REPORT BY THE U.S.

General Accounting Office

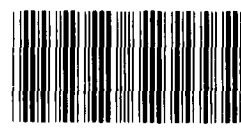
Computerized Hospital Medical Information Systems Need Further Evaluation To Ensure Benefits From Huge Investments

Widespread use of computerized hospital medical information systems within the next 5 to 10 years could represent investments totaling billions of dollars.

The National Center for Health Services Research in the Department of Health and Human Services is responsible, among other things, for supporting research, demonstration, and evaluation of these systems. So far, the Center has not developed sufficient information on the impact of these systems on hospital costs and patients. According to Center officials, a lack of funds prevents further evaluation.

The Department's Bureau of Health Planning and the Center are developing a workbook with added guidance to help health systems agencies evaluate hospital requests to acquire these medical information systems.

The Center should ensure that future funding allocations are provided for more evaluations. The Bureau should see that appropriate guidance is issued on a timely basis.



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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

HUMAN RESOURCES
DIVISION

B-199685

The Honorable Patricia R. Harris
The Secretary of Health and Human Services

Dear Mrs. Harris:

We just finished studying computerized hospital medical information systems (HMISs) which are expected to proliferate in our Nation's hospitals within the next 5 to 10 years. We did this review to determine what the National Center for Health Services Research in the Department of Health and Human Services has done to answer questions on the social and economic impact of HMISs. To accomplish our objective, we reviewed various records and interviewed key Center officials as well as people outside Government who are knowledgeable about HMISs. In addition, we visited several hospitals using or developing these systems. We did not review the program effectiveness of the Center in accomplishing its other missions and this report is not intended to dismiss the Center's accomplishments in other areas of health services research.

We found that the Center has made only limited studies to evaluate the social and economic impact of HMISs in a hospital setting and does not have an updated plan for more evaluations in the immediate future.

Public Law 95-623 requires the Center to undertake and support research, evaluation, and demonstration projects in four areas. One of these areas is the use of computers in health services delivery and medical information systems. Within this area, the Center is committed to support projects pertaining to HMISs. The Center is also responsible for making information from such projects available to decisionmakers in the public and private sectors.

In a November 1978 publication, the Center specified that it would continue to conduct and support projects involving the design, demonstration, and evaluation of the use of computerized hospital medical information systems to develop information about

--the explicit benefits of various systems and

--the economic, social, and political consequences of computerization.

HMISs combine administrative and medical data into a common set of data files for computer processing. These systems have the potential to increase the efficiency of administrative and medical employees by permitting them to, among other things, consolidate, coordinate, and communicate massive quantities of data.

Hospitals are acquiring these systems because they can potentially reduce or contain hospital costs. The President and others have called for action to slow the growth of medical costs which rise significantly each year.

We found that during the last 9 years the Center spent about $750,000 to evaluate only one commercially sold HMIS in only one hospital. The evaluation indicated that the system improved health care delivery. However, the question of whether the system is cost saving or cost raising was not completely resolved. The hospital studied the system and concluded that the cost savings were between $360,000 and $600,000 per year. However, later an independent consulting firm analyzed the system and concluded that while nursing costs had been reduced, total hospital operating costs had increased by $677,000 because the savings did not offset the $947,000 system operating cost.

The Center acknowledges that the results of this evaluation are not sufficient to assess adequately the impact of HMISs on hospitals and patients. More studies are needed because information is lacking on the cost effectiveness of other commercially available HMISs in other hospital settings. Others also have expressed a need for more study of economic and other issues such as other benefits, possible disadvantages, and the security of automated medical records.

In 1978, the Center specified that it was committed to evaluating HMISs. However, it did not have sufficient fiscal 1980 funds to meet all of its priorities and to adequately evaluate these systems. It has no approved plan for spending fiscal 1981 funds for evaluating these systems. Further, the Center has not updated its plan since the early 1970s nor has it selected a strategy for further HMIS evaluations. Center officials are uncertain of how many more evaluations are needed. Because the officials believe these studies are costly, they are considering some alternatives for obtaining economic information only.

The Center has spent a minimum amount of funds for evaluating HMISs in hospital settings. We found that during the last 9 years about $29.5 million was provided for HMIS-related projects, but only $750,000, or 2.5 percent, of this was spent for evaluating these systems in hospital settings. The remaining funds were spent on various HMIS-related projects such as a computer-aided medical audit and drug interaction warning applications. Although these projects may be worthwhile, we believe that in the future funds should be allocated to evaluating HMISs because hospital investments in them is expected to approach several billion dollars over the next 5 to 10 years.

Some of the Center's HMIS-related projects should prove useful to decisionmakers in evaluating HMISs. For example, the Center contracted for a workbook designed as a guide for assessing the adequacy, risks, and likely outcomes of proposed systems. The Department's Bureau of Health Planning is evaluating the workbook to determine if it could be useful to health systems agencies which need guidance for evaluating hospitals' requests to install HMISs. If acceptable to the Bureau, the workbook with added guidance would be made available to health systems agencies sometime in fiscal 1981.

RECOMMENDATIONS

We strongly support the use of computer technology to reduce or contain the cost of medical care. However, we believe that more information about the effects of HMISs on our Nation's hospitals is needed by decisionmakers in the private and public sectors so these people can formulate policies to maximize the benefits of HMISs and minimize adverse economic and social consequences. We also believe that health systems agencies need guidance to assist them in evaluating requests to install these systems.

Therefore, we recommend that you direct the Center to (1) reassess its fiscal 1981 funding allocations to determine what funds can be allocated to evaluating these systems and (2) update and implement its program plan to assure that future funds are provided for more evaluations. We also recommend that you direct the Bureau of Health Planning to take the action necessary to assure that appropriate guidance is issued on a timely basis.

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Our findings are summarized in appendix I. We have discussed them with various officials in the Center and have included their comments where appropriate. The Department

also submitted written comments on a draft of this report (appendix II); our evaluation of them begins on page 14.

Because this report contains recommendations to you, you are required under section 236 of the Legislative Reorganization Act of 1970 to submit a written statement of actions taken on our recommendations to:

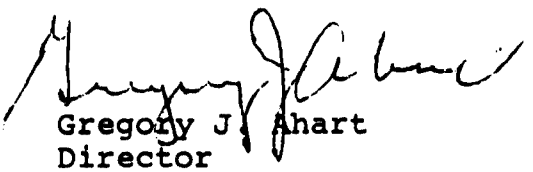
--The House Committee on Government Operations and the Senate Committee on Governmental Affairs within 60 days of the date of the report.

--The House and Senate Committees on Appropriations with the agency's first request for appropriations made over 60 days after the date of the report.

Copies of this report will be sent to the Director of the Office of Management and Budget and the Chairpersons of the Committees just mentioned as well as of the House Committee on Interstate and Foreign Commerce and the Senate Committee on Labor and Human Resources. We will also send copies to your Assistant Secretary for Health.

We appreciate the courtesies and cooperation extended our representatives during the review. We would appreciate your comments and advice as to actions you take or plan to take on these matters.

Sincerely yours,



Gregory J. Ahart
Director

SUMMARY OF GAO FINDINGS AND RECOMMENDATIONS ON THE NEED TO ANSWER QUESTIONS ON THE IMPACT OF COMPUTERIZED HOSPITAL MEDICAL INFORMATION SYSTEMS

During the 10 year period ending in 1978, annual hospital costs rose to $76 billion, an increase of about 300 percent. In 1979 these costs reached $80 billion. The Government pays a major share of these costs since Medicare and Medicaid payments represent about 40 percent of total inpatient hospital costs. In his fiscal 1980 budget message to the Congress, the President called for action to contain this nationwide rise in hospital costs.

Hospital administrators are looking more and more to the use of hospital medical information systems as a means to help contain hospital operating costs. An HMIS is a computerized communication and information handling system. It receives information from hospital departments, processes it, and maintains medical and financial records about each patient. The HMIS makes this data available hospitalwide for patient care, administrative and business management, and other purposes such as research.

HMISs are an outgrowth of specialized computer software programs which were designed for diagnostic, therapeutic, administrative, and financial purposes. These programs were integrated into information systems by several commercial firms beginning in the late 1960s, and by individual hospitals through self-development efforts.

These systems evolved because:

--Hospitals must coordinate and communicate massive quantities of medical data.

--Third party payment systems and Medicare and Medicaid programs have increased requirements for data to assure the validity of claims.

--Computers can increase efficiency and reduce or contain costs through substitution of capital equipment for costly hospital workers.

TRENDS AND FUTURE GROWTH

According to a February 1978 market analysis, the use of HMISs has grown at a cautious rate. Nevertheless, the funds

spent for these systems are substantial. The analysis shows that the market for these systems was $419 million in 1977 and is expected to increase to $939 million by 1982.

In addition, a noted HMIS expert estimates that half, or about 900, of the larger (200 beds or more) short term general hospitals will install HMISs by 1990. He expects this figure to grow to about 1,350 hospitals by the turn of the century.

Officials at the National Center for Health Services Research share a similar view. They indicated that if the 2,000 largest hospitals were to install such systems, costs might reach about $2 billion per year. While growth to this level will take time, officials estimated that half these hospitals will acquire HMISs within the next 5 to 10 years. Center officials told us that HMIS will be a major economic factor in our Nation's hospitals.

THE NATIONAL CENTER FOR HEALTH SERVICES RESEARCH

The National Center for Health Services Research is required by Public Law 95-623 to undertake and support research, evaluation, and demonstration projects on the

--accessibility, acceptability, planning, organization, distribution, technology, utilization, quality, and financing of health care services and systems;

--supply and distribution, education and training, quality, utilization, organization, and costs of health personnel;

--design, utilization, organization, and cost of facilities and equipment; and

--uses of computer science in health services delivery and medical information systems.

The Center is responsible for making information from such projects available to decisionmakers in the public and private sectors so that they can make more informed decisions.

The need for information about health services research was recognized in the late 1960s when the President directed that the Center's predecessor agency be established. The Congress strongly supported this proposal and enacted Public Law 90-174 providing specific authority to support health services research. This research was to provide information essential to the development of (1) effective health policies and (2) innovative approaches in delivering health services.

Under its mandate, the Center has supported extramural research in such areas as cost containment, emergency medical services, health insurance, health personnel, quality of care, and computer science applications.

In computer science research, the Center supported projects pertaining to areas such as computerized data banks, computed tomography scanners, automated analysis of electrocardiograms as well as various projects related to hospital medical information systems, such as clinical drug therapy, drug interaction warning systems, and the development of computer-stored medical record systems. A November 1978 research priorities statement specified that the Center would continue to conduct and support projects involving the design, demonstration, and evaluation of the use of HMISs in order to develop information about

--the explicit benefits that can be realized from HMISs and

--the economic, social, and political consequences of computerization.

The Center was interested in these issues as early as 1971.

LITTLE KNOWN ABOUT THE EFFECTS OF HMISs

The Center has been deeply involved in the development and application of computers in health care settings and in dissemination of information about HMISs to decisionmakers for over 10 years. However, the Center has studied the impact of only one commercially sold HMIS at only one hospital. It found that this HMIS helped reduce nursing costs, but it also increased total hospital costs. The Center has not studied this HMIS and others in different hospital settings. As a result, questions about costs, benefits, and confidentiality of medical records are left unanswered. Center officials attribute their inability to make more studies to a lack of funding.

The Center funded two studies of this commercially sold system in a 464-bed community hospital in California. The hospital serves patients under the care of its own physicians. The client population is primarily suburbanites, relatively young (69 percent were between the ages of 14 and 64) and of middle to upper-middle income level. Although the hospital is not associated with a medical school, it does participate in several teaching programs for health care professionals such as nurses and radiology technicians.

In 1971, the Center awarded the hospital a demonstration and evaluation contract totaling $1.2 million. This included funds to install the system in all departments and to make sure it worked properly before evaluating it. About $50,000 of the $1.2 million was for an economic evaluation. This evaluation was made by hospital staff to determine how much the hospital should pay the HMIS vendor for use of the system.

Also in 1971, the Center awarded a $696,000 contract to Battelle Columbus Laboratories to make a comprehensive, in-depth evaluation of the medical, technical, organizational, and economic impacts of the system on the hospital. However, Battelle was precluded from making an economic evaluation until the hospital completed its study.

The first of Battelle's evaluations pertaining to medical, technical, and organizational impacts was released in December 1975. Battelle found the system had improved health care delivery. For example, the system:

--Permitted the nursing staff to reduce the amount of time spent on clerical tasks, facilitated better planning of patient care, and helped to improve communications among nurses and ancillary departments, such as pharmacy and radiology.

--Improved the ability of the hospital staff to deliver patient care as measured by more readily available, more complete, and more accurate information used for administering care and for monitoring patient progress. Moreover, the timeliness of tests and medical procedures had generally improved because of better communication and coordination among nurses, doctors, and supporting hospital departments.

The hospital's economic evaluation also was released in December 1975, and concluded that on a per patient-day basis, the annual cost savings were between $360,000 and $600,000. Cost per patient-day is important to the hospital administrator because many health insurance carriers use it as a basis for reimbursement.

The hospital's evaluation consisted of studies of specific tasks--such as nursing--that were most likely to be affected by HMISs, rather than an analysis of the impact of HMISs on total hospital costs. Accordingly, the purpose of the Battelle study was to analyze the impact on total hospital costs.

The Battelle economic study, completed in September 1979, was not as encouraging as the hospital's evaluation.

The study concluded that the system reduced the cost of operating departments such as nursing and pharmacy. The system improved the efficiency of nursing care, reducing nursing costs per patient by 5 percent. Nevertheless, on a per patient-day basis, these and other savings were not sufficient to offset the $947,000 needed to operate the system; hospital expenses increased by $677,000 as a result of the system.

Battelle's recommendations were basically the same as those in its December 1975 study. Some of them are:

--The barriers to wide scale adoption of this technology should be identified. These may include inability to finance transitional and start-up costs.

--Comprehensive hospital medical information systems should be demonstrated and evaluated in other types of hospitals, such as large urban hospitals and Federal hospitals, to determine the extent to which benefits can be realized in other hospital environments.

--A study should be made to determine the ways in which physicians' practices have been changed through their direct interaction with HMISs.

Additional study is needed

The Center acknowledges that the results of its studies at the California hospital are not sufficient to adequately assess the impact of this new computer technology on hospitals and patients. An executive summary prepared by the Center on the impact of this HMIS on hospital costs noted:

> "It is not known what the effects of a comprehensive medical information system would be in a larger or smaller hospital or in a hospital with different characteristics, such as a specialty hospital."

The summary concludes:

> "The study * * * is but an initial step in the necessary evaluation of a new technology. Future studies are needed because of the lack of information about the effectiveness of such a system in other hospital settings, and because the results of this study raise additional questions. The potential advantages of a new technology deserve a fair assessment, as do its economic consequences. Widespread acceptance and implementation of hospital information systems should not be promoted indiscriminately without more reliable information on their cost effectiveness."

Others also have expressed a need for more study of economic and other issues of the development and use of HMISs.

In a November 1977 report, the Office of Technology Assessment concluded that some benefits such as cost savings and timeliness of patient data have been documented, but other anticipated benefits as well as possible disadvantages of HMISs have not yet been carefully studied. This report was requested by the Senate Committee on Human Resources because of its increased concern over the quality and rising costs of medical care. The Office of Technology Assessment also concluded that the issue of when and how the Government should get involved in the development and use of HMISs needs to be addressed because:

--The systems are a costly technology. Initial costs for implementation may amount to millions of dollars, and operating costs may exceed a million dollars annually in a medium-sized hospital.

--Development and widespread use of these systems could proceed indiscriminately.

During May 1978 hearings held by the Subcommittee on Domestic and International Scientific Planning, Analysis, and Cooperation of the House Committee on Science and Technology, several witnesses discussed the potential of HMISs to help control the growth of medical costs. They also discussed the need for more evaluations of these systems to answer questions about benefits and disadvantages. For example, one witness stated:

"While computers and medical information systems have great potentialities for controlling cost, improving quality and assisting the patient * * * they also have the potentialities for adding to the cost of health care without any of these benefits. This undesirable state can be reached, for example if * * * medical information systems are merely added to current costs and potential benefits are not realized."

Concerns have also been raised about the confidentiality of computerized medical records. In its July 1977 report, the Privacy Protection Study Commission concluded that large, automated information systems pose new problems from a protection viewpoint and cited the need

"* * * to spell out the rules under which personnel within a medical-care institution shall have access

to all or part of an automated medical record and the necessary levels of physical security for automated records * * *."

To assure that medical records in HMISs are protected adequately against unauthorized access and disclosure, we believe hospital administrators will need independently validated information on whether the controls designed into HMISs are sufficient and whether they function as intended. This kind of information could become even more critical if the Congress enacts the recently proposed Privacy of Medical Information Act (H.R. 5935). The proposed legislation prescribes, among other things, rules to guard against the unauthorized access and disclosure of medical records maintained by medical care facilities.

Why more studies have not been made and current initiatives

Center officials told us they lack the funding for more studies. According to these officials the total extramural research budget for the Center has dwindled from $51 million in fiscal 1972 to $15.3 million in fiscal 1979. Cost information provided us by the Center shows that its total extramural research budget for fiscal 1972 through 1979 was $224.2 million of which $64.1 million was spent on projects pertaining to the use of computer science in health services delivery and medical information systems. As shown in the following table, about $29.5 million was spent on projects related to HMISs.

Fiscal year	HMIS-related projects	Other computer science projects	Total	Percentage of total projects related to HMIS
	(millions)			
1972	$ 3.7	$ 7.3	$11.0	34
1973	3.1	7.3	10.4	30
1974	6.5	6.8	13.3	49
1975	5.0	3.3	8.3	60
1976	4.0	1.5	5.5	73
1977	3.3	3.6	6.9	48
1978	1.7	2.0	3.7	46
1979	2.2	2.8	5.0	44
Total	$29.5	$34.6	$64.1	46

With the $29.5 million the Center has funded various research and development projects such as automated nurse care planning, computer-aided medical audits, and chronic disease data banks. However, only about $750,000, or about

2.5 percent of the $29.5 million, has been spent on evaluating an HMIS in a hospital setting. We are not implying that the other projects are not worthwhile, but pointing out that only a minimum amount was spent on evaluating an HMIS in a hospital setting.

Recently, the Center has allocated some of the HMIS-related funds to projects designed to aid decisionmakers in evaluating HMISs. For example, in fiscal 1979, the Center committed about $281,000 to the development of two workbooks on HMIS. One workbook is being designed for hospital administrators and is intended primarily to guide them in planning for, acquiring, and installing HMISs.

The other workbook is being designed as a guide for assessing the adequacy, risk, and likely outcomes of proposed systems. The contractor recently submitted a draft of this workbook to the Center. The Center and the Bureau of Health Planning 1/ are evaluating the draft, and if it is acceptable, the Bureau plans to issue it as a technical assistance guide to health systems agencies for evaluating requests by hospitals to install HMISs. The Bureau expects to make the workbook with appropriate guidance available to health systems agencies sometime in fiscal 1981.

At the time of our inquiry, Center officials told us they had not developed an overall strategy that would assure that HMISs are evaluated sufficiently in hospital settings to determine the systems' impact on costs and the administration of health care. Officials were uncertain as to how many additional evaluations should be made, and have not selected an approach for evaluating systems which may be selected for review.

Center officials told us they are considering two alternatives to comprehensive evaluations because they believe studies such as the one conducted by Battelle are too costly.

1/The Bureau of Health Planning is located in the Department of Health and Human Services' Health Resources Administration and is responsible for implementing the National Health Planning and Resources Development Act of 1974 (Public Law 93-641). Among other things, the Bureau is responsible for providing guidance to health systems agencies which are local planning bodies established under the act. The guidance is intended to assist these agencies in evaluating and recommending for approval certificates of need for capital expenditures of $150,000 or more proposed by health care facilities in the agencies' geographical areas.

One alternative would require an evaluator to predict potential benefits, including measurable cost savings, based on actual and estimated requirements for processing hospital information. Actual requirements would be documented about a year after implementation. The other method does not require a prediction of potential benefits. Instead, a case study on such items as implementation of HMISs and the efforts of management to realize savings will be prepared. Neither approach has the same broad scope as the Battelle studies; the alternatives do not address other issues such as changes in the quality of care and confidentiality of medical records. A Center official estimates that either of the alternative methods could be funded for less than $100,000; the Battelle contract was $696,000.

During fiscal 1980, the Center did not award any grants or contracts to evaluate benefits using any of the three methods for obtaining information about the impacts of HMISs. Nor is any fiscal 1981 funding committed to evaluating HMISs now installed in hospitals. Further, the Center has not developed a formal strategy which specifies (1) the method or methods that will be used to obtain information on the impact of HMISs, (2) how many studies should be made to provide sufficient information, and (3) completion dates.

CONCLUSIONS

We strongly support the use of computer technology because it offers significant potential for improving productivity and reducing or containing costs of many services provided to the public. In the medical area, the Center has spent over $60 million on various projects pertaining to computer technology. The Center's evaluation shows that the use of HMISs may improve the delivery of health care and reduce certain hospital costs like nursing.

Over the next several years, hospitals are expected to install these systems to contain rising costs and improve services. Expenditures for HMISs are expected to reach billions of dollars--money that must be spent wisely. Hospital decisionmakers will need objective information on the cost-effective uses of these systems and the social effects the systems will have on patients and health care professionals. Although promising, the results of the Center's studies of the system in California have not sufficiently answered such questions as:

--In which areas will HMISs reduce or contain costs in various types of hospital settings?

--Do the medical benefits associated with HMISs justify their costs?

--To what extent do the security measures in these systems adequately safeguard the confidentiality of medical records?

Following its current course of action, the Center will not obtain the answers to these or other questions. In the past, the Center allocated a minimum amount of funds to evaluating HMISs in hospital settings. Currently, it has not committed any funds, yet the private sector is developing and marketing these systems.

We believe the Center needs a plan to ensure that any future evaluations provide sufficient information on the cost effectiveness and other benefits and disadvantages of HMISs. The plan should reflect evaluation goals and objectives and the various alternatives for meeting them. At a minimum, the plan should identify (1) the method or methods used in making evaluations, (2) the number of evaluations to be made and in what types of hospital settings, (3) the means for disseminating the results to public and private sector decisionmakers, (4) the cost to accomplish the various alternatives in terms of funds and staff, and (5) completion dates.

Also, where health systems agencies receive requests to install HMISs, the agencies need guidance for determining how necessary the systems are. The Center's efforts to develop a workbook as a guide for assessing the adequacy, risk, and likely outcomes of proposed systems are expected to assist the Bureau of Health Planning in developing appropriate guidance for health systems agencies; the Bureau expects to make this guidance available sometime in fiscal 1981. We believe the importance of providing useful guidance warrants the Bureau ensuring that such guidance is issued promptly.

We believe that further evaluations of these systems by the Center should provide useful information to health systems agencies. Such evaluations should assist the agencies in applying any guidance eventually issued by the Bureau of Health Planning and provide them with current information on new technological developments and hospital experiences.

AGENCY COMMENTS

The Department concurs with our overall observations concerning HMISs in terms of

--their potential impact on the delivery of hospital based health care,

--their rapid growth,

--their potential for both cost savings and cost inflation, and

--the need for both additional evaluation and research in the area.

The Department, however, did not concur with our suggestion that it reassess its commitment of funds for evaluating HMISs: "The commitment of /Center/ funds for evaluation of HMIS is appropriate given the mandate of the law * * *."

In support of this position, the Department pointed out that evaluation of HMISs is only an aspect of one of its four major areas of responsibility involving three study strategies--research, demonstration, and evaluation. The Department also pointed out that a high proportion of the Center's funds has been spent on HMISs despite shrinking appropriations. We recognize that HMISs fall within one of the Center's four major areas of responsibility and that available funds have been shrinking. We also recognize that the Center is required to support research and demonstration as well as evaluation of these systems. Nevertheless, cost information provided by the Center shows that $64.1 million was allocated for the use of computer science in health services delivery and medical information systems--of which $29.5 million was spent on HMIS-related projects. Further, the Center agrees that only one evaluation of an HMIS has been made in a hospital setting. This evaluation cost about $750,000 or only about 2.5 percent of the funds spent for HMIS-related projects.

Apparently, our suggestion that the Center reassess its commitment of funds for evaluating HMISs was not clear. The appropriateness of the level of past funding may be questionable; however, as expressed in the draft, we are more concerned that the Center is not now committing funds to further evaluations of these systems. Thus, we are revising our suggestion to make it clear that we are recommending the Center reassess its present funding allocations to determine what funds can be made available for more evaluations. In the draft we pointed out, and the Department agreed, that HMISs will represent a significant investment in the future and that there is a potential of both cost savings and cost inflation of such systems. In a period when decisionmakers in the public and private sectors are doing what they can to reduce or slow the growth of hospital costs, we believe that funds should be allocated for evaluations which can help answer questions about the economic and social impact of HMISs.

In its comments on the draft report, the Department specified that because of the results of the Battelle studies there is a justifiably cautious approach to the implementation of total HMISs such as the type used by the California hospital, and that consequently, the Center is directing its efforts toward disseminating the information it has and funding projects aimed at enhancing the benefits of HMISs when they are implemented. The Department felt that we had understated the importance of these efforts.

We did not intend to understate these efforts nor do we believe we did so, particularly concerning the projects for disseminating information. In the draft report we highlighted dissemination efforts such as the workbooks for hospital decisionmakers and health systems agencies. On the latter project, we also encouraged the timely issuance of appropriate guidance to the agencies.

With respect to its enhancement efforts, we have added references to some of these projects on pages 3, 7, and 11 of this report. It should be recognized, however, that these projects are largely developmental efforts designed to help realize the potential benefits of HMISs. While such efforts are likely to produce useful results, we believe that further evaluations of HMISs in hospital settings are also needed to help determine future directions in the development and use of these systems. For example, more evaluations of total HMISs in various hospital settings should shed more light on the beneficial approaches to implementing these systems. Unfortunately, according to the Center the present cautious approach is based on only one evaluation.

Also, a Department official told us that because of the uncertainty surrounding total HMISs some hospitals are implementing HMISs on a department by department basis--a modular approach--because it is a cheaper way to implement a system. According to Center documents, the modular approach was tried in the early 1970s but was not feasible due to a lack of commitment on the part of all hospital department heads. The documents also indicated that the total systems approach may be better. If the modular approach is tried again, we believe the Center should plan to evaluate an HMIS implemented through the modular approach to determine the extent to which this approach is feasible and its benefits and problems.

We also suggested in our draft report that the Center develop a plan for more evaluations of these systems.

However, the Department believes that the Center has a viable plan for evaluating HMISs. It states that:

> "/The Center/ developed 'A Program Plan for Hospital Information Systems' in 1972 and is implementing it to the extent permitted by appropriations. This plan calls for, among other things, the evaluation of different types of HMISs in a variety of sites. Subsequently, elements of this plan and strategy appeared in the following documents: 'Evaluation Plan FY '73 - FY '77' of the Health Care Technology Division; Health Care Technology Division 'FY '74 Program Plan'; and 'Computer Applications in Health Care,' June 1979."

During our review, we had requested the types of documentation mentioned above from Center officials, and they provided us with a copy of the June 1979 publication "Computer Applications in Health Care." This document contains a discussion on the results of the evaluation studies of the total system used by the California hospital and the fact that an attempt to implement an HMIS by the modular approach was not feasible. In our opinion this document is not a strategy for future evaluations of HMISs because it lacks essential factors of a good plan. This document is essentially historical and does not identify how many evaluations should be made and in what hospital settings, and does not specify the amount of resources needed for these evaluations.

As for the other documents, Center officials said that because of various organizational changes within the Center, planning documents were no longer available. Our evaluation of these documents--provided to us later by the Department in support of its comments--shows that Center officials were planning, as early as 1972, more HMIS projects in various hospital settings. In our opinion, had the Center implemented its plans some of the questions about the social and economic impacts of HMISs might have been answered.

The March 1972 program plan specified that the Center's role, in part, was to foster evaluations of HMISs in settings that illuminate both the potential benefits and problems that accompany these systems, and to disseminate results to decisionmakers. The plan also specified that as many as 10 HMIS projects should be funded and that about $9.3 million would be needed during fiscal 1972 through fiscal 1975. Some of the types of projects planned included:

--Undertaking a total HMIS implementation, administration, and evaluation in a large city hospital for a 3-year period.

--Supporting the implementation and evaluation of an HMIS in an overburdened hospital serving the disadvantaged.

--Starting a second project which required the implementation of an HMIS through the modular approach.

The other documents cited by the Department did, in fact, contain elements of the 1972 program plan.

We have revised our suggestion to recognize the existence of this 1972 program plan. Although the planning documents were once beneficial, we believe they must be updated to ensure that any future evaluations provide sufficient information on the benefits and problems of HMISs. The plan should be updated for the following reasons.

--Milestones for completing projects are outdated. For example, studies of the systems' impacts and efficiencies were to be completed by fiscal 1978.

--The planning documents do not identify which HMISs will be evaluated.

--Funding requirements are stated in 1972 dollars and are identified only through fiscal 1975. To provide Department management and the Congress with more realistic budget data, project needs for current and future years should be stated in current dollars.

--Recommendations made in the Battelle studies should be considered in identifying the objectives of further HMIS evaluations.

--Emphasis and concerns over the confidentiality of medical records require that an evaluation of confidentiality be included as part of any project.

--The Center is currently considering other approaches for evaluating HMISs and those approaches should be included in an HMIS evaluation strategy.

The Department concurs with our observation pertaining to the timely issuance of guidance to the health systems agencies.

"The Bureau of Health Planning already has plans to undertake appropriate and timely action to issue appropriate HMIS materials and guidance to HSAs based on the /Center's/ workbook."

RECOMMENDATIONS

To assure timely answers about the effects of HMISs on cost, patient care, and confidentiality, we recommend that the Secretary of Health and Human Services direct the Center to reassess its fiscal 1981 funding allocations to determine what funds can be allocated to evaluating these systems, and to update and implement its program plan to assure that future funding allocations are provided for more evaluations. Further, we recommend that the Secretary direct the Bureau of Health Planning to act to ensure that appropriate HMIS guidance is issued to health systems agencies on a timely basis.

OBJECTIVES, SCOPE, AND METHODOLOGY

Our review was made to determine what has been done to answer questions on the social and economic impact of HMISs. Because of expected widespread use of these systems, their potential for cost savings and impact on health care delivery, and congressional interest in their evaluation, we reviewed the Center's efforts to support evaluations of HMISs in settings that illuminate both the systems' potential benefits and problems. Thus, we did not review the Center's effectiveness in accomplishing its other missions and this report is not intended to dismiss the Center's accomplishments in other areas of health services research.

To accomplish our objectives, we reviewed applicable legislation, studies, reports, project documents, funding and budget data, and other related records. We also interviewed responsible Center officials, representatives of manufacturers of commercially sold HMISs, and officials of various medical associations. In addition, we visited several hospitals using or developing HMISs.

APPENDIX II

DEPARTMENT OF HEALTH AND HUMAN SERVICES
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

Office of Inspector General

JUL 31 1980

Mr. Gregory J. Ahart
Director, Human Resources
Division
United States General
Accounting Office
Washington, D.C. 20548

Dear Mr. Ahart:

The Secretary asked that I respond to your request for our comments on your draft report entitled, "Computerized Hospital Medical Information Systems--Evaluation Guidelines and Further Assessments Can Help Assure Benefits from Large Projected Investments." The enclosed comments represent the tentative position of the Department and are subject to reevaluation when the final version of this report is received.

We appreciate the opportunity to comment on this draft report before its publication.

Sincerely yours,

Richard B. Lowe III
Acting Inspector General

Enclosure

cc:
D.L. Scantlebury

COMMENTS OF THE DEPARTMENT OF HEALTH AND HUMAN SERVICES ON THE GENERAL ACCOUNTING OFFICE DRAFT REPORT ENTITLED "COMPUTERIZED HOSPITAL MEDICAL INFORMATION SYSTEMS--EVALUATION GUIDELINES AND FURTHER ASSESSMENTS CAN HELP ASSURE BENEFITS FROM LARGE PROJECTED INVESTMENTS"

GENERAL COMMENTS

The Department concurs with the overall observations of the General Accounting Office (GAO) in reference to Hospital Medical Information Systems (HMIS) in terms of their potential impact on the delivery of hospital based health care, the rapid growth of such systems, the potential of both cost savings and cost inflation of such systems, and the need for both additional evaluation and research in the area.

Unfortunately though, we believe that the report substantially overstates the relative importance of HMIS compared to the remainder of the mandate which the National Center for Health Services Research (NCHSR) operates under. Similarly, the report substantially understates the degree of effort placed on this subject by the Center. Also, there are several other problems with the report, which we discuss in the "Technical Comments" section of this response.

The Center's mandate is much broader than that discussed by the report. GAO does not recognize exactly the full scope of the Center's mandate under the PHS Act, Section 305 (b)--the level of total required Center effort in very broad subject areas; the various types of methodologies required (research, demonstration, and evaluation), and the fact that HMISs are only one portion of the required computer science study area.

In short, the report implies that evaluation of medical information systems is the principal activity of the Center rather than research, demonstration, and evaluation in health systems, manpower, facilities, and computer science. Also, the GAO report focuses on only one out of more than 40 Center demonstration and evaluation efforts related to HMIS. Unfortunately, it neither puts that effort in its proper perspective nor does it recognize the significance of numerous other related Center activities.

Nevertheless, the Center has played a dominant role in the development of HMIS. It has supported key research, demonstration, and evaluation efforts in the field and made important contributions to developing the methodologies necessary to evaluate these systems. It is important to note that as the methodology for evaluating medical information systems has been improving under the auspices of the Center, so has the development and standardization impact of HMIS. The Center has also demonstrated and documented the benefits of HMIS and carried out research and development activities essential to its progress.

Most importantly, the actual proportion of the Center's extramural research budget for the FY period 1972 through 1978 was 14 percent ($48,446,904)--a figure considerably higher than the less than one percent proportion appearing in the GAO report. (See GAO note below.)

GAO RECOMMENDATION

"To assure timely answers about the impacts of HMIS on cost, patient care, and confidentiality, we recommend that the Secretary of Health and Human Services direct the Center to reassess its commitment of funds to the evaluation of HMISs as required by the 1978 law, and to develop and implement a plan for obtaining needed answers."

DEPARTMENT COMMENT

We do not concur. The commitment of NCHSR funds for evaluation of HMIS is appropriate given the mandate of the law (PHS Act Section 305 (b)):

". . . the Secretary, acting through the Center, shall undertake and support research, evaluation, and demonstration projects. . . respecting--

"(1) the accessibility, acceptability, planning, organization, distribution, technology, utilization, quality, and financing of health care services and systems;

"(2) the supply and distribution, education and training, quality, utilization, organization, and costs of health manpower;

"(3) the design, utilization, organization, and cost of facilities and equipment; and

"(4) the uses of computer science in health services delivery and medical information systems."

It should be noted that the allocation of funds to HMIS over time has been at a relatively steady and high proportion despite steadily shrinking appropriations to NCHSR, and given that HMIS represents only one aspect of number (4) above and evaluation is only one of the three study strategies required by the law.

The HMIS project singled out in the report has had a profound impact on the field. While it convincingly demonstrated that a large, comprehensive system, requiring physicians to operate a computer terminal, could be successfully implemented, it did not provide equally convincing evidence that these systems are cost justified. As a result of this carefully

GAO Note: According to a Department official, this information was based on preliminary data obtained from the Center. Data subsequently submitted to us indicated $29.5 million was actually spent on HMIS-related projects during the period fiscal 1972 through 1979. Based on this data, we revised the one percent shown in the draft report.

APPENDIX II

documented and frequently referenced study, there is not only a wide appreciation of the potential benefits that might be derived from such systems, but also a justifiably cautious approach to their implementation.

Consequently, NCHSR has directed its efforts towards first documenting and disseminating what it already knows, then developing elaborations and enhancements of HMIS that will move these systems toward the realization of their potential. The documentation and dissemination effort is reflected in the following activities: a grant to produce guidelines for HMIS; a contract to provide a workbook for hospital administrators to aid in system implementation; a study of alternative methods for examining the cost impact of HMISs; numerous journal articles and presentations at professional meetings describing the NCHSR research, demonstration and evaluation progress in HMIS; and an evaluation of various less comprehensive HMISs.

Elaborations on and the enhancements to HMIS aimed at realizing their potential include the following development activities funded by NCHSR: automated nurse care planning; computerized dynamic nurse staffing; computer-aided medical audit; an in-house designed HMIS; drug-drug interaction warning; departmental automation, e.g. radiology pharmacy, etc.; chronic disease data banks and other medical decisionmaking aids; the problem-oriented medical information system; and a design methodology for information systems. These activities have been widely reported in the professional channels. An extensive listing of these activities is contained in the NCHSR publication Computer Applications in Health Care.

In addition, NCHSR developed "A Program Plan for Hospital Information Systems" in 1972 and is implementing it to the extent permitted by appropriations. This plan calls for, among other things, the evaluation of different types of HMISs in a variety of sites. Subsequently, elements of this plan and strategy appeared in the following documents: "Evaluation Plan FY '73 - FY '77" of the Health Care Technology Division; Health Care Technology Division "FY '74 Program Plan;" and "Computer Applications in Health Care," June 1979.

GAO RECOMMENDATION

"Further, we recommend that the Secretary direct the Bureau of Health Planning to take the action necessary to assure that appropriate guidelines are developed and issued on a timely basis."

DEPARTMENT COMMENT

We concur. The Bureau of Health Planning already has plans to undertake appropriate and timely action to issue appropriate HMIS materials and guidance to HSAs based on the NCHSR workbook.

GAO Note: Technical comments have been excluded.

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