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Telecommunications and Informatics in the United States (**)

My first introduction to the health field occurred at the National Institutes of Health. For a number of years, I designed instruments there for biomedical research. When a researcher needed an instrument to measure the activity of brain cells or required a modification to a chromatograph, I would go to his laboratory, have him explain the problem and observe the setting in which he was working. I then designed and had fabricated the instrument the researcher had requested. After a brief test in the researcher's laboratory that usually indicated the need for some fine adjustments, the instrument was delivered. The time span from request to delivery was somewhere between a few weeks and a few months.

In 1969, I started working for the National Center for Health Services Research. I naively assumed that applying technology to the delivery of health care was not very different from meeting the needs of the biomedical researcher. It came as a rude awakening when I discovered that the controlling factors in solving health services problems appeared to be more dependent on the sociology and the economics of the situation than on the state-of-the-art of the technology. The time scale from problem to solution was no longer weeks and months but years. Some of the most significant products of our research, like automated electrocardiogram analysis, the MUMPS, medical computing language, and COSTAR, the computerized ambulatory record system, took ten to fifteen years from the beginning of development to the point where a commercially marketable product was available. I make these observations, because I believe that advances in telecommunications and informatics in health will have to be measured in the same 5 to 10 to 15 year time scale. The technology is advancing a lot more rapidly than our understanding of the organizational sociology that seems to govern the rate of adoption of these innovations.

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My intention today is twofold. First to discuss with you the problems we are attempting to address with telecommunications and informatics (including the settings of those problems) and, second, to bring you up-to-date on some of the telecommunications and informatics developments of importance in my country.

What are the problems in the American health system? The first complaint is cost. The cost of health care has, for many years, risen faster than the cost of living. It has risen to the point where somewhat more than one dollar in every ten is spent on health care. This has resulted in dislocations in the economy. American automobile manufacturers who are under pressure to compete with Hondas and Fiats point out that it cost them more per car to pay for employee health insurance than to pay for the steel that goes into producing the car. Federal and State budgets are strained by Medicare and Medicaid payments for the health care of the elderly and the poor.

Perhaps, the outcry against rising costs would be somewhat muted if there were strong evidence that these rising expenditures resulted in a commensurate improvement in the Nation's health. Unfortunately, when we examine almost every objective criterion of health status, such as infant mortality, death rate and longevity, we find no significant improvement.

The escalation of health care costs has persisted in spite of a succession of measures intended to control, or at least contain, the increase. These measures have included freezes on prices, requirements for a certificate of need for capital equipment, restrictions on the addition of new beds, and most recently, prospective reimbursement based upon diagnostically related groups. All of these measures, however, relate more closely to the *structure and financing* aspects of medical care than to the *process* aspect of care. It is my view that medical care *costs* might better be controlled by focusing attention on the *processes* of medicine rather than the *financing* mechanisms, and it is here that I feel telecommunications and informatics have an exceedingly important role to play.

Let me, for a moment, delve more deeply into the questions surrounding the processes of medical care. I think those questions are best illuminated by the research done by Dr. John Wenneberg of Dartmouth College. Dr. Wenneberg studied equivalent small areas in Maine and uncovered a twelve-fold difference in hospital admissions for tonsillectomy. This same researcher found a nine-fold difference in admissions for back surgery and a 3.5-fold variation in hysterectomy. Other admissions, for ear, nose, throat, knee and dental procedures, showed variations that were similarly high. Remember that these patients were drawn from essentially the same population. They were exposed to the same climate, diet, work patterns and came from similar socio-economic backgrounds. The physicians admitting these patients to the hospital are graduates of the same medical education system. *The question then arises, "what accounts for this wide variation in medical practice?"* The answer that I suggest is that the discrepancy arises from differences in the access to and assessment of information. This, then, is the real challenge to informatics and telecommunications.

It is to assist the physician in acquiring, manipulating and interpreting information in a way that will assure the reliability and validity of the medical care process.

It is interesting to note that as the potential benefits, risks and monetary costs of medical interventions have escalated, the choices made by today's physicians have a far greater impact on the individual patient and collectively on society than ever before. At the same time, the expanding diagnostic and therapeutic armamentarium has, for many clinical problems, made the selection of a correct strategy more complex by increasing the number of available options. Thus, it has become both more important and more difficult for the physician to make decisions wisely.

One way to look at the problem is that a group of Americans who represent less than one-half of 1% of the population determine how nearly 10% of the nation's gross national product will be spent. Although physicians' professional fees represent only one-fifth of health care expenditures, they are responsible for *decisions* that govern the way that as much as 90% of each health care dollar is used. Despite the economic importance of physicians' decisions, only recently have we begun to explore the factors that govern medical decision-making. Even more recently have we begun to evaluate ways of motivating doctors to provide more cost-effective medical care.

Since I have placed the emphasis on the process of care, it may be useful to quickly review that process in order to better delineate the areas where informatics and telecommunications can be applied. Medical practice has been described as an information-intensive process, and a variety of models have been proposed to better describe and understand this activity. A simplified model of that process follows. The patient enters the system with the expectation that the physician will serve him in two ways. First, he expects that he will be provided with a plan of action to cure or improve his physical complaint. Second, he expects information that will help him to understand his medical problem. At this first contact between patient and physician, the physician, based on the patient's complaint and his own first impressions, determines a data gathering strategy. He then proceeds to collect the indicated items of history, physical and laboratory data. This data, made up of signs, symptoms, laboratory findings, history and demographic information, may be regarded as descriptors of the patient. Following the data collection phase, we come to the critical activity in the process and that is the decision-making associated with arriving at a diagnosis, selecting a treatment and formulating a prognosis.

Before the availability of computer aids, the physician would attempt to match the patient's particular constellation of descriptors with a similar constellation described in the literature (medical knowledge) and/or similar constellations that he has seen before (clinical experience). Once having arrived at a diagnosis, the physician again uses a matching process. This time, he matches the diagnosis with medical knowledge and his clinical experience in order to select the most appropriate therapy. At the same time, his predictions as to the future course this patient's problems will take are formulated in a prognosis. If the outcome

of the therapy matches both the patient's expectations and the prognosis, the patient is satisfied and will continue on the therapy until he is cured or his condition stabilizes (whichever his expectation was). If the outcome does not match his expectation or the prognosis, the patient is not satisfied and will return for a follow-up visit or go to another doctor.

Looking more closely at the decision-making phase of the process, there are essentially four elements involved. These are the patient data, medical knowledge, clinical experience and the cognitive ability of the decision-makers.

We have finally arrived at the juncture where informatics and telecommunication can gainfully be employed. Telecommunication may be used to facilitate the access to medical knowledge. With the accelerating production and accumulation of medical knowledge, it is virtually impossible for a physician to be cognizant of all of the knowledge relevant to the patient's current problems. Similarly, it is not likely that a physician can command an unbiased recall of his own clinical experience. Also, he would further benefit if he were able to share in the aggregate experience of his colleagues. Telecommunications can give him access to data bases that contain just such collections of medical knowledge and clinical experience. Frequently, the tasks of arriving at a diagnosis and selecting an optimal treatment regimen is a complex matter, involving the consideration of numerous factors. To aid the physicians, the field of informatics has produced some expert systems that augment his decision-making powers.

I will describe for you today a number of telecommunications and informatics-based expert systems that have recently come into use or are in the process of being implemented.

First, let me distinguish between telehealth and telecommunications. Telehealth or telemedicine, implies the use of communications technology between the patient and a health care provider in order to provide diagnosis, treatment or consultation. Telecommunications in this context is the transmission of medical data, information and knowledge to facilitate the delivery of health care. I will touch briefly on telehealth and spend more time looking at current examples of the use of telecommunications in medicine.

Over ten years ago, my office commissioned a number of exploratory telehealth projects. These projects are shown in the Fig. 1. Different technologies were applied in a variety of health care settings and the results examined. The general conclusions drawn from these experiments were that telehealth was technically feasible and useful and made available consultation services where they were not available before.

On the negative side, there were many legal and technical problems and dissatisfaction was expressed by some of the providets. In particular, many of the systems were too complex for the physicians to operate. Other complaints were made about the resolution, quality of the color, location of the equipment and the interruption of the providers' schedule to handle telemedicine sessions. In all cases it was found that the systems were used less than had been expected. Very few of these projects withstood the ultimate test, the withdrawal of govern-

Telemedicine 1972-1975

Picturephone	Mental Health	5 sites
2 Way TV	Rural Practice	2 sites
Cable TV	Ped/Ortho/Psych	2 sites
TV network	Med/Lab/Pharm	5 sites
TV/Telephone	Primary Care	4 sites
TV/Telephone	Anesthesiology	2 sites
2 Way TV/Microwave	Speech/Derm	3 sites

Fig. 1

mental support. My view is that only in the few exceptional cases where health care is inaccessible will telemedicine find successful application.

On the other hand, the application of telecommunications in medicine is proceeding at a rapid pace. A facilitating factor in this growth is the availability of extensive commercial data communications networks (Fig. 2). These networks allow subscribers to connect to a large central computer over their regular telephone lines. They have phone connections to most American cities. This allows the service to be provided throughout the country without the high costs of long distance phone charges. The subscriber simply pays for the time he is connected to the computer and for the data storage capacity he is currently utilizing.

Some of the systems we will be discussing are (Fig. 3).

NLM: NATIONAL LIBRARY OF MEDICINE

MEDLINE contains approximately 800,000 references to biomedical journal articles published in the current and three preceding years. An English abstract,

Telecommunications Systems

MEDLINE
AMA/NET
PHYCOM
FDA/EBB
PDO
TELERADIOLOGY

Fig. 2

Give Procarbazine, 150.0 mg. PO for 7 days.
[56.3 mg./m.sq. = attenuated to 75% following aborted cycle.
[100% dose = 200.0 mg.]

. . . . . John Doe . . 12-34-56 . . . . . .
The patient should receive chemotherapy PAVE-3A.

— CHEMOTHERAPY —	29 dec 80	6 jan 81	23 jan 81	30 jan 81	6 feb 81
BSA (m2)	2.1	2.1	2.1	2.1	2.1
OVERALL	4	4	3	3	2
Karnofsky (%)	100	100	100	100	100
PCV	39.1	40	39.4	40.4	39.9
WBC	6.9	4.5	2.1	6.6	2.8
Platelets	335	225	318	333	421
Combination Name	PAVE	PAVE	PAVE	PAVE	PAVE
Cycle #	2 A	2 B	DELAY	3 A	ABORT
Procarb., 100 mg/m2 POx7	200.0	200.0	0	200.0	0
Alkeran, 7.5 mg/m2 POx2	14	14.0	0	14.0	0
Velban, 6 mg/m2 IV	10	10.0	0	10.0	0

Fig. 3

if published with the article, is frequently included. The articles are from 3,000 journals published in the U.S. and foreign countries. Coverage of previous periods (back to 1966) is provided by back files searchable online that total some 3,500,000 references.

TOXLINE (Toxicology Information Online) is a bibliographic data base covering the pharmacological, biochemical, physiological, environmental and toxicological effects of drugs and other chemicals.

CHEMLINE is an online chemical dictionary with over 500,000 records. It contains chemical names, synonyms, CAS Registry Numbers, molecular formulas, NLM file locators and limited ring information.

RTECS is an online, interactive version of the National Institute of Occupational Safety and Health (NIOSH) publication, Registry of Toxic Effects of Chemical Substances. It contains basic acute and chronic toxicity data for more than 57,000 potentially toxic chemicals.

TDB (Toxicology Data Bank) is composed of approximately 4,000 comprehensive, peer-reviewed chemical records. It contains toxicological, pharmacological, environmental, occupational, manufacturing and use information, as well as chemical and physical properties. Compounds selected for TDB include highly regulated chemicals, high volume production/exposure chemicals and drugs and pesticides exhibiting high toxicity potential.

DIRLINE (Directory of Information Sources Online) an online interactive directory which refers users to organizations and other sources of information in specific subject areas.

AMA/NET: AMERICAN MEDICAL ASSOCIATION

The American Medical Association has sponsored a new service that thousands of physicians have subscribed. Fig. 4 describes the services that are available through AMA/NET (AMA 1-6).

1. Content areas addressed by the Medical Information Network.
2. Network services can be broadly classified as AMA/NET data bases and MED/MAIL. AMA/NET data bases contain numerous records and use sophisticated research capabilities. MED/MAIL consists of both medical communications applications such as information bulletins from the Surgeon General and an electronic mail service.
3. Lists current data bases.
4. Overview of the clinical literature reference service, EMPIRES.
5. AMA conducts ongoing research to develop and/or acquire products in content areas important to physicians, as ascertained via a representative survey.
6. MED/MAIL provides three major services.
7. Capabilities of electronic messaging.
8. Informational bulletin boards and scripts.
9. Electronic mail scripts.
10. Example of interactive scripting capability to register for CME credit.
11. Example of interactive scripting capability to order the full text of articles.
12. The network has begun and will continue to expand its International presence.

AMA/NET Information Bases

(1) Drug Evaluation Data-base
(2) Drug Therapy Information Base
(3) Disease Information
(4) Current Procedural Terminology Information Base
(5) Socio/Economic Bibliographic Information Base
(6) Clinical Literature Information Bases

Fig. 4

NEWS	News Release
ENFORCE	Enforcement Report
APPROVALS	Drug and Device Product Approvals List
IMPORT	Import Detention Lists
BULLETIN	Text from Drug Bulletin
NOTICIAS	News Releases in Spanish
CONSUMER	FDA Consumer Magazine Index and Selected Articles
SUBJ-REG	FDA Summaries by Subject
ANSWERS INDEX	Index of News Releases and Answers
DATE-REG	FDA Federal Register Summaries by Pub. Date
URGENT	Urgent News

Fig. 5

Taking the AMA/NET one step farther, this is the beginning of the list of self-taught courses for continuing medical education (Fig. 5).

Another service aimed at physicians is PHYCOM (Fig. 6). Most of the services are offered free and are sponsored by the drug and device manufacturers who advertise their products on the system.

If you choose the first item MPI, your next display would give you these two choices (Fig. 7). If you choose MEDIPHORE, for which there is a fee.

The PHYCOM medical news gives you a large number of titles of medically related news items that have appeared in the last few days (Fig. 8). If you choose any of those titles, you will see a brief, concise paragraph on the subject.

PHYCOM II Selections

(1) Medical Product Information (MPI)
(2) Medical News (NEWS)
(3) Computer News/Reviews (CNR)
(4) Financial News/Services (FIN)
(5) Medical Literature (MDL)
(7) Communications (COM)
(8) Request Catalog (REQ)
(9) Administrative Services (ADM)

Fig. 6

Medical Product Information (MPI) Menu

Free access

(1) PDR(R) On-Line/Product Database (MED)

Fee access

(2) MEDIPHOR Drug Interactions (DIA)

Fig. 7

The next example of telecommunications in action is sponsored by a government agency. The Food and Drug Administration Electronic Bulletin Board provides these services. It is a very rapid and efficient way for a federal regulatory agency to keep its clients informed.

PDQ: PHYSICIAN DATA QUERY SYSTEM

Cancer is a complex disease that can originate at, or spread to any of the body systems. The clinical management of cancer usually involves the application of an intricate treatment regimen. Meanwhile, cancer research is proceeding at a rapid pace. To keep aware of the vast volume of data that research is producing relating to the causes of cancer, its pathology, diagnosis and treatment is a challenge to any physician. Beyond keeping current with the state of the art of the disease and its treatment, there is also a need for the physician to have the information to appropriately refer the patient. Patient referral could be for

Medical News

6-OCT-1985 15:03 Soviet Paper Reports on AIDS
6-OCT-1985 15:02 Brain Tissue Probe Ordered
6-OCT-1985 15:01 AIDS Drug Focuses On Safety
6-OCT-1985 13:05 Tragedy Lingers On In Bhopal
6-OCT-1985 10:05 Dr. Aims Missiles At Cancer
5-OCT-1985 15:04 Research Center To Be Built
5-OCT-1985 15:03 AIDS Drug Tested At Hopkins

Fig. 8

What is PDQ?

- State-of-the-art prognostic and treatment information on all major cancers
- Protocol information on more than 1,000 active clinical trials from both NCI-supported and other investigators
- Directory listings of physicians and organizations that provide cancer care

Fig. 9

further treatment, or for social, psychological, educational or economic support. All of these requirements are probably beyond the information resources of most physicians.

The answer to these problems is the recently announced Physician Data Query System (PDQ) (Fig. 9). PDQ represents a major effort by the National Cancer Institute (NCI) to communicate advances in cancer treatment using computer technology. It utilizes a modern large scale computer mainframe to provide processing speech, a general purpose data base management system to provide retrieval and display functions and flexibility and commercial communications networks to provide access to an audience of physicians and other health care professionals seeking up-to-date information on cancer treatment. Information about the prognosis and treatment of 82 different types of cancer, physicians and organizations that provide health care to cancer patients and active research protocols is retrievable with a terminal or personal computer. PDQ is accessible through a series of user-friendly menus that allow searching, browsing and displaying, eliminating the need for the user to learn a specialized searching language. The basic system files are shown (Fig. 10).

PDQ Menu

(1) Description	(5) Physicians
(2) Instructions	(6) Organizations
(3) News	(7) Protocols
(4) Cancer Information	(8) PDQ Editorial Board

Fig. 10

The NCI has made a version of PDQ available through the National Library of Medicine (NLM). This version of PDQ served as a model distribution system for potential commercial vendors of PDQ and has established the feasibility of using the certain structures and pointers with an external data base management system and suggested ways of presenting the data in a user friendly manner. By distributing PDQ on the NLM system, NCI has been able to make the medical community aware of PDQ and create a demand for it. The system will most certainly improve the quality of care delivered to cancer patients. And, by assuring the appropriate and timely treatment, overall costs per patient will be contained.

If you entered the Protocols section you would be asked for diagnostic and staging information. Finally, the system will give the inquiring physician (1) the experimental protocols that are under way for that cancer; (2) which hospitals and clinics are administering the protocol; and (3) which doctors are responsible for them.

TELERADIOLOGY

The last of the telecommunications systems we will discuss is Teleradiology. Teleradiology is the transmission of X-ray images from one location to another using telephone lines or other electronic means. The technology has now developed to a point where radiological images can be scanned, converted into digital format, transmitted and then the images reconstituted on a display screen.

A teleradiology system was recently designed, developed and field tested by Mitre Corp. The results of the evaluation showed that the overal accuracy of film is consistently higher than video, by a small percentage (five percent or less); the system can perform reliably in a field setting; and projected annual costs for an operational teleradiology system, as based on field trial system expenditures and various work loads, range from $ 5.52 to $ 13.55 per case.

TELECOM CONCLUSION

I think the systems I have discussed with you today give you some idea of how the use of telecommunications is developing in the USA. We have seen both government supported and privately supported systems. We have seen rather general information systems, like PHYCOM, as well as those that deal quite specifically with a particular disease entity like PDQ.

INFORMATICS

Now, I would like to move on to informatics. One of the most promising and potentially important uses of informatics is in devising and implementing

expert systems. I have a few examples of such systems, specifically HELP, CARE, ONCOCIN and ATTENDING.

I will attempt to show you how they are used and the typical type of display they generate. The first system is HELP.

HELP

For most hospitalized patients, a physician has many decisions to make and an array of rapidly changing information to track. To manage this complex stream of data and actions may be beyond what is reasonable to expect from even the most capable of physicians. What must be taken into consideration at critical times in the course of a patient's management in the hospital are: the individual characteristics of the patient; the data that has been gleaned from his history and physical examination; results from laboratory tests; and reports of X-ray and other special diagnostic and therapeutic procedures. Even if the physician had the capability of tracking this staggering information load, there is still a difficult task left undone. That task is the interpretation of the data that is being amassed and updated. Frequently, just recognizing that some of the data lies outside of the normal range is not sufficient to understand the cause of the patient's difficulty. What is required is the ability to interpret the data in the context of the dynamics of the physiological system in question and other related information.

A computer-based system called HELP provides some of the assistance that the physician needs to effectively manage a hospitalized patient (Fig. 11). The HELP computer, using techniques of artificial intelligence, collects information about the patient from a medical record entered into the system. This record includes the patient's history and physical exam, the doctor's and nurse's notes and data about the patient from monitoring equipment like an electrocardiograph — and from laboratory test machines — like an automatic blood analyzer or an X-ray.

Help doesn't wait for the doctor to ask a question. As information comes in, HELP analyzes it and immediately begins asking for more information, suggesting tests, offering a diagnosis or reacting to the doctor's treatment plan by warning of drug interactions, allergies or other contraindications. The doctor does not have to take the system's advice. However, at some point in the patient's record, he will have to indicate why the advice was ignored. (It is always possible that the doctor knows something about the patient that the computer doesn't). The system was installed at the Arnot-Ogden Memorial Hospital in Elmira, New York, and has saved money for the hospital by making the billing system more efficient, but, more importantly, has saved money for the patient and the patient's insurer by reducing the length of stay.

A typical HELP display is reported (Fig. 11). It is terse, specific and directive.

HELP — Data Network for Distributed ICU/Nursing Divisions

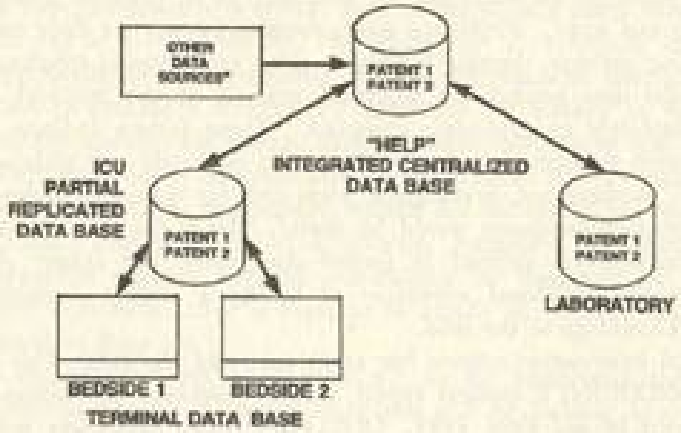

Fig. 11

CARE

The CARE system is primarily a computerized medical record system that has been designed to remind the physician of what was planned to be done for that visit or what the data indicates needs doing. Some typical displays from the care system are shown.

In tests of the system, it was shown that the physician is twice as likely to do the indicated procedure if the reminder is provided.

ONCOCIN

The clinical management of patients with certain cancers follows protocols that describe a complex and extended treatment regimen. These protocols are described in detailed documents, often 40 to 60 pages in length, which specify the alternate therapies being compared in the experiment and the data that need to be collected in order to study the effectiveness and toxicity of the compared treatment plans. They specify drug dosages and modifications, the intervals at which patients should be seen, and the times when laboratory tests and X-rays should be ordered. These specifications are generally complex, and no single physician is likely to remember all of the details in even one of the protocol documents, not to mention the 30 to 60 such protocols that may be used in a major cancer center.

Although the documents are usually available in the oncology clinics where

patients are being treated, a busy clinic schedule, coupled with a complex protocol description, often leads a physician to rely on memory or advice from colleagues when adjutsing drug doses or deciding which laboratory tests to order. Furthermore, the protocols do not spell out solutions to all possible treatment contingencies that can occur. Physicians must, therefore, often use their own judgment when treating patients, thereby leading to some variability in treatment decisions. Similarly, the data needed for statistical analysis of the protocol results may not be completely or accurately collected. These factors indicate a need for assistance with remembering the details of the protocols and with accurate data collection. Furthermore, oncologists who care for protocol patients generally acknowledge that assistance would be useful. Since the core knowledge about oncology protocols is defined in formal documents, the cancer chemotherapy domain has the additional advantage of having a readily available source of structured knowledge of the field.

Medical information science has again answered the call. This time in the form of ONCOCIN, a medical expert system developed at Stanford University that has been in use since 1981. ONCOCIN assists physicians with the management of patients enrolled in cancer chemotherapy protocols. The system is used by physicians to record and review patient data. It provides not only the intricate details of the therapy but also advice and explanations related to therapy.

The ONCOCIN system is designed to fit smoothly into a busy clinical environment. To achieve this, it must offer the users economies of effort and time, as well as an improved level of quality of care for the patient. A sample ONCOCIN screen is Fig. 12.

An interesting expert system with a somewhat different approach has been developed by Dr. Perry Miller at Yale University.

CLOSING

With regard to the future of telecommunications and Informatics in health, these are my views. In telecommunications, I see a very rapid growth of the

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Select Cancer Diagnosis by:

(1) Body System/Site
(2) Histologic Tissue/Type
(3) Childhood Cancers
(4) Alphabetically

Fig. 12

kinds of systems that I have discussed with you today. The reason I believe it will happen is that a number of important factors have come together that assure the success of these systems. The first factor is that it appears that over the years we have accumulated a critical mass of useful data bases that physicians are willing to pay to have access to. The technology is continually increasing in power and decreasing in cost, removing most of the financial barriers that previously existed to owning a computer. Computers are already in use in most physicians' offices already, for billing, reimbursement, accounting and scheduling. The independent existence of the large data communications services such as Telenet provides a shared, relatively inexpensive, vehicle for delivering the required data and information. Finally, there is a growing awareness by physicians that medical information requires fast and convenience to this body of knowledge. There is hardly a profession that is changing as rapidly as medicine and physicians are hard pressed to keep up.

Similar arguments obtain to informatics. As the complexity and criticality of medical decision-making increases, physicians will be looking more and more towards the decision aides that we have seen today. The time scale for these expert systems will be much slower than for the telecommunications we previously discussed. We have really just scratched the surface in expert systems, and in so doing, we have exposed unsolved problems in such basic areas as knowledge representation, inference, perception and learning. Only after we have addressed these fundamental research questions will we be capable of advancing rapidly in the field of expert systems. We have made a credible start, but a profusion of useful products is still ten years away.

Finally, in preparing for the speech, I came across an interesting and insightful thought by the poet Edna St. Vincent Millay:

Upon this gifted age, in its dark hour
Falls from the sky a meteoric shower
Of facts . . . that lie unquestioned, uncombined.
Wisdom enough to luck us of our ills
Is daily spun: but there exists no loom
To weave its fabric.

Thank you again for the honor of addressing you.