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# Preface

The Yearbook of Medical Informatics was conceived in 1990 by Board members of the American Medical Informatics Association, and its first issue was published in 1992 by the International Medical Informatics Association. This is the sixth anniversary of the Yearbook, and its youthful energy and enthusiasm is exhibited in this issue by its consideration of the challenging topic of Computing and Collaborative Care. The timeliness of this subject is supported by the extraordinary changes currently taking place in the financing and organization of the health care industry in many countries of the world, and by the growing influence of informatics technology innovations on the provision of patient care.

## Collaborative Care

The increasing expectations and strong demands of patients for technology innovations that can extend healthy life, prevent or overcome life-threatening infections, support or replace worn-out organs, limbs and joints, all have resulted in significant increases in the costs of medical care. In attempts to improve the efficiency of the health-care process and to exploit modern technology, yet maintain health-care costs at a level the public will accept, major restructuring has occurred in the financing and organization of most health-care pro-

grams in the United States.

Efficient collaborative care is an essential requirement for every large program that uses several hospitals with associated medical offices and clinical support services (clinical laboratory, radiology, pharmacy, and others). Compared to single institutions, the expected advantages of large multifacility health-care programs include: (1) economic benefits by improved access to capital (such as by public ownership of stock), increased efficiency, economies of scale, and greater ability to diversify; (2) personnel and management benefits, such as improved recruiting and ability to develop and retain a high quality staff; and (3) planning, program, and organizational benefits with a regional rather than a local perspective on health needs.

In the 1940s, per capita payment for medical care services provided by group practice physicians was initiated in California. In the 1970s this concept began to diffuse throughout the United States in the form of Health Maintenance Organizations (HMOs) that expanded their preventive medical services to encourage the maintenance of health (well care) in addition to sick care. In the 1990s, the increasing demand for health-care services is beginning to exceed the supply of available resources, so health-care programs are attempting to limit this demand by more closely managing the provision of medical services.

There is currently an explosion in the United States of "managed care"; a concept designed to increase the efficiency of the delivery of percapitation paid care by controlling the total cost paid for care per person per year, and by containing the physician services provided, yet furnishing an acceptable standard of quality of patient care. Managed care is probably just the beginning of a major restructuring of health-care in this country. In the first half of the 1990s, most efforts in managed care have been directed to controlling costs since business and accounting data for medical care services were readily available. However, increasing dissatisfaction of both physicians and patients will demand improvements in both access to services and in quality of care.

The substantial growth in the sizes of merged health-care programs has resulted in large numbers of patients being served in multiple medical facilities that are often located at considerable distances from each other. This has introduced some extraordinary requirements for storing and processing the large volumes of patient data collected from all of the various services and facilities collaborating in the care of the patients. The mergers of many managed care programs has stimulated the need for informatics technology capable of providing the managers of such large health-care programs with data that permit maintaining an acceptable balance among cost controls, physicians' services, and quality of care. To accomplish this requires their information systems to be extended to include more clinical data so that managed care programs can more closely monitor and control both the processes and outcomes of patient care; this has the potential of re-engineering the entire patient care process.

At this date about one-quarter of the people in the United States are enrolled in prepaid health-care pro-

grams, and this number is steadily increasing. At this same time the majority of physicians are joining groups which are also merging to better compete in order to gain a larger volume of patients; and to gain access to shared information systems that facilitate computer-based patient records and the electronic processing of claims for the payment of services they provide.

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## Computing Support

In the 1970s, the medical care of most patients was provided in single institutions, usually in one hospital with its associated physicians' offices, that used minimal computer-based information systems. In the 1980s, large health-care programs emerged that used multiple hospitals and medical office facilities, and these programs required the information processing capabilities of multifacility medical information systems. In the 1990s, mergers into even larger health-care programs require even more complex medical information systems that can accommodate an increasing volume and variety of information due to the greater diversity of its components. They also require more sophisticated communications and networks within and between their facilities for the electronic exchange of patient care data and for the sharing of computer-based patient records.

When multifacility programs share data, they need to link and collate all the information located in distributed databases for each patient; and to provide to clinicians all, or requested parts, of an integrated medical record for the full period of time that the health-care program has been responsible for the patient's care. In such large programs patients often move between hospitals and physician specialists' offices. When these facilities are located some distances from each other, the traditional separation of the patient's medi-

cal record in each facility can be a serious impediment to providing a good quality of continuing care. As a result, in the 1990s larger health-care programs in the United States are becoming more horizontally integrated to provide a broader range of specialized, acute, chronic, and extended care services. Their multi-facility information systems are now evolving to process and exchange not only textual data but also digitized documents and images. Their clinicians need access to integrated, relevant, past medical information for their patients to help assure continuity of care. Their physicians need online access to clinical care guidelines, electronic mail between facilities, online access to the Internet and to the National Library of Medicine's MEDLINE to support clinical decision-making and to help assure quality of care.

For planning purposes, the administrators of managed care programs need patient demographic and community data, and the ability to monitor inventory and use of resources. In order to meet their patient care service requirements and the increasing competition for patients, managed care programs are dependent on having an adequate, integrated database of their members' demographic attributes and health status, and their members' use of services in order to plan for an appropriate mix of health-care professionals to provide these services. They need to know the operational costs of all services provided, the capital costs and the operational use of facilities and equipment, and the predicted changes in their competition and in their community. Thus, in a managed care program with distributed facilities in a collaborative care environment, an exquisitely detailed administrative information system is essential. The information system must be capable of furnishing in a timely way both numerator data (numbers and costs of each service and procedure

and of health plan members served), so that the utilization rates and costs for each service (hospital days, laboratory tests, medications, and procedures, per member per year) can be monitored and managed to minimize their total cost.

It is obvious that to survive, collaborative care will require the support of a reliable information system with two major subsystems: (1) a clinical information system to monitor and support good quality direct patient-care processes and outcomes, and (2) an administrative information system to monitor and manage the rates and costs of all the services provided.

Current managed collaborative care information systems lack the necessary clinical data to adequately access and monitor the quality of patient-care, which require collecting and analyzing complete, accurate data directly related to the care processes in order to provide patient-centered measures that can be used to modify those processes which can improve patient care outcomes. In the past, most analyses of patient care processes and outcomes have been retrospective. What is

needed is the ability to monitor online the care processes so that, when a change is made in a process, its effects on outcomes can be readily assessed. This approach to health-care requires an innovative multi-facility information system, the electronic exchange of all patient data, and integratable computer-based patient records. Fortunately, current innovations in medical informatics technology can provide substantial support for the increasing informatics requirements of collaborative care, such as by using more powerful clinical workstations linked through an Intranet, which can be compared to an organization's small Internet superimposed over the existing communication networks, and legacy information systems in the health-care program's hospitals and their affiliated physicians' offices scattered around in the community. The Internet, satellite, and telecommunications can then be used for more distant collaborating facilities. The remainder of the 1990s will surely see more use by medical information systems of multifunction clinical workstations, client-server technology, Intranet- and

Internet-based applications, centralized integrated computer-based patient records, and effective decision support systems.

This 1997 Yearbook focuses on the timely subject of medical informatics requirements, essential for the success of collaborative care: (1) computer-based patient records that link and integrate all of the patient textual data, signals, and images generated in all services and facilities collaborating in the health-care program; (2) adequate data protection to maintain the confidentiality and security of patient data; (3) clinical decision support for the health-care providers to help assure an acceptable standard of quality of patient care; and (4) administrative decision support to help in monitoring and controlling utilization of resources and costs of care.

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