical conditions in teaching and non-teaching hospitals. Lancet 2:785-790, 1957

Lipworth L, Lee JAH, Morris JN: Case-fatality in teaching and non-teaching hospitals 1956-59. Med Care 1:71-76, 1963

2. Prematurity and Perinatal Mortality: General Population vs. Prepaid Group Practice Population

After continued study of the differences in prematurity and perinatal mortality between patients enrolled in the Health Insurance Plan of Greater New York (HIP) and patients in the general population of New York City, an analysis based on a three-year experience, 1955-57, was conducted. Data indicated significantly lower prematurity and perinatal mortality rates in the population enrolled in HIP than in the total New York City population. The differences could not be explained by a more favorable occupational distribution among enrollees in HIP compared to the general population.

Further study is indicated on the measure of socioeconomic status, clarification of cultural and attitudinal attributes of population subgroups and their influences on health practices prior

2. (continued)

to and during pregnancy, and on the management of obstetrical care for patients of "private" physicians and "ward" cases.

This is the first well-designed study indicating the potential benefits of prepaid group practice for improving the quality of care.

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 48:170-187, 1958

Shapiro S, Jacobinzer H, Densen PM, Weiner L: 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 50:1304-1317, 1960

3. Hospital Beds for Mental Illness

Prediction of future needs for health services requires both cross-sectional estimates of current patterns and longitudinal descriptions of the past. Trends, their direction and rate of change may be identified, measured and related to scientific and technological developments as a basis for planning future services. The best way to do this is to define a population and observe it over time.

On April 1, 1961 a paper reporting the results of a study of mental hospital patients traced over five years supported the conclusion that mental hospital beds in England and Wales should be reduced from 3.3 to 1.8 per 1,000 population. This recommendation was based on a sample of patients first admitted to mental hospitals in England and Wales in 1954. Admissions, discharge, transfers and deaths of this group were followed and analyzed by age, sex, diagnosis, length of stay, readmission rate, and the numbers remaining in hospitals after various periods. Similar cohorts were started in 1955 and 1956 and the three cohorts were compared for two years to obtain the published projections. The impact of drug and community-based therapy on hospital use was measured with relative precision and made available promptly.

This study and its interpretation in relation to current developments in the drug and community-based therapy of mental illness was the basis for a public policy decision in the Hospital Plan for England and Wales of January 1962 (nine months after publication of the original article). This is an example of precise research, competently executed, clearly articulated and related to a specific health services problem. The savings to the country have been and will continue to be substantial and take full advantage of the biomedical research that preceded the health services research.

Tooth GC, Brooke E: Trends in the mental hospital population and their effect on future planning. Lancet 1:710-713, 1961

Ministry of Health: A Hospital Plan for England and Wales. London, Her Majesty's Stationery Office, Cmnd. 1604, 1962

4. Early Hospital Discharge in Obstetrics

Randomly selected control and experimental groups at Kings County Hospital in Brooklyn, New York, were discharged from hospital at different intervals post-delivery, and the difference in their respective experiences were compared. Mothers in the experimental group were discharged within 72 hours after delivery, while those in the control group were discharged five days after delivery.

4. (continued)

No basic statistical differences were shown in the health or wellbeing of the mothers who were discharged from the hospital early as compared to the controls. Mothers discharged earlier were less satisfied with the hospital stay and with general hospital care than those who stayed longer. Nevertheless, more than half the mothers were satisfied with their short stay. Although no statistically significant differences could be shown between the experimental and control groups, there did seem to be a consistent, although small, difference between the two groups. Almost all the mothers and babies of the longer-stay group did slightly better than the experimental group.

In addition, the short stay had some areas of jeopardy for the babies which should be recognized. In the early discharge group, it was possible that jaundice would not be recognized, unless daily visits had been made to the home during the first week after discharge by nurses with broad experience in obstetrics. Furthermore, because the early discharge babies were seen less often by the pediatrician, it was possible to dismiss babies with congenital defects without their being noticed.

Judging by the opinions expressed by patients, they usually preferred a hospital stay of three to four days, an interval midway between the periods employed for this controlled study. The evidence suggests that the substantial savings in costs for shorter hospital stays outweigh the slight subjective reduction in benefits experienced by the mothers. The babies' welfares could be protected by a responsible follow-up at home or in a clinic.

This study supported the decision to shorten hospital stays post-delivery from the earlier practice of ten days' stay to three or four, a practice that is now widely adopted.

Hellman LM, Kohl SG, Palmer J: Early hospital discharge in obstetrics. Lancet 1:227-232, 1962

5. Evaluation of Screening in the Early Detection of Disease

A related series of studies in the United Kingdom on the validity, therapeutic value, and cost-effectiveness of screening measures in the early detection of disease is a good example of health services research and development that has a direct bearing on health planning and policy decisions. Substantial resources would have to be diverted from other medical services in order to carry out many of these tests on a routine basis. Prior evaluation, therefore, is a matter of immediate practical concern to the administrators of the National Health Service, as well as to the medical profession generally.

The Department of Health and Social Security, the Medical Research Council, foundations, universities and the medical profession have all contributed to this research. About five years ago, one of the private foundations, the Nuffield Provincial Hospitals Trust, organized an expert working party to develop a scheme of evaluation and to review the accumulated evidence. The group selected ten screening procedures already widely in use for detecting urinary infections in pregnancy, cancer of the breast and cervix, deafness in childhood, diabetes mellitus, glaucoma (abnormal pressure in the eyes), iron deficiency anemia, genetic chemical abnormalities, tuberculosis of the lung, and RH blood factor disease of the newborn. Their approach is typical of the eclectic nature of health services research generally; it involved the synthesis of information from biomedical research, clinical practice, epidemiology, economics, technology, and sociology. The major issues examined were: Is the screening technique itself reliable? Does it pick up all those with the abnormality without including many who are not affected? Is the abnormality that it seeks to uncover one that can be effectively treated as a result of early detection and in the present state of knowledge about the natural history of the disease? Has a workable method been demonstrated to reach the population at risk and carry out the test? What are the benefits in relation to the costs?

5. (continued)

Very briefly, the working party concluded that the evidence was seriously deficient for six of the ten tests analyzed. Their findings were published in 1968 and have been widely read. They are supported by other evaluative studies of the periodic checkup and of multiple screening programs. The net effect has been to foster a more selective approach to the use of presymptomatic testing in the United Kingdom and to discourage the introduction of "multiphasic" screening centers until further evidence can be collected.

The timing of this research is worthy of comment. As the Nuffield expert working party pointed out in its report, it is important to initiate health care studies as soon as it appears that new knowledge may have general implications for the practice of medicine and the services provided; otherwise, public demand may make it impossible or unethical to conduct the necessary controlled trials.

Beck A: The Feasibility of Periodic Medical Examinations in General Practice. Assen, the Netherlands, Van Gorcum & Co., 1966

Nuffield Provincial Hospitals Trust: Screening in Medical Care. London, Oxford University Press, 1968

6. Level of Hospital Utilization and Selection of Patients in Finland

The regional hospital system in Finland, in which hospitals are normally jointly owned by groups of small municipalities ("communes"), enabled this analytical study of hospital utilization and of existing preferences in selecting patients to be conducted. The Kuopio Central Hospital District, chosen for analysis, had a population of 270,000 in 29 communes of different sizes in 1960. Among these there were no marked differences in general health or socioeconomic level, and the annual hospital admission rates ranged from 44 to 165 per 1,000 population. Basic materials for the study were the individual hospital discharge abstracts from each hospital in the district.

Lengths of hospital stay decreased as hospital admission rates for the populations of different communes increased. When the same relationship was examined for large hospital regions and the whole country, the opposite relationship was observed: higher hospital bed/population ratios were positively correlated with shorter lengths of stay. If the supply of beds is limited, only the most severe cases, which usually cannot be treated in a short time, are selected for admission. High utilization can be ascribed either to short-term "trivial" cases or to patients with chronic diseases.

Total hospital admission and bed day rates for different communes affected the relative amounts of hospital care given to various age groups. Growth in utilization had very little influence upon the hospitalization of children, but it correlated much more closely with the share of hospital treatment given to patients of working ages and was especially noticeable in the growth in the amount of care given aged people. Children had priority when hospital bed capacity was limited; the needs of aged people were met last.

Admissions were grouped according to diagnosis as urgent and non-urgent, and the selective influence of the total amount of hospital services used by these two groups was measured. The amount of care given to urgent cases was only very slightly dependent upon the total amount of services available or used. Growth in utilization was reflected mainly in the care of non-urgent patients. A similar relationship was found when different clinical entities or disease groups were studied. Acute diseases, especially those markedly affecting the working capacity of the patient, were preferred to the chronic illnesses, particularly those in the elderly.

6. (continued)

For some diseases there seemed to be a limit which was not exceeded by the need for treatment, however great the available bed capacity was. On the other hand, there were diseases or other conditions for which the demand did not show any signs of coming into balance with available beds. The slogan "the more beds--the more needs" seemed true with regard to the needs of non-urgent cases, elderly patients, and chronic patients. It does not apply to needs saturated at a known level of utilization.

An operational model of hospital utilization based on this kind of approach, and the availability of a hospital discharge abstract system, can be useful in planning, particularly in estimating the effect of increased hospital capacity on the case load. Using the model in the opposite direction, one can compare the utilization and saturation levels and thresholds reached or not reached in different geographic regions and thus obtain some indication of the real needs of the population.

This study established the point that, at least for some health problems, there is a saturation point for beds beyond which further beds are unnecessary and could be wasteful.

Vaananen IS, Haro AS, Vauhkonen O, Mattila A: The level of hospital utilization and the selection of patients in the Finnish regional hospital system. Med Care 5:279-293, 1967

7. Medical Care Price Index: A Study

This study compared estimates of a medical care price index based on average costs for the treatment of specific illnesses with those generated by the Bureau of Labor Statistics (BLS) medical care price index. The latter is based on prices of selected items of medical care and holds quality and quantity of services constant. The experimental price index was calculated for 1951-52 and again for 1954-65, using patient and physician data from the population of the Palo Alto Medical Clinic. The five specific illnesses used in developing the index were acute appendicitis, maternity care, otitis media in children, fracture of the forearm in children, and cancer of the breast.

The experimental price index recorded increases substantially greater than those indicated by the BLS price index. Five reasons were offered for the disparity:

a. The experimental index reflected changes in treatment of the specific illnesses; the BLS index held these changes constant.
b. The experimental cost data included individually priced items, such as ancillary services, the prices of which increased more sharply than others; until 1963, the BLS index used percentage estimates for such services based on overall increases.
c. The experimental index data incorporated the overall increases in fees and average costs of treatment; the BLS data did not allow such inclusion.
d. The experimental index reflected increases in physician specialization (estimating a doubling in fees for procedures which became the prerogative of specialists); the BLS index held this constant.
e. The experimental index reflected a to-be-expected increase in prices for the Palo Alto area, which doubled in population and became part of metropolitan San Francisco during the fourteen-year study.

Accepting what the BLS index attempted to measure, the study concluded it underestimated the actual costs of medical care over the fourteen-year period. Future BLS indices were expected to be more accurate, since they now include directly priced ancillary services and the differences in average and customary physician fees have greatly decreased. However, on the basis of the experience with the experimental index, the author argued that the BLS index must take into account changes in quality, as indicated by changes in treatment and increases

7. (continued)

in specialization. The BLS index would then reflect the full "actual" cost of care to the patient, who is severely restricted in shopping for care and must buy whatever is the current "quality" medical care.

Scitovsky AA: Costs of treatment of selected illnesses, 1951-65. Am Econ Rev 57:1182-1195, 1967

8. Evaluation of the Nurse's Role in Ambulatory Care

To evaluate a more active role for nurses in ambulatory patient care, a project was initiated at the University of Kansas in which patients from a medical clinic were divided randomly into two groups, after initial testing and evaluation. One group received virtually all its medical care from a nurse, with back-up support from a physician. Most of the clinic patients were women over fifty years of age and were from the lower socioeconomic levels of society. The majority of patients held rather strong opinions about having physicians perform most of the functions associated with medical care. A significant percentage of them had negative attitudes toward the setting of care. In general, these 66 patients had many complaints and made frequent use of clinic facilities.

All patients were re-evaluated one year later. Retesting of the control group revealed no changes. In the experimental group several significant changes were evident. The nurse was accepted as a primary source of care. There was increased adherence to appointment schedules and better utilization of time, as demonstrated by time and motion studies. The overall cost of the program on a dollar basis was lower. In addition, patients in the experimental group exhibited a decreased frequency of complaining and less tendency to call upon physicians for minor complaints. The experimental group shifted their preferences in favor of the nurse as a provider of many of the services formerly reserved for the physician. The quality of care and patients' satisfactions with care were higher in the experimental group.

Thus, although certain stereotyped roles exist for physicians and nurses within the minds of patients, these can be changed by experience. The fact that change is possible, as indicated by the results described above, suggests that the needs and desires of patients for certain types of therapeutic relations are greater than their needs to maintain pre-existing attitudes toward specific roles. There are significant problems in initiating interprofessional programs of patient care which can have important effects on the success of attempts to expand the role of the nurse in ambulatory care. However, when the primary focus was placed upon the needs of patients, rather than the needs and images of professionals, it apparently became easier to accomplish comprehensive care with more clearly defined guidelines for more efficient use of professional manpower.

This study supports the position that primary care provided by nurses is acceptable to at least some patients, and can be of good quality.

Lewis CE, Resnick BA: Nurse clinics and progressive ambulatory patient care. N Engl J Med 277:1236-1241, 1967

9. Children, Stress and Hospitalization

Children admitted to a hospital for tonsillectomy, with their mothers, were randomized into experimental and control groups. The experimental group members were admitted to the hospital by a specially trained nurse who attempted to create an atmosphere which would encourage the mothers to talk about their fears, anxieties and special problems, and to ask any and all questions on their minds. The information given to the mothers tried to paint an accurate picture of the reality of the situation. Mothers were told what routine events to expect and when they were likely to occur, including the actual time schedule for the operation.

9. (continued)

The investigators found that the emotional support reduced the mothers' stress and changed their definition of the hospital situation, which in turn had a beneficial effect on their children. Children in the experimental group experienced smaller changes in blood pressure, temperature and other physiological measures; they were less likely to suffer from postoperative vomiting and made a better adaptation to the hospital; and they made a more rapid recovery following hospitalization, displaying less fears, less crying, and less disturbed sleep than children in the control group.

This and related studies showed that a little sympathy, support and instruction can have great benefits. More frequently than not, those who endorse the idea that the doctor should provide sympathy and support to the patient do so on the belief that this is a noble and human thing to do. It is rarely appreciated, however, that establishing relationships with patients facilitates the informational process between doctor and patient and contributes in an important way to the management of the patient and his progress toward recovery.

Skipper JK Jr, Leonard RC: Children, stress, and hospitalization: A field experiment. J Health Social Behav 9:275-287, 1968

10. Evaluation of a Comprehensive Pediatric Care Program

In 1964, a three-year study was begun at Children's Hospital Medical Center in Boston, designed to evaluate the effect of a comprehensive, family-oriented pediatric care program on variables such as morbidity, utilization patterns, costs and patient attitudes and satisfactions. The evaluation was based on a carefully designed study in which matched experimental and control groups were measured before, during and after the experiment with respect to these variables; the experimental group families received all their pediatric care in the comprehensive program, while control group families continued to obtain pediatric care from various facilities which these low-income families used before 1964. Results have been published on utilization, patient attitudes and satisfaction.

The utilization data suggest that the families receiving comprehensive care had significantly fewer hospitalizations, fewer operations, more physician visits for health supervision, and fewer physician visits for illness, when compared with the control families. There were no changes among the mothers in such general attitudes as alienation, acceptance of the maternal role, and views on preventive health practices. Increased satisfaction with pediatric care delivered and increased preference for a primary care physician in pediatric problems was observed for the experimental group. These changes were most striking in the area of provision of pediatric care; few group members carried over these attitudinal changes and preferences to adult health care. This suggested that there will only be a major impact on the fragmented medical care of the poor if there are major changes in the services offered.

This study concerns one model of care. Its results indicate the need for greater efforts at evaluation of other proposed and working models of care.

Alpert JJ, Heagarty MC, Robertson L, et al: Effective use of comprehensive pediatric care: Utilization of health resources. Am J Dis Child 116:529-533, 1968

Alpert JJ, Kosa J, Haggerty RJ, et al: Attitudes and satisfactions of low income families receiving comprehensive pediatric care. Am J Public Health 60:499-506, 1970

11. Variations in the Incidence of Surgery

Analysis of records of the Kansas Blue Cross Association in 1965 showed three- to four-fold variations in regional rates for the performance of six common surgical procedures--

11. (continued)

tonsillectomies, appendectomies, hernia repairs, hemorrhoidectomies, cholecystectomies, and varicose vein operations. These variations characterized not only tonsillectomy, often an elective procedure, but also procedures with more definite indications for surgical intervention, such as appendectomy and herniorraphy.

The reasons for the three- to four-fold variations in common surgical procedures were difficult to explain on the basis of differences in the prevalence or incidence of disease in the population or their illness behavior. Rather, the numbers of hospital beds, board certified surgeons, and other physicians who perform surgery were found to be significant predictors of the incidence of surgery.

The author offered an interpretation of the results as supporting a medical variation of Parkinson's Law: admissions of patients for surgery expand to fill available beds, operating suites and surgeons' time. He pointed out the necessity of considering the costs of this surgery for both the services and the facilities used, and the need for further inquiries.

Lewis CE: Variations in the incidence of surgery. N Engl J Med 281:880-884, 1969

12. Surgeons and Operations: The United States and the United Kingdom Compared

The shortage of physicians' services in the United States has many causes, of which the inefficient use of the physicians' time and inequities in their geographical distribution may play greater roles than any alleged deficiency in their actual numbers. Bunker's study investigated the hypothesis that an additional cause of this shortage may be the maldistribution of physicians among the medical specialties, particularly in surgery.

In 1970, there were twice as many surgeons in proportion to population in the United States as in England and Wales, and they performed twice as many operations. Fee-for-service, solo practice and a more aggressive therapeutic approach appeared to contribute to the greater number of operations in the United States. More frequent use of consultations, closely regulated and standardized surgical practices, and restrictions in facilities and numbers of surgeons appeared to contribute to the lower rates for England and Wales.

Bunker suggested that indications for surgery were not sufficiently precise to allow determination of whether American surgeons operated too often or the English and Welsh too infrequently. He concluded that determination of the need for surgical manpower requires better information on how much operative treatment the public's health requires, and further must take into account the total medical manpower needs of the country.

Bunker JP: Surgical manpower: A comparison of operations and surgeons in the United States and in England and Wales. N Engl J Med 282:135-143, 1970

13. An Information System for Monitoring Payments and Use of Services

The impact of the introduction of utilization charges (co-payments) for physician visits under a provincial health insurance plan and the changes in fee schedules or levels of reimbursement can be assessed from a well-designed information system. The system based on the claims forms used by the Medical Care Insurance Commission of Saskatchewan is capable of producing the following kind of table relating to the use of physician services by the great majority of the population of that province.

13. (continued)

ANALYSIS OF PER CENT CHANGE IN ANNUAL GROSS PAYMENTS

Year	Gross Payments (000's) for Medical Services	Per Cent Change Due to:							Total Per Cent Change
		Change in Population	Addition of New Types of Beneficiaries	Increase in Fees	Utilization Fees	Change in Type of Insured Service	Change in Claims Inventory	Change in Per Capita Utilization	
1963.....	$18,329	—	—	—	—	—	—	—	—
1964.....	20,439	1.92	—	—	—	4.16	−0.22	5.75	**11.61**
1965.....	20,105	0.95	—	—	—	−0.67	−4.05	2.43	**−1.34**
1966.....	22,207	0.74	3.70	—	—	−1.45	2.62	4.52	**10.13**
1967.....	23,384	1.13	1.77	0.48	—	—	−1.77	3.69	**5.30**
1968.....	24,077	0.30	0.17	9.74	−7.17	1.95	1.04	−3.07	**2.96**
1969.....	27,388	0.07	5.23	12.11	−5.57	2.88	−1.36	0.39	**13.75**
1970.....	30,554	−1.70	0.60	2.43	—	—	1.32	8.91	**11.56**
Average Annual Rate of Change 1963-70.....		0.49	1.64	3.54	−1.82	0.98	−0.35	3.23	**7.71**

Gross Payments for Medical Services:
Payments made by M.C.I.C. for medical services in each of the calendar years indicated.

Change in Population:
Increases or decreases in the number of persons covered by the Plan, not including new types of beneficiaries indicated in (3) below.

Addition of New Types of Beneficiaries:
Groups of persons added to the covered population,
(a) Saskatchewan Assistance Plan recipients—April 1, 1966
(b) War Veterans Allowance Recipients—July 1, 1968
(c) Most Indians living on reserves—January 1, 1969
(d) M.C.I.C. acts as agent for services provided to beneficiaries of the Psychiatric Services Branch. Neither payments or beneficiaries are included in this table.

Increase in Fees:
(a) From November 1, 1967 to July 31, 1968, the basis of payment for visit services was increased from 85% to 95% of the payment schedule. Some revision was also made with respect to pathology, radiology and anaesthesia services.
(b) A new payment schedule was introduced on August 1, 1968 and payments were based on 85% of that schedule until August 1, 1970 when the rate for visit services was increased to 100%.

Utilization Fees:
The amount payable by the Commission was reduced due to utilization fees introduced April 1, 1968 of $1.50 for office visits and $2.00 for home and emergency visits.

Change in Type of Insured Service:
(a) Pathology and Diagnostic radiology payments began on June 24, 1963
(b) Physiotherapy and mileage became disinsured effective July 1, 1965 but M.C.I.C. began to pay for non-emergency psychiatric care by out-of-province physicians.
(c) Refractions by physicians became insured on July 1, 1968 and refractions by Optometrists were insured on September 1, 1968.

Change in Claims Inventory:
Increases or decreases in dollar value of claims on hand waiting to be processed compared to the previous year.

Change in Per Capita Utilization:
The change in the number of services provided per beneficiary.

Total Per Cent Change:
Per cent change in the gross costs of medical services.

The data suggest that the introduction of the utilization fee in 1968 reversed a rather steady annual increase in utilization until 1970. Increases in unemployment and in the number of doctors in the province may have accounted for the change in that year. Increases in fees seem to have accounted for the majority of the total change in gross annual payments in 1968 and 1969.

Medical Care Insurance Commission of Saskatchewan: Annual Report, 1970, p. 23

14. Reimbursing Hospitals at Inclusive Rates

A pressing current problem of the American health care system is the cost of hospital services, which has been rising at the rate of 13 percent per year. One cause is the complexity and scope of the paper work involved in hospital administration. Much of that complexity may be attributed to the insurance claims function.

14. (continued)

Most hospitals use an average billing rate for some charges--room, board, general nursing, and certain other services--but the majority of ancillary services are billed "a la carte" as individual line items. An alternative is a method of billing in which all services are included in an inclusive average charge. While the possible bases for charging under an all-inclusive rate system are varied, the critical feature of any such system is that, with the exception of accommodations, the patient's charge is independent of his utilization of particular services.

A study was performed under contract with the National Center for Health Services Research and Development to ascertain whether substantial savings could be obtained by extending the averaging procedure to include all services provided by hospitals to patients. Under the traditional itemized billing concept, an average of 14 ancillary charges per patient per day must be processed; about 10 million such charge slips are generated each day in the United States. An inclusive rate by definition would appear to eliminate a significant portion of this administrative work and streamline the billing system.

A systems engineering analysis of the charging and billing functions in seven Massachusetts hospitals using the traditional "a la carte" charging procedures was conducted by the Division of Systems Engineering of the Massachusetts Hospital Association. They determined the work elements which would no longer be necessary following a conversion to inclusive charging, and computed the resulting savings. To determine the feasibility of widespread implementation of inclusive rates, an extensive program of research and field investigation was undertaken by the study group.

The study indicated that substantial savings can be achieved through use of the inclusive rate. The projected administrative cost reductions were approximately 0.5 percent of total hospital operating costs. On a national basis, the estimated annual savings would have been $83 million for 1969.

It was also determined that hospital receivables could be reduced under inclusive charging, by facilitating presentation of the patient's bill on the day of discharge, and eliminating the waiting period for late charge slips. Such savings in interest totaled 0.2 percent of total hospital operating costs, or an additional savings of $33 million for 1969.

The results of the survey indicated that there were no insuperable barriers to widespread implementation of inclusive charging. Therefore, the study group recommended to hospitals and public and private third party payers that this method of reimbursement be adopted universally.

Report of Hospital Inclusive Rates; A Report Prepared for the National Health Services Research and Development Center. The Boston Consulting Group, 1970

15. Computer-Assisted Electrocardiographic Interpretation

The electrocardiogram (EKG) is the single most useful and widespread noninvasive technique for evaluating heart disease. There are 50 million EKG's taken annually in the United States, with an annual increase of about 10 percent. The annual cost is $1 billion using 280 man-years of physician time, 1,100 man-years of EKG technician time and 700 man-years of secretarial time. A $4 million, 40 man-year effort by the Heart Disease Control Program of the National Center for Disease Control developed a system that could reduce the cost in money and manpower and improve accuracy and reliability in the reporting of EKG's. The system was complex and early attempts to replicate it failed.

A recent attempt to introduce a less complex and more accessible centralized system in Denver suggests that economies of scale might eventually justify the current Federal subsidy

15. (continued)

being provided by a contract. At present the Community Electrocardiographic Interpretation Service is reported to be processing about 110 EKG's daily. The projected volumes required to support the computer charges are shown in the following table.

Computer Costs vs. System Utilization
(Denver EKG Project)

Computer Center Charge	Volume of EKGs/Year Needed to Recover Costs
$2.00	180,000 (579/day)
$3.00	130,000 (353/day)
$4.00	85,000 (254/day)
$5.00	70,000 (198/day)
$6.00	50,000 (163/day)

In Denver approximately 120,000 EKG's were taken in 1969. Real savings are only likely to be experienced when as many as two-thirds of the Denver EKG's are handled by the new centralized system.

These relationships indicate the importance of health care services aggregated into systems that provide the volume necessary to justify the costs of health services R & D. Important savings are unlikely to be realized until large-scale systems evolve.

Demonstration of a Computer-Assisted Electrocardiographic Interpretation System. Informal Progress Report on Contract HSM 110-69-414 prepared by the Community Electrocardiographic Interpretation Service, May 1971

Health Care Technology: An Evaluative Report. Prepared for the Office of Science and Technology by the National Center for Health Services Research and Development, December 1970

16. Evaluation of Computer Development in Medicine

Enthusiasm for the transfer of computer applications found useful in business and industry, particularly the aerospace industry, to health services, is not always matched by sound judgment with respect to practical problems and priorities.

In January 1969 the Nuffield Provincial Hospitals Trust commissioned a survey of the current uses of computers in medicine in Scotland, an examination of applications that would merit priority in development over the succeeding five years, and their costs. The incisive report, published in 1970, considered such complex issues as: extent of centralization of processing, specific applications, use of integrated health records, manufacturers' equipment proposals, and type of organization and staffing required.

State of the art, economies in the capture of data, contributions to patient care, acceptability, feasibility, potential impact on health care costs and capacity to influence future developments favor applications to hospital and patient management data using batch processing. It should be noted, however, that the commission's inquiries rarely produced definite statements of economic benefits to be achieved from particular applications.

This succinct yet exhaustive analysis concluded that initial application should be concerned with patient administration and the accurate recording of admissions, discharges, transfers, operations, diagnoses, treatments and tests. Data currently collected in the Scottish Hospital

16. (continued)

Discharge Abstract Form were seen as the logical point of departure. Later applications were proposed for selective hospital service departments, bed allocation plans, patient follow-up and drug administration. The potential savings in costs and efficiency, given the present state of the art and the organization of health services, is such that further experimentation is required prior to applications to fields such as nursing and staff scheduling, menu planning and diagnosis.

Because of its thoroughness and timeliness, the report is believed to have had a substantial influence on public policy in this field in the United Kingdom.

Ockenden JM, Bodenham KE: Focus on Medical Computer Development: A Study of the Scottish Scene by Scientific Controls Systems, Ltd. London, Oxford University Press, 1970

17. Effects of Medicaid on the Medical Care Pattern of Children

Actual changes in the medical care pattern of children after enrollment in the New York Medicaid program were compared with the declared intentions of the legislators to reduce or eliminate differentials regarding access to, availability of and quality of medical care due to socioeconomic standing. The question studied was, can such goals be reached by a simple reduction of financial barriers?

The program did enroll over 90 percent of the eligible child population, but this led to only minor changes in source, frequency and reason for care. Poor families still received less care, continued to depend on public clinics and had a higher proportion of illness-related rather than preventive medical contacts. This was exactly what the consumers in earlier interviews had anticipated and what most professionals would have predicted. Of special importance was the administrative decision, after two years of operation, to cut fees for private physicians but to honor full charges from clinics. Thus the better financing of the care in the public sector led to a solidification of the two-class system of care.

In addition to the findings which have important policy implications, the study illustrated the importance and possibility for a research team to survey continuously a local health care system and evaluate the effects of new legislative programs. Several surveys by team members from the Rochester Child Health Studies were analyzed for this evaluation of the Medicaid effects. The 1970 census summary tapes were used to provide eligibility estimates. The cooperation of local Medicaid administrators was essential.

Roghmann KJ, Haggerty RJ, Lorenz R: Anticipated and actual effects of Medicaid on the medical care pattern of children. N Engl J Med 285:1053-1057, 1971

18. Acute Myocardial Infarction: Home and Hospital Treatment

A cooperative study of 1,203 episodes of acute myocardial infarction in men under 70 years of age, living in four areas of southwestern England, was recently completed. The mortality at 28 days was 15 percent. This preliminary report compared home care by the family doctor and hospital treatment, initially in an intensive care unit; 343 cases were randomly allocated to home or hospital care. (Of the remaining 760 cases, 654 were electively treated in hospital, and 106 were electively treated at home.)

The randomized groups did not differ significantly in composition with respect to age; past history of angina, infarction or hypertension; or hypotension when first examined. The mortality rates of the random groups were similar for home and hospital treatment. The group sent electively to hospital contained a higher proportion of initially hypotensive patients whose prognosis was bad wherever treated; those who were not hypotensive fared rather worse in hospital.

18. (continued)

These preliminary results indicated that for some patients with acute myocardial infarction seen by their general practitioner, home care was ethically justified. The broader issue for further consideration is the need for general admission to hospital, as opposed to home care, whatever the disease entity under consideration.

This controlled clinical trial demonstrates the feasibility of doing such a study under normal conditions of clinical practice and illustrates the need for assessing the relative costs and benefits of providing medical care in different settings, in this instance home versus hospital intensive care units, before policy decisions are made.

Mather HG et al: Acute myocardial infarction: Home and hospital treatment. British Med I 3:334-338, 1971

19. Case-Fatality of Hyperplasia of the Prostate: Teaching and Non-Teaching Hospitals Compared

Summary data on hospital discharges has shown that mortality from hyperplasia of the prostate, as in several other common conditions, is higher in the non-teaching hospitals than in the teaching hospitals of England and Wales.

The patients in the study were 932 men with simple hyperplasia of the prostate consecutively admitted to two teaching and three non-teaching hospitals in the same region between March 1964 and June 1969. There were five deaths among 556 men admitted from the waiting list, and negligible variation among the hospitals. Among the 376 unplanned emergency admissions there were 35 deaths, 26 of them in 71 men who did not have prostatectomy. Unplanned admissions, especially those not operated on, were older than the rest and mostly in acute retention; many also had cardiovascular and other diseases. Seventy-eight percent of the admissions to two of the regional non-teaching hospitals were unplanned; the operation-rate for these men was generally low and case-fatality rate was 14 percent. In contrast, only 22 percent of the admissions to the two teaching hospitals were unplanned, nearly every case was operated on, and the case-fatality rate was 4.3 percent. The two non-teaching hospitals with their relatively small resources were carrying more than their share of the most difficult cases.

On the basis of these data, the study concluded that a national survey to assess the treatment of hyperplasia of the prostate was indicated. The study also demonstrates the importance of adequate information about the workings of the health services system and the need for regular reporting and analysis of data on all hospital discharges.

Ashley JSA, Howlett A, Morris JN: Case-fatality of hyperplasia of the prostate in two teaching and three regional-board hospitals. Lancet 2:1308-1311, 1971

20. Treatment of Varicose Veins

A variation in method of medical treatment may result in substantial savings in terms of hospital resources and of time that a patient is away from his work.

A number of medical conditions have been studied by the Department of Health and Social Security in England as part of its program for health services R & D. They were chosen because they are large utilizers of hospital resources and because the opportunities for innovation in their medical management presented themselves. One such condition was varicose veins.

Varicose veins can be treated either by inpatient surgery or by an outpatient technique involving injection of fluid into the affected veins. In 1965, the treatment of varicose veins in England was responsible for 52,000 hospital admissions.

20. (continued)

The subject of varicose veins was studied from several aspects in controlled clinical trials by research teams in Wales and London. The study indicated that:

a. the results of treatment by surgery and by injection-compression methods were comparable in terms of their medical outcomes;

b. the cost of inpatient surgery was four times higher than the cost of the injection-compression method in a hospital outpatient department;

c. the number of days lost from work before, during, and after treatment was significantly less for the injection-compression patients than for those who received surgery (approximately 8 days compared to 31); and

d. the majority of patients treated for varicose veins expressed a preference for the injection-compression technique, assuming the end results were equally satisfactory.

In conclusion, this comprehensive study of two alternative methods of treatment for varicose veins indicated that the injection-compression method would have a significant advantage over the more commonly used inpatient surgical technique. It seems probable it will be advocated as the treatment of choice by the National Health Service of England and Wales.

Ford FR: Innovations in care: Treatment of hernia and varicose veins, chap. 12, Portfolio for Health, The Role and Programme of the Department of Health and Social Security in Health Services Research. London, Oxford University Press, 1971

APPENDIX E

Examples of Current Health Services R & D

The following brief abstracts of current health services R & D were selected from the reports of granting agencies in Canada, Sweden, the United Kingdom and the United States to illustrate the breadth of the problems under investigation.

1. Concepts and analytic methods of health care services and systems:

Econometric Model of the Health Care Sector — Martin S. Feldstein, Ph.D., Harvard University

Development of an operational, statistically estimated model of the health care sector which can provide a base for policy discussion and a framework for teaching and further research.

Operations Research in Health Services — J. Stringer, M.A., Institute for Operational Research, London

Among other projects, operational research studies to develop methods and techniques for comprehensive planning of health services for any given area.

Measures of Effectiveness of Health Services — D. S. Sackett, M.D., McMaster University

Development and testing, using operations research techniques, of a method for selecting the optimum set of health services programs in terms of cost and effectiveness. Ultimately, to be used by decision/policy-makers for allocation of scarce resources.

2. Organization and delivery of health services:

Assessment of New and Alternative Forms of Legal Organization for the Administration and Delivery of Health Services — William J. Curran, J.D., S.M.Hyg., Harvard University

Development of a national classification of alternative legal structures for the administration and delivery of health services in municipal hospitals, group practices, and other large health facilities. To include all forms of legal organizations which may offer alternatives, adaptations, or new ideas for health services programs.

Coordination of Ambulance Services with Hospital Emergency Department in Metropolitan Toronto — Ian H. Mitchell, University of Toronto

To indicate coordination required between ambulances and hospitals, with particular attention to communications and readiness, physical equipment and layout, training and standards, and rational dispatching.

Public Acceptance of Prepaid Group Practice — Charles A. Metzner, Ph.D., University of Michigan

Explanation of differential public acceptance of prepaid group practice medical care plans in terms of various characteristics of the plans; developing procedures to study group attributes dictating choice of plans; and determining impact of demographic variables on demand.

3. Health services planning, policies, and strategies:

Basic Guidelines for the Scope and Design of a Health Services Plan — Swedish Planning and Rationalization Institute of Health and Social Services, Stockholm

Development of a proposed planning system for county council activity, and a model program for health and medical planning over a 15-year period, identifying necessary input information, formulation of aims, and presentation of results.

Up-dating Master Plan of Hospital Facilities Including the Development of a Regional System of Hospital Care — Hospital Planning Unit, Ontario Hospital Service Commission

Development of a balanced and integrated system of hospitals and related facilities in Ontario, using statistical analysis of patient records and factors affecting hospital utilization and medical referral patterns.

4. Development and use of health information systems:

Automation of the Problem-Oriented Medical Record — Lawrence L. Weed, M.D., University of Vermont

Automation of a previously designed record system, in order to: a) develop medical record auditing procedures; b) facilitate assessment of patient management; c) build data base of problem-oriented medical information; d) aid training and education of staff and students; and e) adapt to hospital information system to enable unit cost accounting and cost-benefit analysis. Designed for eventual expansion to a regional information system.

Optimized Care Planning and Delivery Through a Patient-Oriented Information System — William A. Spencer, M.D., Texas Institute for Rehabilitation and Research

Resource utilization in a rehabilitation hospital is optimized and individualized through an integrated computer-based information system that monitors and tracks individual plans of care, admissions, patient status, resource usage, care transactions and patient outcome indicators. Responsive alterations in the care process according to patient needs are made possible by interaction between personnel and the information system. The data base affords information for institutional management maximizing resource deployment. Eventually development into an auto-evaluating care process model may be possible.

Study of Hospital Discharge Abstract Systems — Jane H. Murnaghan and Kerr L. White, M.D., Johns Hopkins University

Review and critical evaluation of major hospital discharge abstract systems, in operation or development, for the United States, Canada, and European countries. Basic data set identified, as well as areas for research and development, and prospects for implementation of coordinated abstract systems responsive to wide variety of users.

5. Measuring and improving effectiveness of health services:

Evaluation of Nurse Practitioners in Health Care — S. R. Burnip, M.D., Kaiser Foundation Research Institute, Oakland

Controlled study to evaluate the effectiveness of pediatric nurse practitioners in a large pediatric group practice, to study their impact upon other health care providers in the group, and their own job satisfaction and changing relationships with patients.

6. Quality assessment and evaluation of health services:

Medical Audit in Hospitals — Gilbert Blain, M.D., University of Montreal

To show that it is possible to estimate the value of professional activity of doctors and the quality of care they provide to hospital patients; drawing upon PAS and MAP experiments in the United States and similar experiments in Montreal.

Study of Hospital Discharge Records — David Hewitt, M.A., University of Toronto

Evaluation and development of the potential of routinely compiled hospital records for quality control and for epidemiological research purposes.

7. Improving accessibility to and equalizing distribution and utilization of health care services:

Analysis of Hospital Procedures Affecting Utilization of Services — Michael G. Saunders, M.D., Winnepeg General Hospital

Examination of hospital factors which might contribute to undue patient stay with special emphasis on laboratory processing, weekend effects, and methods of producing mathematical model of patient stay.

Economic Determinants of Geographical Distribution of Physicians — Jawed Aziz, Senior Research Economist, Health Resources Directorate, Department of National Health and Welfare, Ottawa

Measurement of influence of economic and other factors on the distribution of physicians; results will aid in policy development toward

(continued)
equitable distribution, and will point out areas for further research.

Urban Patterns of Utilization of Health Services — Edward W. Hassinger, Ph.D., University of Missouri

Determination of factors related to the decisions of urban families concerning utilization of health care services from medical and other health practitioners, recognizing that access to widely available services may be curtailed by structure. (Follows an earlier study on rural and small town utilization patterns.)

8. Improvements and innovations in health services facilities:

Experimental Construction--Children Outpatient Modules — Robert E. Cooke, M.D., Johns Hopkins University

Uses two forms of experimental construction (a multi-station clinic through which the patients move; and the more traditional series of individual physicians' offices, in which service is brought to the patient) as dependent variables in a study of efficient and acceptable outpatient care to disadvantaged children.

Model Surgical Complex Demonstrating Integrated Care — Walter Bornemeier, M.D., Illinois Masonic Hospital

Construction of model surgical complex, architecturally designed to demonstrate integrated care via physical interrelation of surgical suite, pre- and post-operative facilities, and an intensive care unit. Expectations: to improve bed utilization; to design and develop more economic and efficient systems of supply and waste dispersal.

9. Improvements in health services manpower:

Projection of Manpower in the Health Industry in Quebec — Richard Beland and Thomas J. Boudreau, University of Sherbrooke

Prediction of manpower requirements of the health sector, especially of hospitals, by professional category; using population forecasts, morbidity rates, data on hospital stay, and other functions which depend on type and size of hospital. (Similar projects in most other Canadian provinces.)

The Practicing Physician and Allied Health Personnel--A Feasibility Study of the Team Approach in the Delivery of Personal Health Care — Stanley Greenhill, M.D., University of Alberta

Determination, by time study of general practitioners, of most effective use of health care personnel; what medical problems and amount of time and responsibility can be delegated to them, while maintaining patient satisfaction and enhancing quality of care.

Training in Health Services Research — Robert C. Hardin, M.D., University of Iowa

Development, organization and staffing of course curricula to prepare doctoral students in economics and in graduate programs in health and hospital administration to undertake substantive individual research in health care delivery.

10. Utilization of technology in health services:

Automation of Cervical Screening — O.A.N. Husain, M.D., St. Mary Abbots Hospital, London

Evaluation of prototype equipment as a possible means of automatically scanning and classifying cervical smears.

Evaluation of Medical EDP Systems — Swedish Planning and Rationalization Institute of Health and Social Services, Stockholm

Analysis of results of developments in electronic data processing systems, with particular emphasis on those suitable for wide-scale introduction into routine work in the near future.

Hospital Communications and Laboratory Data Handling — Seymour Werthamer, M.D., Methodist Hospital of Brooklyn

Development of an inexpensive, on-line computer system to facilitate rapid and accurate ordering, performing, reporting and retrieval of clinical laboratory tests in small hospitals.

11. Financing, costs, charges and incentives of health care services:

Average Cost Behavior in a General Hospital — Robert E. Kuenne, Ph.D., Princeton University

To devise methods and analyze data that will make possible better cost estimates and thus more efficient hospital management. By fitting theoretical economic functions to hospital statistical data, relevant cost functions will be estimated to determine price for each "final output".

Exploratory Study of Utilization (Co-insurance) Fees in a Saskatchewan Health Center — B. L. Marshall, University of Saskatchewan

To investigate and determine the influence utilization fees exert on physician behavior; particularly, if physicians take into consideration and make exceptions for such factors as age, type of illness, number of visits, etc., when levying the fee, when the Medical Care Insurance Act does not.

HIP Incentive Reimbursement Experiment

Sam Shapiro
Health Insurance Plan of
Greater New York

Tests the premise that financial incentives paid to a prepaid group practice plan will enable the plan to use more efficiently medical manpower, hospitals, and extended care facilities for Medicare beneficiaries. Expectations: reduction in hospital admission rates and lengths of stay, unchanged physician utilization, and increased turnover in extended care facilities. (Reimbursement experiments akin to this one are going on in California and Connecticut.)

Insurance Plans and Psychiatric Care

Walter Barton, M.D.
American Psychiatric
Association, Washington, D.C.

Descriptive analysis and evaluation of the existing coverage and utilization of psychiatric care insurance; its impact on psychiatric services; actual and potential impact on community mental health centers; and development of recommendations for planning psychiatric care insurance coverage under future voluntary or governmental health insurance programs.

APPENDIX F

Potential Contributions of Technology in Health Services R & D

The Present Situation

Many companies have viewed the health services system as a potential market for new technology, and have studied the possibilities in great depth. Their market surveys have included extensive interviews with physicians, hospital administrators, and other health professionals; engineers have been assigned to work in health facilities in an attempt to evaluate the receptivity of the health system to new devices. Recently, in a period of diminishing Federal support of military-space R & D which has left the country with an unused technological capability, these sallies into the health services system have become much more commonplace.

In an informal mail survey of private industry conducted by the Panel staff, some 60 companies reported activity in health services R & D. Forty of the 60 reported major R & D interests in the area of instrument technology that were largely supported by their own funds. In addition, about 20 organizations emphasize consultation services for management, planning and research. These companies do not generally invest their own funds, but are dependent upon government contracts for pursuit of these activities. A study conducted by the Arthur D. Little Company for the National Academy of Engineering estimated that industry in 1970 had invested $100 million in R & D in the field of biomedical engineering. The results of the Panel's survey indicate that most of this investment that is related to health services ($50 million) is also equipment-related technology.

Concomitant with this limited private investment by technological industry is a rather short list of successes. There is an occasional company for which the acceptance of a new piece of equipment like the automated analyzer has led to one of the great success stories of modern technology. More often, the small company founded to manufacture an electronic stethoscope or similar device moves into bankruptcy, while the larger company withdraws into military-space business or manufacturing for other industries.

Meanwhile, national committees wrestle with the problem of what is wrong. Why is the gigantic health services field not markedly influenced by modern technology? When the costs of health care are skyrocketing and a significant fraction of the population has no access to

health care, why is technology not adopted, at least as a palliative? Why are we unable to match the under-utilized technological capability to health needs? What is the essential role of the Federal government in realizing such a match?

Prerequisites for the Application of Technology

In the light of these general considerations, what can be said about the role for technology in health care? What conditions should exist to create a promising potential for the application of technology?

1. Need for Organization of Health Services

An adequate health care system must exist as the environment into which the technology is to be injected. The fully automated clinical laboratory, for example, is logical only when associated with a hospital or health care system or organization in which it is feasible to use the equipment full-time. If a hospital is considered, this presumably means one of at least 500 beds, and consideration is then immediately restricted to only 600 of the 7,000 hospitals in the country. An alternative is a sharing of one efficiently sized laboratory by a variety of users, a situation which imposes the requirement for at least a minimal inter-institutional system to insure adequate service and standards, authority and responsibility.

The blood supply situation in this country is a national disgrace. Almost half the country's supply of plasma--one plane load a week from one million donors annually--is imported from Latin America. Any sensible steps that can be taken to aggregate the sources of supply, to reimburse donors fairly, to maintain standards for processing, storage, and distribution, and to set up equitable arrangements for payment should be encouraged. Here again, technology obviously can immediately provide a strong amelioration of present difficulties, but only if a suitable regional organization exists to capitalize on that technology while providing the services required by the medical institution, the doctor, and the patient.

2. Need for an Adequate Knowledge Base

Technology can only be applied when the appropriate base of scientific knowledge exists, although technology can also indicate dramatically where scientific research is needed. The current rapid growth of automated multiphasic health testing has been subjected to criticism from the health profession not only because frequently many of the tests made do not clearly indicate high-risk situations, but because efficacious modes of intervention do not exist, or organizational arrangements for post-testing health care and follow-up are not available. Certain tests, such as those for nutrition, cannot be made economically; other tests cannot be interpreted because the distributions and variances of the measured values in general or so-called "normal" populations are unknown.

In spite of these limitations, automated multiphasic health testing systems continue to grow rapidly. They are believed to provide unusual opportunities for initial access to the health care system for large segments of the population, and are widely accepted as an important element of preventive health care and early warning for specific diseases and difficulties. The costs and benefits of this large-scale activity have yet to be determined.

3. Need for Understanding the Health Care System

Application of technology requires at least minimal understanding of the operation of the system within which the technology is to be used. Just as in the case of automated multiphasic screening systems, attempts to innovate with technology often indicate precisely the areas in which the system's operation is not adequately understood and where directed research should be done.

The recent history of the automation of hospital information systems is an excellent example. The computer is clearly and immediately applicable to the routine, management data processing (billing, accounting, payroll, inventory records and purchasing). There are successes in automated monitoring and record keeping for routine tasks of medical care personnel. When the computer is applied to either the patient's medical care records or to high-level management decisions, however, enormous gaps in understanding the detailed operations of the system and their desired characteristics become apparent. There are

substantial deficiencies in knowledge not only in the medical area but also in the economic and behavioral aspects of health care institutions and systems.

4. Need for Consumer Protection

The application of technology requires that mechanisms be developed to protect the consumer from its misapplication. The full impact of the benefits of biomedical research and medical technology can only be realized if instruments, equipment and test reagents representative of that technology are widely available to the providers of health care and if, in turn, those providers are competent in their use. How can such devices for detecting, diagnosing, monitoring, and treating disease be made widely available, meeting the standards of efficacy, safety and reliability of which technology is capable? How can the providers of health care be trained in the use of such devices? How can needed standards of device quality and user training be maintained continuously?

An unknown number of tests are performed annually for ambulatory patients, and over half a billion tests for hospitalized patients. It is estimated that perhaps as many as a quarter of all practicing physicians employ no tests, that probably a quarter of tests done are insufficiently accurate, that an unknown proportion of tests may be inappropriate or useless, and that a few may be either harmful or unduly hazardous. Similar under-application and misapplication of technology in therapeutic procedures is believed to be likely.

Additional laboratory applications for technology are ready for widespread development or use. These involve "dip-sticks" and test "kits" that use reagents and sometimes instruments for physicians' offices, and "do-it-yourself" specimen kits for cervical cytology, sputum cytology and pregnancy testing.

A program to develop needed standards was recommended in the report of the Cooper Committee in 1970.* The Food and Drug Administration is currently taking preliminary experimental steps in accordance with those recommendations. To have a significant impact on the nation's health services within the next five years, these efforts to develop

* Study Group on Medical Devices: Medical Devices: A Legislative Plan. Washington, D.C., Department of Health, Education, and Welfare, September 1970 (mimeographed)

standards must be very substantially expanded. The National Bureau of Standards and the Center for Disease Control are other Federal agencies which could be helpful in developing standards. A major effort by such agencies, supported by academic institutions and industry, is warranted to establish the needed standards program.

5. Need for Public Support

Successful development of technology for health care depends upon the intensive involvement of industrial, non-profit, and governmental capabilities. The principal development effort in this country has always resided in industry. The involvement of industry requires the existence of either an aggregated and discernible market, and a reasonably short time span between investment and sales, or direct governmental support of the development and production engineering. Further, it requires an attractive patent policy and a mechanism and motivation for encouraging innovation in health care.

It should be noted that the above statements do not imply the necessity to focus only on large markets. Technology can be developed successfully for quite limited markets (for example, the blind or the child with dyslexia), provided only that society is willing to invest in the costs of new devices and systems for the benefit of those who will be affected. In other words, success in technological innovation in health care depends on political acceptance of the priority of this problem and a health care system able to accept the change--not a priori on the size of the market or the number of people directly affected. In this sense, successful technological innovation depends upon health education of the public in the highest sense of public relations.

Conclusions

In spite of the potential contributions of the scope suggested above, little apparent progress has been made by technology in alleviating problems in health services in the past decade. Clearly, there are several reasons:

1. National priorities for the use of technological capabilities have been on space-military missions, such as Apollo, rather than on health missions.

2. There has been difficulty in establishing national priorities within the health field. As a consequence, the engineer, as an outsider looking at the health services system, receives the impression that care of critical problems and end-stage disease is the most important issue. Thus, emphasis is placed on glamorous developments such as the artificial heart, intensive care units and the like, to the detriment of any technological contributions in other areas of the health care system.

3. Because of the difficulty in establishing national priorities in health and maintaining them long enough to allow technological progress in the field, the research effort is seriously diffused, with too few resources committed to any one area to allow significant results.

4. Inadequate data inhibit evaluation on the basis of either health care quality or cost-effectiveness.

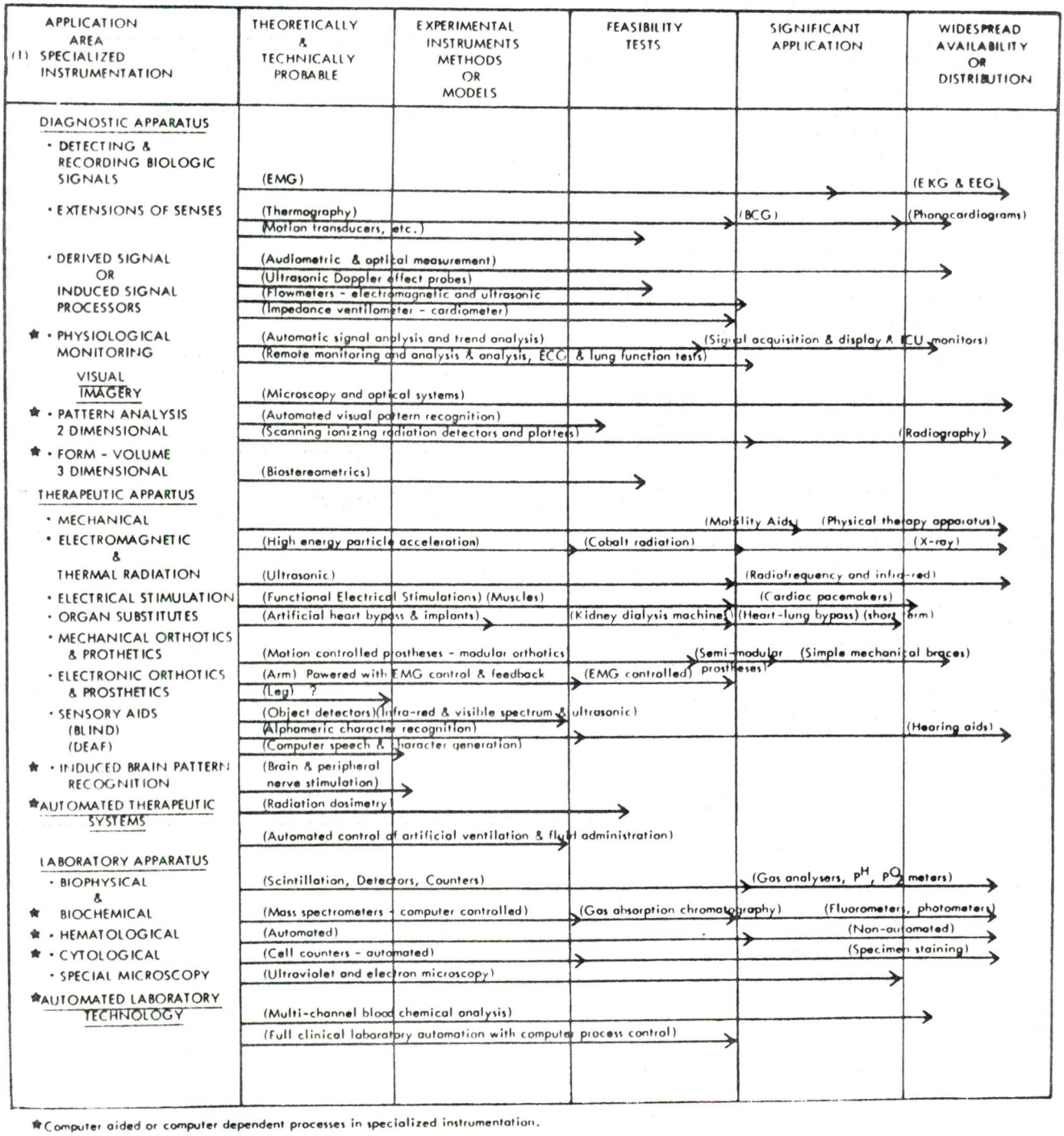
5. A definable market to encourage industrial investments in development is lacking in the health services field. An electronics company is not accustomed to allocating the large fraction of cost to marketing that is found in the pharmaceutical industry. The Federal government has been unable to utilize its several hundred VA and DOD hospitals to provide a market base.

6. Government agencies have failed to support device and subsystem development. An essential characteristic of such support would be the provision of incentives to industry to involve its best engineering capability.

7. There are great difficulties in effecting changes in any on-going social system, such as that of health care and health services, without waiting for an entirely new generation of professionals to be trained.

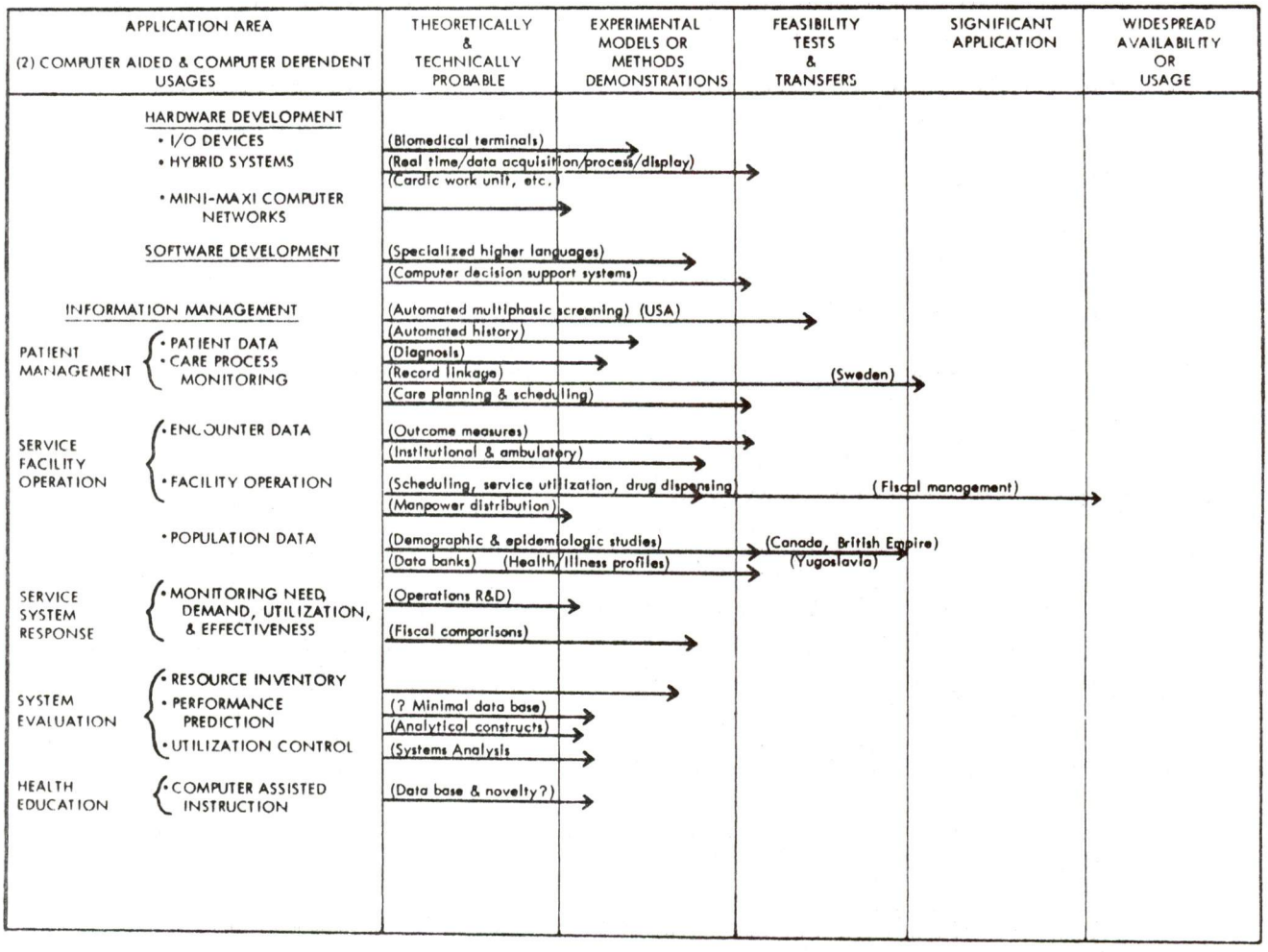
Finally, although the field is ripe with possibilities, technology can contribute to significant changes in health services only with a long-term, popular political commitment to health and health care as a major national goal. Once such a goal is accepted, technological research is required, development must be supported, and programs must be initiated with adequate provisions for testing and evaluation.

Figure 1. DEVELOPMENTAL LEVEL OF APPLICATIONS OF TECHNOLOGY IN HEALTH SERVICES



★Computer aided or computer dependent processes in specialized instrumentation.

Figure 1. (continued)



APPENDIX G

Major Disciplines Required for Health Services R & D

Fundamental and Applied Research

Health services R & D is a multidisciplinary field. To a large extent it is undertaken by those who enter it partially, temporarily or permanently from other fields. The major professions that contribute to health services R & D are those discussed below.

Economists

Health economists are concerned with explaining and predicting the behavior of physicians, patients, administrators and other participants in the health care system, especially in response to changes in income, insurance coverage, wages, prices of services and other economic variables. They seek to discover the relationship between costs and scale of operation, the role of medical care and socioeconomic variables in the production of health, the reasons for apparent shortages or surpluses of various types of health personnel and services, and the cost-benefit ratios of different service programs. Economists have typically relied on secondary analysis of data collected for administrative and other purposes, but a few are beginning to experiment with more direct observation of health-related activities.

Because the health services system involves the allocation of scarce resources among competing goals and has become a major industry, it will be necessary to increase the number of economists working on health problems and to improve the institutional arrangements to facilitate research.

Engineers

There has been little formal training available for engineers in the health care field. Biomedical engineering is perhaps the best developed area, but here the efforts are modest compared to the needs. Operations research has also been developed to a limited extent. Industrial engineering perhaps is in greatest need of development, particularly with respect to the design of subsystems for larger health care systems and institutions.

The possibility of providing short courses (six months to one year) for engineers in the substantive problems of health services organizations should be explored. Just as it takes

time for engineers to become familiar with the aerospace, transportation and communications industries, so it takes time and experience to learn the intricacies of the vastly more capricious, ill-defined and poorly organized field of health care.

Epidemiologists

Epidemiology, the study of "that which is upon the people", is the basic science of population and community medicine. Familiarity with the concepts, principles, methods and accomplishments, as well as awareness of its pitfalls and limitations, is essential for those assuming responsibility for health services development and evaluation. Competence in the use of this discipline's methods is essential for many of those who undertake fundamental or applied research in health services. Many epidemiologists will be concerned with the study of communicable and chronic diseases, their incidence and prevalence, the circumstances and conditions under which they arise and spread, and the factors that foster their control and eradication. Other epidemiologists will be concerned with identification of those populations at risk of succumbing to these health problems and with evaluation of the impact of health services on the problems. Epidemiologists are needed for the conduct of controlled clinical trials, for the critical evaluation of the efficacy, toxicity and hazards of drugs, procedures, instruments, devices and even of administrative practices, but especially for evaluation of the impact of health services on the health of populations.

Physicians

The largest group of professionals in health services research have their primary training in medicine. They should be better prepared to work comfortably in teams and formal organizations, and to support or themselves conduct clinical trials and evaluative research in the field of health services. All of this implies the need for change in medical education and broader exposure of medical students and clinicians to health services R & D and to the nature and problems of health care organizations. The same is true for nurses and the allied health professions.

Sociologists

Medical sociologists deal with such issues as the effects of varying forms of organizational and professional patterns; consumer expectations and response; intraorganizational coordination; the effects of culture and social setting on health and illness behavior; and the impact of social patterns on the occurrence of disease and disability. If new kinds of organizational arrangements, new types of health manpower and new kinds of management are to be introduced in the health care field, it is essential that sociologists study the attitudes and behavior of consumers and professionals and examine the factors that impede and accelerate the introduction and acceptance of these innovations. Sociologists are also largely responsible for the development of survey methods and statistical analysis essential to many aspects of fundamental and applied health services R & D, and these methods need to be more widely known and practiced.

Statisticians

Health statisticians at Federal, state and local levels will be needed to design and operate the information systems required for the management of health care organizations at all levels. They are also essential for analysis and evaluation of health services. In recent years most of the departments of biostatistics in schools of public health have emphasized the training of biomathematicians. The need now is for statisticians trained in health statistics who are able to design surveys, controlled clinical trials, information systems and evaluation schemes, and related quantitative approaches for the health care field.

Development, Administration and Management

The problem of training health care administrators is so crucial, not only for health services R & D but also for the whole future of the health care system and the prospects for change and improvement, that it deserves special comment.

Health Care Administrators

Traditional public health administration and hospital administration need to be supplanted by a new discipline of health care administration or perhaps of administrative medicine. Both physician and non-physician candidates should receive rigorous graduate education in a one-

or two-year program, including epidemiology, health statistics, health economics, behavioral sciences, industrial management, accounting, public finance, health care organization and administration, health services research methods, and the history of health institutions and professions.

There are few health services administrators and managers today with the necessary background to appreciate the need for research, to formulate problems, or to ask researchable questions. It is estimated that Federal, state and local health departments employ about 5,000 "public health administrators", "program analysts", and "program representatives". The major professional category consists of physicians who, in accordance with programs developed fifty years ago, have received one year of vocational training in a school of public health, leading to a Master of Public Health degree and reclassification as "health officers". This figure probably includes a few individuals with advanced degrees and the 400 epidemiologists and 800 health statisticians currently employed.

In addition, it is estimated that there are about 17,200 "hospital administrators" and their managerial assistants. Formal training in hospital administration has been under way for only 20 years and the total number of graduates over the years probably does not exceed 2,500, or less than 15 percent of those administering the nation's 7,000 hospitals. It would appear that the vast proportion of administrators of the national hospital system have had primarily on-the-job training.

Current graduates who might be expected to assume administrative responsibilities in the future number annually about 500 from university programs in hospital administration and about 200 from related graduate programs in schools of public health.

While it is clear that the total number of persons receiving any kind of formal training as preparation for running the country's $75 billion health care industry is quite inadequate, serious questions may also be raised about the quality of the candidates being attracted and the nature of the training available. Views on such issues are bound to be subjective and difficult to document objectively. First there appears to be disenchantment on the part of private foundations with the vitality and utility of the education afforded by schools of public health

and, to a lesser extent, by university programs in hospital administration. Secondly, the view is widely expressed in schools of medicine, as well as in the university departments of economics, sociology and operations research, for example, that courses in schools of public health and in university hospital administration programs are of limited value. Finally Federal, state and local governments, hospitals, fiscal intermediaries, health care plans and systems, and universities all seem to experience great difficulty in finding first-rate candidates for vacancies in administrative and managerial positions.

Schools of business administration and of industrial management are becoming increasingly interested in the health care field and their expertise in the management of large-scale organizations is urgently needed in health care. Similarly the expertise of schools of public health in epidemiology and health statistics is needed, as is the substantive familiarity with the hospital industry that characterizes the university programs in hospital administration.

Few if any educational institutions combine competence and concern with respect to the problems of providing personal health services for general populations in addition to the problems of day-to-day operation of hospitals, clinics or health departments; the nature of clinical medicine, its potentials and limitations for modifying health and disease in individuals and populations; and expertise in the basic disciplines of epidemiology, statistics, sociology, economics, operations research, accounting, industrial management and systems analysis.

The manpower issue in health care administration is in many ways as acute as it is for R & D. There is an urgent need for increased numbers and improved quality of both health services administrators and investigators. The latter are needed to carry out the research, development and evaluation, and the former to collaborate and cooperate in the conceptualization of problems, the provision of information and the adoption of useful measures and innovations that result from research, development and evaluation, as well as to develop and manage the country's new health care systems. These relationships argue persuasively for the development of training programs for health care administrators in the same environments and institutions that provide training for health services investigators. Both should take place where organized health care systems exist and where health services R & D is being

actively pursued.

The Panel believes that support of training for administration and management should be the primary responsibility of the Bureau of Health Manpower Education. The level of support for institutional or university graduate programs in health care administration should be increased substantially. University health care centers, schools of medicine, schools of public health and university programs in hospital administration, either alone or in collaboration with schools of industrial management, schools of public administration, or schools of business administration, should be able to mount programs that address the contemporary problems of health care, attract first-rate faculty and appeal to capable candidates. Large-scale support designed to reorient the present training programs, particularly in schools of public health, should be a major approach to the problem. New legislation similar to that provided through the Hill-Rhodes Act, accompanied by adequate funding, could have the necessary impact.

APPENDIX H

Technical Notes

TABLE 1 Estimates made by NCHSR&D staff.

TABLE 2, 3 Special Analyses, Budget of the United States Government, Fiscal Year 1972, pp. 149-173 (Section K). The figures for health services R & D are those given in the category labelled "improving the organization and delivery of health services"; those for biomedical research are those given in the category labelled "health research". All figures for 1971 and 1972 are estimates.

TABLE 4 Federal Government: Special Analyses, Budget of the United States Government, Fiscal Year 1972, pp. 149-173 (Section K).

State and Local Governments: National Science Foundation: Research and Development in Local Governments, Fiscal Years 1968 & 1969 (NSF 71-6). The assumptions are that state and local governments spend about twice as much as the Federal government on health services R & D in proportion to their expenditures for biomedical research, and that total outlays increased by one-eighth in fiscal years 1970 and 1971.

Universities and Colleges: According to a staff study for President's Science Advisory Committee Panel on Health Services Research and Development, universities received $33 million in grant money from HEW specifically for health services R & D in fiscal year 1970. The assumptions are that 10 percent of this amount is matched by university funds (excluding foundation grants included below), and that there was no increase in fiscal year 1971.

Private Foundations: Survey by Dr. David Z. Robinson, member of President's Science Advisory Committee Panel on Health Services Research and Development, for fiscal year 1970.

Other: Staff estimate of amounts spent on health services R & D by the Blue Cross Association, AMA, AHA and other professional organizations.

Industry: A study by Arthur D. Little, Inc., for NAE in September 1970 estimated that industry was investing about $100 million in R & D in the field of biomedical

engineering, with an annual growth factor of 10 percent. The assumption is that half of this effort can be considered health services R & D and that this represents or approximates industry's total investment.

TABLE 5 Special Analyses, Budget of the United States Government, Fiscal Year 1972, pp. 149-173 (Section K), and staff analysis of unpublished figures provided by the Office of Management and Budget.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY
WASHINGTON, D.C. 20506

NOV 16 1972

November 14, 1972

MEMORANDUM FOR

Members
President's Science Advisory Committee

SUBJECT: Report of the PSAC Panel on Chemicals and Health

On September 19, 1972 John Tukey presented a preliminary version of the report of the PSAC Panel on Chemicals and Health. The presentation brought forth a number of comments on the report. Further, PSAC members were asked to comment in depth on the details of the report following the presentation.

Enclosed is a final version of the report proper (Section I). The remaining sections (with the exception of an appendix) have not been altered in substance. The Panel took into account the comments offered by PSAC and others following the September presentation. As a result, a number of changes were made to the chapters which comprise Section I.

The recommendations have now been arranged in a more obvious hierarchical fashion ("Principles, General Recommendations, Detailed Recommendations"). Chapter 4 ("General Summary") has been revised to reflect the tone and major themes of the report. Chapter 5 ("Perspectives on Health") has been revised to be shorter and more easily comprehended.

The report begins with an annotated listing of ten principles ("Key Principles," "Federal Responsibilities," and "Principles of Implementation"). These represent the Panel's conclusions and views on what it viewed as the major issues. Each of these is referenced to later General and Detailed Recommendations which suggest paths for achieving or accommodating the Principles.

The Chairman and several members of the Panel will be present to cover the major revisions of the report. I hope that PSAC members will offer points for discussion about either the substance or form of the report. It is hoped that the report can receive PSAC's approval at this meeting.

Edward J. Burger, Jr., M. D.

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Attachment

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY
WASHINGTON, D.C. 20506

September 12, 1972

MEMORANDUM FOR

Members
President's Science Advisory Committee

Enclosed is a draft copy of the report of the PSAC Panel on Chemicals and Health, which will be discussed at the forthcoming meeting on September 19, 1972. We appreciate that this is an exceptionally large document and few members, perhaps, will have an opportunity to study it closely before the meeting. You are urged to read, if possible, Section I (Summary and Recommendations) and Section II (Perspectives on Health).

John Tukey (Chairman) along with six other members of the Panel will make a presentation of the report at the meeting on September 19. This will be an opportunity to address major issues and recommendations. We suggest that between the September and October meetings, members read critically and mark up their copies in preparation for a detailed discussion in October.

Since the document is large, duplicate copies will not be available at the meeting and members are asked to bring theirs along.

Edward J. Burger, Jr., M. D.
Technical Assistant

Attachment

Appendix IV-B

Other Perspectives on Health

In Chapter 5 we have looked at what linked deaths can tell us about threats to health when the linked deaths are looked at as a percentage of all deaths. We recognized that this measure did not give adequate attention to the greater seriousness of early deaths, and gave, in addition, some figures for "adjusted percentages" of deaths. We now look at linked deaths from a different aspect -- how many people "might be alive" -- which also helps to explain how these adjustments were made.

We then go on to consider long-term changes in survival, and what can be learned by comparing long-term changes in women with those in men.

As we will see in Section 2, the details of exactly what "might be alive in 1967" are mildly complex, just as are the details of "1967 expectation of life at birth." For all this, the reader who takes the "number who might be alive" as a reasonable pointer to the number who really might be alive is, we feel, being as well guided as is presently possible. (The uncertainties in "linking" almost certainly outweigh any that are added.)

1. Number who might be alive

Let us compare two quite hypothetical situations: one in which people continue to die, year after year, in the same numbers at

each age that died in 1967; another in which every death linked to a particular threat is postponed, so postponed that the distribution of continued life is the same for all linked deaths postponed from a given age as it is for all those who reached that age without dying. We next calculate the number that "might be alive", that is how many more people would be alive in the second hypothetical situation than in the first. (Details of the calculation are given in Appendix C.)

Exhibit B1 sets out the numbers that result. Let us look at the first line, that for cigarette smoking, in some detail. If we ask for those who "might be alive" at all ages, we find 4,280 thousand -- about 4 1/4 millions of people. This does NOT mean that had no one born in the last eight or nine decades smoked cigarettes, that 4 1/4 million more would be alive. It DOES mean, though, that thinking about 4 1/4 million more now alive is a reasonable way to grasp the importance of deaths linked to cigarette smoking.

Moving to the right, if we only consider those under 85, about 3,360 thousands "might be alive." Similarly about 2350 thousand under 75 and 1080 thousand (about 1 million) under 65. On the right-hand part of the exhibit we take these numbers apart, and reach, as something to give us a feeling for the impact of cigarette smoking.

1.1 million who "might be alive" under 65
1.3 million who "might be alive" between 65 and 75
1.0 million who "might be alive" between 75 and 85
0.9 million who "might be alive" above 85

"Numbers who might be alive" = difference between
(1) result of continuing all 1969 deaths in succeeding years and
(2) same except that each linked death is replaced
by the average continuation of life from that age.

Cumulative (thousands)				Linked to	Separated* (thousands)			
all ages	up to 85	up to 75	up to 65		up to 65	65 to 75	75 to 85	85 up
4280	3360	2350	1080	smoking	1100	1300	1000	900
1830	1760	1430	1120	alcohol abuse	1100	300	400	100
?	?	?	?	illicit drug abuse	?	?	?	?
125	107	68	31	air pollution	30	40	40	20
?	?	?	?	adverse reactions to medication	?	?	?	?
131	121	106	79	suicides	79	27	15	10
?	?	?	?	coffee	?	?	?	?
?	?	?	?	dust-like particles	?	?	?	?
?	?	?	?	accidents with chem'ls	?	?	?	?
15	14	12	10	toxic exposures	10	2	2	1
5.5	6.5	7.5	7.2	oral contraceptives	5.5	1	0.5	0.2

*Rounded further.

This is to be compared, for example, with the corresponding figures for alcohcol abuse.

1.1 million who "might be alive" under 65
0.3 million who "might be alive" between 65 and 75
0.4 million who "might be alive" between 75 and 85
0.1 million who "might be alive" above 85

Clearly the impact of these two threats is about the same if we only look at ages under 65. The greater impact of cigarette smoking occurs at the ages beyond 65.

Exhibit B1 allows one to gain similar impressions for the other threats considered above that are neither too uncertain nor too small to be worth such treatment.

Clearly we are talking of large numbers "who might be alive" -- something like six million for cigarette smoking and alcohol abuse, perhaps twice this number if we include both choice of diet composition and unknown chemical initators or promoters of cancer and if these two turn out to be very important. How does the impact of these big threats, which clearly far outweigh all the others we have considered, compare with the favorable impact of chemicals?

2. Adjusted percent of deaths

We can now calculate on adjusted percent of deaths -- either for all ages or for ages up to a given limit -- as:

$$\text{adjusted \% of deaths} = \frac{\text{number who might be alive (linked to given threat)}}{\text{number who might be alive (all causes)}}$$

The adjustments used in Chapter 5 were:

Adjustment A: all ages included.

Adjustment B: only ages up to 65.

3. Long term changes

We said earlier that a significant fraction of the improvement in health in this century could be credited to chemicals. What does this mean in terms of those who might, or might not, be alive?

If the 1901 death rates had continued throughout the lifetimes of those now alive, nearly 50 million people now alive would have died. If the 1968 death rates had applied instead, nearly 20 million people now dead would still be alive. The probable impact of today's large chemical threats, say 6 to 12 million who might be alive, may well not be as large as the benefit we have already had from chemicals, but it is at least a large fraction.

For those who want a little more detailed feel, we give age breakdowns for what 1901 and 1968 death rates would mean. If 1901 death rates had been in existence (with no allowance for children born of parents who would have died before having the children).

-- about 40 million people under 65 would not now be alive.

-- about 4 million people between 65 and 75 would not now be alive.

-- about 2.5 million people between 75 and 85 would not now be alive.

-- about 1 million people over 85 would not now be alive.

If the opposite had happened, if 1968 death rates had applied in the past,

-- about 10 million more people under 65 would be alive.

-- about 4 million more people between 65 and 75 would be alive.

-- about 3 million more people between 75 and 85 would be alive.

-- about 1.5 million more people over 80 would be alive.

These figures offer a more detailed feeling for what the differences in death rates -- (1) as they were in 1901, (2) as they changed through this century, (3) as they were in 1968 -- mean in terms of our present population.

4. Effects on lengths of life

Rather than think of how many might still be with us, some wish to think about what impact these threats are likely to make on ones own life. Careful calculation here is a little more complicated, so we will content ourselves with a very rough approximation, namely:

1 year of extra life for every 2 million who "might be alive"

1 month of extra life for every 160 thousand who "might be alive"

1 week of extra life for every 40 thousand who "might be alive"

1 day of extra life for every 5 thousand who "might be alive"

1 hour of extra life for every 230 who "might be alive"

1 minute of extra life for every 4 who "might be alive"

With these rules of thumb the figures of the left-most column of Exhibit B1 have a different, useful (and still more approximate) interpretation.

The conversion applies to "the average person." So far as risks due to the choice of others go, the result if roughly correct for anyone. But where it is a matter of own choice, we need to allow for how many choose. We have taken the fraction of cigarette smokers to be about 3/8 (1/2 for men, 1/4 for women). Accordingly, while removing deaths linked to cigarette smoking would give an average of two years of extra life, non-smokers would gain nothing and the average smoker would gain about 2/(3/8) = about 5 years.

Similar, but often much more extreme, adjustments would be appropriate for other self-chosen threats.

5. Females vs. males

We have noticed how much more the expectation of continued life has been improved for females as compared to that for males. Two major reasons for this are clear: More men than women smoke

cigarettes. (Indeed our estimates link about 140,000 more male deaths than female to cigarette smoking.) More men than women die from accidents, homicides and suicides. This raises such questions as: How much faster do men die? How much of this is due to these two major effects? How rapidly has the pattern changed?

Exhibit B2 sets out the ratios comparing death rates for men to those for women for various ages, as it used to be in 1901, and as it was in 1968. The ratios are the relative number of deaths among equal numbers of men and women at a given age. In 1901, males died about 1.1 times as fast as females. In 1968, males died more nearly 1.8 times as fast as females. In large measure, this came about from the removal of causes of death that affected both sexes more or less equally. In almost equally large measure this came about from the increasing importance of threats that were more important for males than for females.

As a first step in understanding the implications of Exhibit B2, we can look at the corresponding ratios when we set aside all deaths due to accidents, homicides, and suicides. The result is shown in Exhibit B3. We see that in 1901, removing all deaths due to external causes leaves men dying slower than women between 10 and 40 years of age, and, except for the first year of life, never dying more than 1.1 times as fast. In 1967, the omission of deaths from external

Exhibit B2

Relative death rate -- fraction of men dying as a multiple of fraction of women dying -- for various ages, both in 1901 and 1968.

age	ratio in 1901	ratio in 1968	age
0	1.20	1.3	0-1
5	1.03	1.4	5-9
10	1.10	1.8	10-14
15	0.98	2.6	15-19
20	1.06	2.9	20-24
25	1.04	2.3	25-29
30	1.04	1.9	30-34
35	1.12	1.7	35-39
40	1.13	1.7	40-44
45	1.17	1.8	45-49
50	1.15	2.0	50-54
55	1.13	2.1	55-59
60	1.14	2.1	60-64
65	1.14	2.0	65-69
70	1.10	1.8	70-74
75	1.10	1.6	75-79
80	1.10	1.3	80 and up
(median)	(1.10)	(1.8)	

Exhibit B3

Relative death rate -- fraction of men dying as a fraction of women dying -- when deaths from external causes (accidents, homicides, suicides, etc.) are excluded.

age	ratio in 1901	ratio in 1967	1967 further adjusted*
(0)	(1.20)	(1.30)	
1-4	1.07	1.11	
5-9	1.01	1.10	
10-14	.86	1.18	
15-19	.85	1.32	
20-24	.91	1.23	
25-29	.90	1.14	
30-34	.97	1.24	(1.13)
35-39	.98	1.31	(1.08)
40-44	1.01	1.49	(1.19)
45-49	1.04	1.65	(1.34)
50-54	1.05	1.89	(1.57)
55-59	1.08	2.02	(1.69)
60-64	1.09	2.08	(1.72)
65-69	1.09	1.94	(1.53)
70-74	1.08	1.84	(1.48)
75-79	1.10	1.56	(1.21)
80-84	1.10	1.32	(1.19)

* (These are too rough for final use.) With both deaths linked to cigarette smoking and other deaths assigned to external causes removed.

causes has reduced the first peak in the ratio -- the one falling in the late teens -- from 2.9 to 1.3. (The small peak that remains would be accounted for if about 10 percent of those dying because of external causes do so from complications, one of which is then entered on the death certificate as the cause of death.) The second peak -- the one falling in the early 60's, is not appreciably reduced.

It is natural to try to go somewhat further by excluding both deaths from external causes and deaths linked to cigarette smoking. The right-hand column (all in parenthesis) of Exhibit B3 shows that the peak in the early 60's is reduced from 2.08 to 1.72, which is by about one-third. (The fraction of reduction increases away from this peak, reading one-half in the late 40's and early 70's. This leaves us with the impression that differences in frequency of cigarette smoking accounts for a sizeable fraction of the excess death rate for men, as compared to women, but probably for less than half this excess.

What about the remainder? Some will believe that a large part of the remaining excess is due to environmental exposures of some sort or other. Others will believe that the stresses of working life are the major cause. As yet there is no clear answer.

We can say, however:

- that men die at a rate almost twice that of women between 50 and 70 years of age.

- this direction is consistent with more men smoking cigarettes,
- the estimates we have made of deaths linked to cigarette smoking are not large enough to account for the full difference.

Looking at the comparison of men and women does nothing to contradict our earlier analyses; indeed it offers a small amount of indirect support.

6. Measures of life and death

Human life terminating in death is a lengthy process, yet the world we live in changes rather rapidly. As a result, measures of health based on how and when we die tend to be somewhat less than straightforward in their interpretation, not for malicious reasons but rather because making the best use of current information is not a trivial task.

counting deaths

One thing we can do is just to count deaths according to a standard set of causes. This throws some light on the situation: a cause of 500,000 deaths a year is almost certainly more serious than one that causes only 5,000. Besides the absence of a natural reference, two considerations weaken a mere death count: First, all we can do is to postpone death -- the total number of deaths is essentially fixed by the

total number of births. Second, death of a younger person is almost universally agreed to be more serious than that of an older one.

To get around some of the difficulties, we can compare official causes in terms of the percent of all deaths. In 1967, for example, we have such results as those shown in Exhibit B4, where numbers are in one column and percents in the other.

Most readers will agree that they can get a clearer picture from the percent column than from the count column.

* expected years of life *

Expected years of life is a measure that sounds easier to understand than it is. What would probably be most meaningful would be some measure of how long an average individual born at a given date lives. If average is meant in the technical sense -- as an arithmetic mean -- we do not yet know the answer for any group born in this century, since it is not till almost all have died that we will know enough to find an average. (If we really meant "median" we know the answer for those born in the early and middle 1890's, where we cannot yet be sure of the average.) Such "cohort" figures -- quite relevant for individuals -- are of little help in watching changes in current public health. After all they combine what has happened to each cohort (at various ages) over some eight or nine decades.

Exhibit B4

Comparison of number deaths with % of deaths in 1967

(1,852,000)	(Total deaths)	(100.0%)
575,540	arteriosclerotic heart disease	31.0%
315,996	cancer (all forms)	17.0%
202,940	vascular lesions affecting central nervous system	17.0%
108,960	all accidents	5.9%
53,140	motor vehicle accidents	2.9%
27,410	cirrhosis of liver	1.5%
14,120	rheumatic fever,	0.76%
6,560	tuberculosis	0.35%
3,138	hyperplasia of prostate	0.17%
1,450	influenza	0.078%
710	infectious hepatitis	0.038%
371	accidental poisonings	0.020%
110	syphilis and sequelae	9.006%
40	whooping cough	0.002%
20	diphtheria	0.001%

As a result, most expectation of life figures refer to some brief period of time -- often one year, sometimes three years. What they tell us, for instance, is the average age of death of a composite person who spent all his or her life in the short period. If the period were January to December 1967, for example, this imaginary person would be born on 1 January and, if he or she lived to 31 December, would reappear again, 12 months earlier, at 1 January of the same year, aged exactly one year old. And so on, each year of life being lived -- or terminating in death -- in exactly the same calendar year. Clearly this measure makes it easier to watch public health from year to year, since it is calculated from observed deaths in that year and that year alone. (Events that were the underlying causes of some of these deaths happened a decade or more earlier.) Equally clearly, it is at least correspondingly harder to explain just what we are talking about. (This seems to be characteristic of measuring life and death: the more useful the measure, the harder it is to explain.)

* professional measures *

Demographers and epidemiologists need to know about deaths in greater detail than we will really need here. They are likely to use death-rates for, say, given age and sex. This means, of a hypothetical 100,000 people, all of the given sex and all having their nth -- say

their -- 58th -- birthday on 1 January of the year in question, how many will die -- or die of a given cause during that year. (In practice results are quoted for ages spread out to some reasonable degree.) There is no substitute for the use of death rates by age if we need a detailed look at what is happening. Fortunately we will need to make only limited use of death rates here.

Fortunately, also, if death rates at all ages go up, the corresponding expected years of life goes down, while if death at all ages go down, the corresponding expected years of life goes up. Thus, it is usually safe to use "live longer" as a shorthand for "all death rates coming down" and "live shorter" as a shorthand for "all death rates going up."

* impact of deaths *

We said above that the difficulty with merely counting deaths was that it took no account of at what age they occurred. There are various ways to try to take account of this. Some try to do it by assigning an "economic value" to death at a given age, often considering both what society has spent (education, etc.) and what the future return may be in the absence of death (useful work, etc.). We find none of these satisfactory for our purposes here. Our considerations are health considerations, and we resist mixing in economic ones.

Our concern with causes of death is to ask what would be the

impact if they were weakened or removed, thus postponing some or all of the related deaths. What would this mean in health terms?

The simplest -- and most optimistic way of valuing not dying at a specific age is to calculate as if, were death to be postponed at a given age, those for whom it would be postponed would live as long as the average person of that age and sex. If the cause of death that might be postponed has little connection with general healthiness -- as we would expect for accidents, homicides, and being struck by lightning, for example -- this calculation should come close to corresponding to the truth. For other causes of death it may be optimistic. But it is a well defined calculation in any event, and probably does quite well in making a relatively satisfactory allowance for the importance of death at different ages.

To value each death from a given cause in terms of the expected years of life at that age and sex and to add these values up to find a total value associated with all the deaths is numerically the same as to find an average value, here an average years of expected life for all the deaths, and multiply the number of deaths by this factor. We will often find it useful to speak and think in this latter way.

Average years of expected life for a cause of death, then, grade down from largest values for causes of early deaths to smallish values for causes of late deaths. Some examples are:

Cause of death	Average years
deaths from oral contraceptives	50
motor vehicle accidents	33
cancer of the lung	17
cardiovascular disease	11
adverse reaction to medication in hospital	5

In the last example, we have made a rough (judgement-based) correction for the fact that many deaths in hospital linked to adverse reaction to medication involve patients who were, in any case, near death. So far, this is the only case where such a judgement-based assumption seems justified.

* number who might be alive *

If our optimism were correct, and if nothing changed -- death rates and population size remaining constant -- for many years, then the number of people who would be alive if deaths associated with a cause of death were eliminated, but who would not be alive if these deaths were not eliminated would just be this product of annual number of deaths by average years of expected life at death. Accordingly, we will refer to this product as the "number of people who might be alive." We would be more concerned about the difficulties of giving a precise and relevant interpretation to this measure, and about the approximations it involves, were it not true that other measures have, to greater or lesser degree, the same difficulties. Expected years of life, for

example, as we have explained, refers to hypothetical people living all their life in one single calendar year. Indeed, careful analysis shows that the calculation of "number who might be alive" also makes assumptions about how large a fraction of less generally healthy people have died in comparison with more healthy ones.

Once we are prepared to assign an "expected years of life" to a death specified by age (and often, also, by sex) we have only the arithmetic to change when we want to use "expected years of life before age 75" -- or before any other specified age -- in its place.

* chosen measures *

The result of these considerations is thus two-fold. When, as we usually should, we want to give early deaths a higher value, we use -- and recommend the use of --

number who might be alive (before age --)

When we feel that we must use as measure tied as close to observation as we can, we use -- and recommend the use of

percent of all deaths.