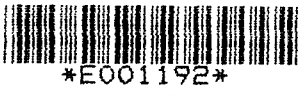
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COMPUTERS IN HEALTH CARE

HEARINGS

BEFORE THE

SUBCOMMITTEE ON DOMESTIC AND INTERNATIONAL SCIENTIFIC PLANNING, ANALYSIS AND COOPERATION

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

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Mr. SCHEUER. Perhaps you would just care to chat with us for 10 or 12 minutes and then we could have some questions.

Dr. LINDBERG. I would be delighted to and I thank you for the opportunity of being here.

TESTIMONY OF DR. DONALD A. B. LINDBERG, DIRECTOR, HEALTH CARE TECHNOLOGY CENTER, UNIVERSITY OF MISSOURI, COLUMBIA, MO.

Dr. LINDBERG. I agree with many of the things I have heard both today and the day before. I won't resay them because many of them are in my printed statement.

I would like to make three points to commence with. Firstly: I do want to urge that one believes that computers have a great contribution to make to health care and biomedical research. This probably would hinge upon their function in medical recordkeeping in the first place, and a second major emphasis, mainly the representation of medical knowledge.

Second: You had asked in your letter about the Federal Government's policy with respect to support of research in computers and medicine, what it is and what it might be. I would like to say that if it has a policy, it is a "fall through" option. It is ad hocism as you referred to, and it is totally unsatisfactory.

Mr. SCHEUER. What is totally unsatisfactory?

Dr. LINDBERG. If the Federal Government has a policy it is an unsatisfactory one and it is not a cohesive policy. It is subject to the criticism of on-again, off-again funding.

Mr. SCHEUER. Are you talking about HEW?

Dr. LINDBERG. Yes.

Third: This can be corrected. I do think that the statements that Ms. Hanft has made are pointed in exactly the right direction. They say that there will be a cohesive policy and there will be an office which draws together the problems of support in this field.

I question if it is possible to do all of that within HEW and I recommend that the committee consider an interagency strategy.

Mr. SCHEUER. If there is anything more unwieldy than a Government agency capability it is an interagency capability. Our record with interagency coordinating mechanisms has generally been a disaster. It usually doesn't work. But anyway——

Dr. LINDBERG. I would have to disclaim any intimate knwoledge of how the Government should really be organized and perform internally, but I think the issue of——

Mr. SCHEUER. One of the basic principles down here is when the subject is everybody's data it is nobody's data, and when you have six or eight agencies coordinating something and nobody has exclusive responsibility, everbody does their own thing. It not only falls between two chairs but it falls between four, five, or eight chairs.

We just don't seem to know how to make interagency coordinating bodies work. Everybody is concerned that they are not going to get the credit, and if it isn't part of their turf nobody cares. That's just a fact of life. And whatever you put on the organization chart, no matter what, very little seems to flow from these efforts. That has been our experience anyway.

Dr. LINDBERG. It is a serious problem that I think you and the staff pointed to, for HEW to work with industry on computer work. That has not been smooth even within HEW. I think one possible approach to it is to include the National Bureau of Standards, which is certainly the most academically oriented within the Department of Commerce. It has in fact involved itself very positively and significantly in medical computing in the past.

Mr. SCHEUER. That's the first I've heard of that.

Dr. LINDBERG. Both through a series of very careful studies on privacy which resulted in the definitive documents on the subject of medical privacy. Also they are participating with the three armed services with the development of TRIMIS, the triservice medical information system.

I think there are many aspects of the medical computing problem. Certainly it is not the primary responsibility of a commerce agency, but on the other hand subparts of the problem are very relevant, and NBS has been very interested in it.

Let me stress, if you will permit, one aspect that has not been directly talked about in the last 2 days—I was not in New York, but I mean the 2 days in Washington—and that is the National Library of Medicine. Their primary mission in the Federal Government is to store, access, and disseminate biomedical information.

Naturally this has taken the form of books and documents over these many centuries. But in this modern computer age it is possible and reasonable to represent much knowledge in a machine form. Indeed, no computer system can do anything until the knowledge is represented in machine form.

That is an area of research which can have a number of names but "artificial intelligence in medicine" is one of the keys to that area.

There are now a number of systems in which this representation has been successful and in which they do a day-to-day realistic job. It is no longer a pie-in-the-sky business. People in that field are no longer making robots and chess-playing games. They are making treatment selection games and antibiotic drug selection functions, et cetera.

Now, that is in the mainstream of the National Library mission and also in the mainstream is a series of training grants. NLM is, so far as I know, the only agency in Government that supports medical information science and medical computer science training grants. The only place.

I would like to take issue with—maybe it's a difference in our phraseology—the previous testimony of the AMA, I will read with extreme interest the statement that tells me the number of medical schools which have programed teaching medical students about computers in medicine because I strongly suspect that the count would be zero.

Mr. SCHEUER. Look, they're right here. Why don't we find out.

Mr. POLLI. Let me only make the point that in fact when I visited Dallas, Tex., to attend the annual convention, not in 1977 but in 1976, they have a policy of permitting medical students in the area to come in for a nominal fee, if anything at all, and they had a booth and I met a student who was very upset, a medical student from the University of Texas. He was very concerned. Why was he learning basic Fortran when he should really be learning applications in that area? We commiserated for a while and I laid

out a program and I told him to go back to the director and say, "Sir, I talked to some people in this area and here is how we should modify a program that exists right now for teaching medical students about computer technology and getting away from the hard bolts down into the specific application and practices." So the only thing I can comment on is that I have one counterexample.

Dr. LINDBERG. I don't think it's a counterexample. Is he a medical student and is it a required curricular course?

Mr. POLLI. The answer to the two questions is, he was a medical student and it was a required course.

Dr. LINDBERG. I will read it with great interest.

Mr. SCHEUER. You will give us a list, to the best of your ability, of the schools who are integrating computer training into their medical training.

Dr. LINDBERG. That is certainly a desirable aim. And that is exactly what the National Library of Medicine training grants are trying to stimulate. There are only 10 schools and I have visited them. I think in each case there is nothing approaching this subject. I think there should be. I in no way underemphasize medicine's need for a whole lot of other professional participation in the way of bioengineering and computer science and so forth. But I think it is key to get medical students trained in this techology early in the game when they are young and malleable so that they will retain that understanding the rest of their lives.

I was surprised somewhat to note how greatly you were interested, sir, in the presentation of Dr. Brandt, and I'm very pleased that he and you talked about it. Well, I was surprised.

Mr. SCHEUER. Why were you surprised?

Dr. LINDBERG. I had expected you would be more concerned with hospital systems and their direct application to health care and their effect on hospital per diem charges.

Mr. SCHEUER. We are interested in that, too.

Dr. LINDBERG. I was happy that you understood immediately that change in the per diem is not the way to evaluate a system and that its effect on societal health care cost is really the way to evaluate it.

Mr. SCHEUER. The thing that scared me is an implication from Dr. Weed's suggestion that at the end of the year you can evaluate what a doctor has really accomplished. The prospect of applying that kind of a computer system to Congressmen—our constituents being able to figure out at the end of the year what we have accomplished—is something that I think 535 Members of this body would feel a little threatened by. But seriously I think the members of this committee who have participated in these hearings have really had an eye-opening and mind-opening experience.

Dr. LINDBERG. I think you should realize that, in spite of the assurances everything will be smooth in government with respect to computers in medicine, that the perception one has from outside the Government is really different.

Mr. SCHEUER. I don't think anything is really going to be smooth. This morning, you heard Ruth Hanft, who is one of the truly great people in government; every time I asked her a question about how could this be done or how that could be done, she would say, "Yes; it's a great idea but just think about the barriers, think about the impediments, and think about the roadblocks." Her instinctive reaction was to recognize all of the things that were combining to defeat any progress in this area.

Of course, she is right. Those are the roadblocks out there, so any progress that is made is something that is encouraging. It's not going to be easy. I take great hope from the attitude that I have heard from the three AMA representatives this morning. After all, they probably have as much to do about the mindset of the future generation of doctors in this country as any other institution, perhaps apart from the medical schools themselves. If my senses tell me anything, it is that the AMA is taking a very creative and forthcoming approach about the involvement of the computer in health care.

Maybe I am naive and maybe I am missing all kinds of signals but this is what I am picking. But I think this is a good augury of things to come and I hope they will be having some communication and impact on the State and county medical organizations. The Governments itself is not organized to do this either within HEW or among all of the other agencies involved. Neither are we organized particularly well in the classic sector. There is the problem of physician resistance and a feeling that he is threatened by all of this technology and that it sort of demeans his ability to play his fine art for the practice of medicine. But there are good things moving too. As I say, we have heard from the AMA people and I think their attitude bespeaks hope for the future.

Dr. LINDBERG. I have been installing computer systems since 1961 and I have almost never heard a negative attitude from the medical people. They may be "from Missouri" and need to be shown. Their attitude is neutral to positive, but I have not found the resistance that Mr. Gallagher referred to. I think it is mythological. I think it is reasonable skepticism about systems that have not yet come to full flower.

Mr. SCHEUER. Well, that's healthy.

Dr. LINDBERG. That is very healthy. I don't think a major obstacle is the M.D.'s resisting the computer applications.

Mr. SCHEUER. What do you think the major obstacle is?

Dr. LINDBERG. Technology transfer. Nobody is in charge of seeing that it goes from innovation to development, to demonstration and then out to the end where it gets into industry. We have operated as if NIH support will terminate once a research problem is successfully pursued. Once a system works, NIH support stops and it is extremely difficult for those systems ever to get over that chasm to the National Center for Health Services Research where the funds are now being sharply limited, and then from there to industry. It almost never happens. Yet, it is that full spectrum of technology development which really should be at the center of Government interest. In other words, it knows how, through NIH, to buy creativity but it does not know how to get that creativity transferred over so that the hospital administrator can ultimately buy it. He cannot buy development. He can only buy from a vendor, and the technology has to get over to industry before he can benefit from that. Much of it never does get that far.

Mr. SCHEUER. Dr. Wells suggested I may have been overly skeptical about the possibilities of improved interagency cooperation.

Why don't you describe to us the kind of interagency cooperation you perceive taking place?

Dr. LINDBERG. I think, Mr. Scheuer, the relevance of a National Center for Health Services Research is very obvious, and that subject has been addressed a number of times today and the day before. In the same way, the relevance of the National Institutes of Health and their role in sponsoring basic research and innovation is quite clear. Everybody in this field knows that for a development at NIH to get to implementation and demonstration in a national center is extremely difficult. Most developments just simply do not make it and it is certainly the case that nobody is in charge of seeing to that transition. That just doesn't happen. And then beyond that is the issue of getting the development into industry. So I see the most logical industry representation being from Commerce and the National Bureau of Standards, who, in fact, have a computer science institute. I see the NIH side being represented by the National Library of Medicine whose prime task it is to deal with knowledge representation. I think NLM could very logically serve as a lead agency, because I think they have strong credibility and ties with the academic community. They have good management and are currently proposing to commit themselves to a major computers-in-medicine program.

Also, strengths on the National Institutes of Health side certainly include the Division of Computer Research and Technology, Dr. Pratt's organization, which I guess is for service within the NIH. There is also the biotechnology resource branch which has sponsored at least two major good systems in this area, and CLINFO, which is a computer record system. In the case of CLINFO, they did attempt this technology transfer I spoke of. They attempted to use Federal funds to get a competitive contract which was won by Rand Corp. to supervise the situation of 3 years to put the systems in at Baylor and Oklahoma and then to carry it further. So it will now, I believe, move out into industry and be marketed by Date General Corp. So BRB has attempted in their own shop to make that entire transition happen. They also sponsor among other resources the Stanford SUMEX facility. It is tied on the east coast to Rutgers, which is the other major mode in the network. So there is a good bit of expertise and real competence in government, no question about it. I really think the problem, sir, is that nobody is in charge of the transition. NIH is in charge of the creativity and the National Center seems to have placed itself in charge of evaluation and assessment, but nobody is in charge of the transition.

The industry is not represented in either of those two health agencies. So the combination is a very powerful interagency committee. It is known that the VA offers the opportunity for implementation at 160 hospitals, and they have created a research institute.

Mr. SCHEUER. The VA has.

Dr. LINDBERG. Yes; in fact, they fund centers in parallel with the National Center for Health Services Research. In other words, where there is one funded by HEW's Health Resources Administration, there will be a Health Resources Center funded by VA. There are a lot of other relevant parts in Government, but I think those are the key parts.

I humbly express my inability to know how the Government should be run. I think anybody can see an intuitive weakness in the strategy of interagency anything. But on the other hand, I think the present policy is a weak one. It is not one which I would put my faith in. I think we have been issued a bunch of promissory notes.

Mr. SCHEUER. That's exactly right. Right now there is very little going on and what is going on is not being coordinated. Ruth Hanft is simply giving us a projection of things to come, hopes, and ideas. I take some hope from the fact that Peter Bourne seems to be interested in this area. He is a close confidant and adviser to the President on health affairs.

Certainly, an effective coordination could come from him if he wills it. He is an enormously talented individual. There seems to be a certain amount of ferment and there seems to be, if I judge Ms. Hanft's remarks, a certain understanding that the potential is there and they are taking advantage of it. There is a certain amount of movement going on. New responsibilities are being created. Of course, the question is how will they work.

Dr. LINDBERG. It really does look to the outside person, the university researcher, as though this whole field has ground to a halt in front of a brick wall. The Study Section on Computers and Biomathematics at NIH was abolished last June. The program for support of computers in medicine at the National Center has, I think, adopted a smart strategy. It has decided that it doesn't have very much money to put into this field, so it has put most of it in the PROMIS system. Whether that is the right system or not, of course, is a matter of personal and professional judgment. But I think the strategy is wise. They probably in fact cannot support very much. I think you ought not derive the impression that PROMIS is an example of many systems being funded. That is the 100-percent sample. That is it. That's where the money is going. So, it appears extremely difficult to conceive of starting a new system now.

The Government seems, from the outside, to be in a phase of evaluating what already exists. That is very discouraging from the point of view of a researcher. That doesn't seem like the proper outlook.

Dr. WELLS. Dr. Lindberg, the proposal that you are suggesting on pages 30 and 31 of your testimony, the interagency strategy which you were just discussing with the chairman our previous reviews in the hearings last fall on computers in education, would, I think, tend to support your notion. We found that a great deal of the expertise and knowledge about computers in education resided in Department of Defense, of all places. Some of the key witnesses and the key suggestions came from Department of Defense. They turned out to hold a veritable gold mine of experience. So I do believe that your suggestion is worthy for us to consider. I do take it that you do not offer this as a specific coordinating body and your listing of various entities is illustrative. Do I understand it correctly that way? It is a conceptual approach.

Dr. LINDBERG. It is a conceptual approach, prefaced by my confessing that in no way is my expertise in political science or government operations. But I would stick with that list, and now also

add ADAMHA which has the alcohol and drug abuse programs. They are highly relevant.

One tends also to forget the great successes of medical information systems and mental health. In fact, it is one of the exceptions in which funding has been relatively consistent and the outcome has been very favorable. The Rockland State System which is MSIS, Multi-State Information System, got a total of about $10 million of Federal funding over a period of 6 or 7 years and is a bang-up success. It is said to serve some 1300 different hospitals and mental health clinics and centers. At one time at its high water mark I think there were 11 different States involved. It changes, of course, from month to month. But, it was, in any event, a very successful program; one the Government and the inventors can be quite proud of. I think it is the case that the alcohol and mental health agencies change in the way the Government is organized from time to time and I'm not sure where they are—if they are properly called HRA or not—but wherever they are they are pretty big and they are pretty important and they have actually made some technological successes. I think I gave you a good list.

Dr. WELLS. Yesterday Dr. Cramblett and Dr. Pengov from Ohio State suggested that one organizational entity that could be considered would be a new institute for computer science research with specific relevance to the health care system.

One of our questions which then followed is: Would it be possible to consider this as an umbrella institute in which you would look at education also, since there are many commonalities where computers are affecting various facets of society? If you take some of the testimony of these hearings and eliminate the words "health care" and put in "education" you will see many of the same things we heard last fall being repeated. So the commonalities appear to be very evident.

What is your reaction, first, to this notion of a special institute devoted to computer sciences in the health care area without specifying where it would be located as an entity and, second, the notion of it being an umbrella-type of institute. How does that relate to your interagency strategy?

Dr. LINDBERG. Well, I didn't hear the testimony and haven't read it, so I haven't thought about it adequately, but it strikes me that the set of agencies that I mentioned was in no way an arbitrary list. I mean those are really the key actors in the medical computer area and each one of them has a lot of competence within its organization and a lot of mission experience and adequate funding.

The reason that they all need to be involved is that none is adequate by itself. So I guess I would worry a little bit. In a way it would be wonderful if there were such an institute as you spoke of. It would face the same problems the Government faces right now; namely, if it is on the NIH side, it will be strong in scholarship but will not have any tradition of strong contacts with industry nor with health care delivery.

In other words, the same weaknesses might actually be a problem for it.

Dr. WELLS. Let me read the recommendations specifically.

We recommend creation of a National Institute of Health Computing within HEW whose function would be to plan, coordinate and undertake in health a broad series of research, development, diffusion and evaluation activities related to the use of computing information science and telecommunications in health. Currently, Federal funding in health activity is dispersed within the HEW bureaucracy, et cetera.

It expands on that point.

In summary, there is no coordination of Federal efforts and relatively small sums of money have been invested to explore the potential offered by computer technology as an extremely powerful tool * * *. There is no institutional memory for lessons learned in the past.

Dr. LINDBERG. That's all true. Is that actually an OTA recommendation?

Dr. WELLS. No; this is an Ohio State recommendation.

Dr. LINDBERG. As I said, I am not an expert on Government operations.

Dr. WELLS. From the concept of having an institute which would pull together, as they suggest, this rather broad capability, how do you view that as having a more centralized focus, at least for HEW.

Dr. LINDBERG. Let me try to say it a different way. I had the privilege of visiting Japan last April and I saw there a model that I want to bring your attention. There are many things admirable about the way they do their medicine and science. One of the things is an outfit called the Medical Information Systems Development Center whose mission is precisely what has been specified in the testimony you just read and, in fact, what I want and what many of us want; namely, a known center to go to with an integrated responsibility to see developments through from their inception until their implementation, including evaluation. A total responsibility. In Japan it is jointly funded by MITI which is the Ministry of Industry and Technology and the Ministry of Health on more or less a 50–50 basis.

I met with the assistant administrator of MITI and he showed me the budget for the last 4 years and for this year and for the next 5 years, a very orderly progress. They know that things don't happen in 18 months and that 6-month progress reports are not sensible if we're talking about building big systems. But also, there was an interesting coordination of the need for industrial development in which the aim is marketable products and the counter aims of the Ministry of Health, whose desires are improved health care and controlling health care cost and access, the same as ours. A very interesting and creative environment has been set up there. I don't think that any project in the United States has ever had funding from Commerce and HEW. I don't know what OMB would ever do if it heard of such a thing. Yet, intellectually, it makes great sense. I think that any institute will have to relate to the scholarship of academia and the knowledge representation, because that is where creativity is in our country. It will have to relate to industry, because otherwise there won't be a marketable product and that is where competence lies in that regard. It has to have enough contact with the health care delivery world, in other words, real hospitals, so that it is guided by the reality of the tests and field trials in those real hospitals. The hospitals are the ultimate market and recipient and beneficiary of the technology developed.

It is flat out impossible to develop any of the medical information systems or medical applications of computers to medicine without those.

So the institute hypothesized would somehow need to touch those three legs of the tripod, or it couldn't succeed. And if it did touch those three, and it had adequate dollars and years, then it probably could achieve its goals.

Dr. WELLS. Thank you very much, Dr. Lindberg.

Dr. MURRAY. I would like to just comment that your progress report to the National Academy of Sciences is the first written call that I have seen for a comprehensive treatment or for a national policy for a coordinated program to support computer technology for uses in health care.

Your position in the order of testimony this morning and the ensuing questions and answers do not reflect that adequately, and I wished to make sure that that was in the record. For that we are very grateful. I personally wish to cite you for an insight which is most valuable. Thank you.

Dr. LINDBERG. I appreciate the opportunity to be here. Thank you.

Mr. SALTMAN. Dr. Lindberg, have you discussed with any of the agencies that you have mentioned whether or not they could undertake, or whether their mission allows them to undetake, the efforts that you propose?

Dr. LINDBERG. I haven't presumed to go and discuss it in detail. I do know in detail the mission of the National Library of Medicine because I serve as a member of their study section, and Dr. Cummings is good enough to meet with the study section three or four times a year. I also know that they have initiated a study of their own extramural research programs through an outside review group and, in fact, that outside review group has strongly recommended a computers-in-medicine philosophy for them and they are favorably disposed toward that.

Beyond that I have not presumed to go.

Mr. SALTMAN. Particularly the group called Computer Science Institute of the National Bureau of Standards.

Dr. LINDBERG. I have not discussed this matter with them, but again through professional contacts with them I have firsthand knowledge of the goodness of their work in connection with the TRIMIS activity.

Mr. SALTMAN. So you are not aware of whether they could undertake or would undertake any other items on page 25 and page 26, items 1 through 6, beginning the formulation and evaluation of criteria, et cetera?

Dr. LINDBERG. No; I have not tried to negotiate with them. I thought it was well to give some examples.

Mr. SALTMAN. Thank you very much.

Mr. SCHEUER. Dr. Lindberg, I have appreciated your testimony very much. I share your concerns. I guess we will have to wait and see what the outcome is. Thank you very much for your testimony.

Dr. LINDBERG. I am pleased to be here and I thank you for the privilege.

Mr. SCHEUER. We will now have our last witness, Mr. Gerald Giebink, director of Health Care Management Systems, Inc. Mr. Giebink has surveyed clinical data processing in the Veterans' Administration at La Jolla. Your prepared statement will be printed in the record at this point, so perhaps you may want to chat with us for 10 or 12 minutes.

[The prepared statement of Mr. Gerald Giebink is as follows:]

PREPARED STATEMENT OF GERALD A. GIEBINK

These hearings are an example of the increasing public interest in computer use in health care. I assume that prior testimony has provided the Subcommittee with some understanding of the diversity of computer applications in health care and their potential benefits. My observations and opinions are derived from ten years of experience in medical computing research, development and evaluation, and I believe they represent a perspective balance between research interests and practical experience. I would like to acknowledge the assistance and involvement of my colleague, Leonard Hurst, in the preparation of this statement.

I wish to concentrate first on three fundamental problem areas which require further work and investigation prior to the development and implementation of a comprehensive national policy:

(1) As a prerequisite to establishing a national policy, "computers in health" concepts and vocabularies should be clearly defined.

(2) Preliminary policy should be aimed at thorough synthesis and classification of the wide range and variety of ways that computers can be used in health care.

(3) Policy should be aimed at establishing a cooperative and unduplicated research and development effort.

Finally, implementing options are discussed for the preliminary work which should precede establishment of a comprehensive national policy.

FUNDAMENTAL PROBLEM AREAS

(1) *As a prerequisite to establishing a national policy, "computers in health" concepts and vocabularies should be clearly defined.* The absence of a standard vocabulary and clear concepts and definitions is an obstacle confronting those investigating national policies. For example, a recent study by the Office of Technology Assessment [1] set forth some definitions useful for discussing policy. The study addressed the difference between medical information systems and health data systems defining a medical information system "as a computer-based system that receives data normally recorded about patients, creates and maintains from these data a computerized medical record for every patient, and makes the data available for the following uses: patient care, administrative and business management, monitoring and evaluating medical care services, epidemiological and clinical research, and planning of medical care resources." Health data systems were defined as "collections of data organized for a variety of purposes including reimbursement of health services, utilization review, assuring quality of care, and planning, monitoring, or evaluating medical care services." The study excluded health data systems and also excludes computer applications such as automated clinical laboratories, pharmacy systems, intensive care monitoring systems, and financial systems which benefit particular areas of clinical care or institutional management. Much additional work is required to develop definitions so that appropriate definition and boundaries can be placed on national research and development policies. A related problem is the need for development of a vocabulary in which computers in health care, as a topic, can be clearly discussed and communicated among individuals in federal agencies and industry.

Conceptual clarity is also needed. An understanding of the use of computers in health care is a prerequisite to adopting or implementing a national policy regarding research and development. For example, computers can be seen as both an instrument used to achieve an end and as an end in themselves. Three areas of computer application are described below, each illustrating where national policy might or might not focus:

A. Education of health professionals

Although differing in content, the education of health professionals can be viewed as similar to educating lawyers, educators, or engineers. A certain body of knowledge and the methods of applying that knowledge must be transmitted to a group of motivated people who are interested in becoming doctors or other providers of

[1] Policy Implications of Medical Information Systems, November 1977, Office of Technology Assessment, Congress of the United States.