1996

The Computer-Based Patient Record and Health Information Management Professionals

Rosemary Ann Van Vranken
Loyola University Chicago

LOYOLA UNIVERSITY CHICAGO

THE COMPUTER-BASED PATIENT RECORD AND HEALTH INFORMATION MANAGEMENT PROFESSIONALS

A DISSERTATION SUBMITTED TO
THE FACULTY OF THE GRADUATE SCHOOL
IN CANDIDACY FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATIONAL LEADERSHIP AND POLICY STUDIES

BY

ROSEMARY ANN VAN VRANKEN

CHICAGO, ILLINOIS

JANUARY 1996

ACKNOWLEDGEMENTS

I would especially like to thank my daughter Michele for her continued support throughout my research and my studies. Michele's emotional strength never ceases to amaze me.

There were many colleagues and instructors who also offered their assistance and guidance and helped me to persevere through the years of pursuing my formal education.

Most importantly, I want to thank my committee members Dr. Todd Hoover and Dr. Kathy Westbrook, but especially Dr. Terry Williams, my advisor, who not only guided me through my dissertation, but whose never-ending patience helped me to achieve my maximum potential in the completion of my research.

A special thanks also to my many friends who took "second place" to my educational demands and still remained my friends. And, a special rememberance for my friend Leslie Blide, EdD, RRA, who was very influential in the development of my survey and who recently passed away.

LIST OF TABLES

TABLE OF CONTENTS

Chapter

Appendix

CHAPTER 1

INTRODUCTION

Historical Perspective

The process of documenting health care services can be traced back in history to the ancient Greeks. A small body of writings from the 10th Century have been ascribed to Hippocrates who is known as the "Father of Medicine," although Hippocrates may have belonged to a family that had produced physicians for many generations (Compton's Interactive Encyclopedia, 1993).

The earliest documentation of health care in the United States has been evidenced by records from the Pennsylvania Hospital established in Philadelphia in 1752 by Benjamin Franklin. These brief records only listed the patient's name, address, disorder and dates of admission and discharge. As the hospitals began to grow in number in the late 18th Century, the expansion of documentation necessitated some type of organization of the medical record. Diseases and operative procedures were beginning to be cataloged, and the findings were used for patient care, research, and statistical purposes. These three major functions for preserving clinical documentation remain the same to the present day (Huffmans, 1994). Because of the successful utilization of medical records in preserving the continuity of patient care, the

record began to acquire a fourth function, that of determining physician competency. The first group to recognize this new function was the American College of Surgeons in 1913. Surgery standards were developed by this organization not only to include physicians, but also to include hospitals. "Steady improvement in the quantity and quality of medical records began with the advent of hospital standardization" (Huffman, 1994, p. 5).

In the 1920s, members of the American College of Surgeons began to take an interest in the improvement of medical records and at their annual meetings in 1928,..."they appointed Mrs. Grace Whiting Myers, librarian emeritus of Massachusetts General Hospital, as general chairman to organize committees, direct the preparation of a program, and plan exhibits" (Huffman, 1994, p. 5). At this meeting, the organization of the present day American Health Information Management Association (AHIMA) was formed. At that time, it was named the Association of Record Librarians of North America and Mrs. Myers was elected the first president. The purpose of the organization was to continue to elevate the standards for clinical records. Since that time, members of the organization (now referred to as Health Information Managers) have continued to maintain as their primary purpose the goal of improving the quality of health care via improving the quality of documented medical information.

By the early thirties, the founding members recognized

the need for trained individuals who would work with clinical information in other hospitals. By 1935, four schools, affiliated with hospitals, were approved to begin the training and as the programs grew, they expanded from the hospital setting to colleges and universities. The first baccalaureate degree granted in Medical Record Administration was from the College of St. Scholastica in Minnesota. In 1932, a written examination was also required for certification and remains a requirement to become credentialed, after graduation from an approved school.

In the early 1950s, because of the surge of new hospitals being built, or the expansion of older facilities, a shortage of registered medical record administrators existed. Therefore, in 1953, the first schools for the education of health information technicians (Accredited Record Technicians) were approved. These schools offer two-year programs with an Associate of Science degree. In the 1940s and early 1950s health record organizations were also being formed internationally. Although formal education and training differ in various countries, an international organization was formed and was named the International Federation of Health Record Organizations. The first meeting of the Federation was held in 1972 in Sidney, Australia. The Federation meets every four years at various locations around the world (Huffmans, 1994).

In 1972, the national association in the United States

changed its name to the American Medical Record Association (AMRA). In the early 1990s (in order to update its image) the name was changed again to the American Health Information Management Association (AHIMA). This name provided a more appropriate description of the current role of the health information professional.

The late 20th century also saw the establishment of innovative types of healthcare facilities other than hospitals. With the expansion of health care and greater involvement of governmental agencies, a variety of healthcare organizations such as ambulatory care centers, neighborhood health centers, long-term care facilities, managed care facilities and home health agencies began to appear. With the expansion of these facilities came a medical record "paper" boom (Huffmans, 1994). Augmenting the paper boom, in the late 1960s and early 1970s, the health care industry witnessed a "medical malpractice" crisis. Health care organizations and clinicians began to take a microscopic look at medical documentation. In the past, quality of care was primarily reviewed by accrediting bodies such as the Joint Commission on Accreditation of Healthcare Organizations. These reviews always relied on medical documentation for maintaining hospital status and sanctioning approval of facility services. With the dramatic rise in medical professional liability claims, the medical documentation in the patient record could either minimize or maximize adverse effects of financial loss

to a hospital or healthcare facility. Adequate and accurate documentation became imperative not only for the financial solvency of hospitals, but also for greater profitability. Medicare payments to hospitals began to be made based on written diagnostic results. In the 1980s the Medicare payment system was changed, through legislation, from a cost-based system to a diagnosis-related group (DRG) system. According to the DRG system, hospitals are reimbursed, per case, on a classification system of code numbers. These code numbers represent the resources required to care for patients as well as all diagnoses and procedures. The only place this information is available, in aggregate, is the patient's medical record. The only individuals who receive specialized training in the documentation of these code numbers are credentialed Health Information Management professionals. Such credentialed individuals, who rely on complete and accurate clinical documentation of the patient chart, thus contribute to a facility's financial solvency.

During the 1980s the medical record served as a document that communicated not only quality patient care, but also physician competency. Together these functions often determine the financial stability of a healthcare organization (Huffmans, 1994). The transformation of the medical record in the 1990s is one of tremendous significance. It involves a metamorphosis into a "paperless" technology. This "paperless" technology is part of a communication technology that has been

developed world-wide and is affecting many aspects of people's lives. Within the realm of healthcare, the medical record system in the United States has been changing at a rapid pace from primarily a manual system to a computerized patient record system. This has continuously been documented both in the general health care literature as well as in the journals and newsletters of many health care professional associations.

For example, noted electronic data interchange expert Francis W. Lavelle (1994), who has provided clinical, financial and management information to over 1300 healthcare institutions in the United States and Europe, recognizes that the reengineering of the healthcare delivery system will need to include . . ."integrated health networks that require fast and accurate exchange of information that is presented in a consistent and easy-to-use format" (p. 45). Mr. Lavelle foresees that by the year 2010 there will be a new meaning for the word "hospital". He visualizes a hospital as being a healthcare network within a community. His vision is fast becoming a reality with telecommunication vendors who are already proposing information superhighways. An already established network on which to base healthcare transmission is Internet. Internet is an international network utilized by researchers and educators and is supported by . . ."five federal agencies involved in operating research networks and from universities, states, and private companies that operate and participate in local and regional networks" (p. 44). It

has also been noted that the continued evolution of Internet should be a model for the type of infrastructure needed to transmit data from a computer-based patient record (Institute of Medicine, 1991).

Noteworthy authorities in the computer industry, such as Jeffrey Blair (1994), a marketing manager for clinical information systems at IBM's Health Care Industry Consultants, identify the need for multi-institutional healthcare delivery networks to . . ."focus on the goals of controlling rising healthcare costs and demonstrating healthcare quality" (p. 30). He recognizes that this will be accomplished only through the implementation of a new healthcare information infrastructure based on clinical information systems with the computer-based patient records at their core. Mr. Joe Weber, Vice President of Marketing and Sales for Sudbury Systems, who has had a background that includes hospital administration, health systems consulting and medical research, also concurs that a CPR . . ."will lead us into a new direction for profoundly assuring the quality - and reducing the cost - of our health care" (1993, p.5). Mr. Weber even suggests that a clinical decision support system is inevitable, because once a patient's complaints and a physician's findings are universally stored with a standardized code, the physician will have immediate access to valuable data in an empirically based network.

Management authorities in the healthcare field such as

J. Peter Melrose (1993), Director of Management Services at the District of Columbia General Hospital in Washington, D.C., have stated that . . ."aggressive computerization of the medical record and associated information is becoming recognized as a near-term opportunity for improving the efficiency of healthcare delivery" (p. 60). Subscribing to that same concept, Randy Golab (1994), Manager of Ernst and Youngs Midwest Healthcare Practice in Minneapolis, concurs that . . ."advances in technology continue to push healthcare toward the computer-based patient record" (p. 58). Mr. Golab's proposed strategies for building a CPR include the use of a stand-alone clinical data repository. In future considerations by the Federal government, when contemplating the implementation of the CPR, such a concept might be feasible as a viable model, since the advantages are numerous.

For example, easy access to medical data (for any authorized individual) through a clinical data repository would not only provide quick availability to longitudinal patient information, but would also provide patient information in a comprehensive, integrated manner. From a management perspective, the clinical data repository would assist healthcare administrators in managing the health care delivery process under a capitated system.

Within the professional field of physicians, clinical experts, such as Charles Bishop who writes for M.D. Computing, discuss the importance of specific formats with the

computerized medical record. Bishop states that, "With the advent of computer technology, various computer-based systems have been created to streamline the medical record and make its information more readily usable" (1990, p. 208).

Speaking also from the clinical perspective, Dr. Gabriell, clinical pathologist and president of Electronic Health Care Records Research, Inc., notes that the greatest impact of the computer-based patient record . . ."will take place in the medical record profession" (1993, p.71). He discusses the structure of information in an electronic patient record and the complexity of automated medical text analyzers. He notes very specifically that "The American Health Information Management Association should add medical computational linguistics to the educational curriculum of the profession. At this stage the medical information manager should have at least a good basic understanding of text analysis with its supporting disciplines, linguistics, semantics, and medical information representation" (p.81).

The focus of the health information field in general has recently centered on the technology and specifications of the computer-based electronic patient record. The focus of a federal governmental study, published in 1991 by the Institute of Medicine based in Washington, D.C., examined the problems of existing medical record systems and proposed actions and research for the improvement of these systems (Institute of Medicine, 1991). Advocates of the CPR concur that the

existing medical record system needs to be reengineered and new paradigms developed for the approaching computer-based patient record. Because of the availability of reporting technologies such as digital dictation and voice recognition, a true patient care management system might also be generated. That is, the computer will become a unique partner to the clinician by assisting in the treatment of the patient. Programs will be available to help the physician diagnose and make patient care decisions.

Within the last decade and in concurrence with the changes in technology, Health Information Managers, both in academe as well as the work place, have been attempting to facilitate progress in preparing for the CPR. This preparation has been brought about by many different stakeholders such as the accrediting bodies, involved governmental agencies (such as the Health Care Financing Agency, HCFA) and the American Health Information Management Association, AHIMA. Among healthcare organizations, Kaiser Permanente has become a leader in CPR. Kaiser, as of 1993, is prepared to invest over $100 million in CPR development and is planning to start prototype testing in the near future. Since the individual Health Information practitioner in a direct or indirect manner has some affiliation with all of these organizations, attempts are being made, by the practitioners, to assist in the design and selection of appropriate information systems for patient-related data.

Overview of the Study

This study was completed in order to discover the nature and extent of technology found in healthcare facilities where future HI graduates would be employed. If it could be determined how computer hardware and software were being utilized by HI practitioners, then health information educators would more likely address curriculum revisions. Therefore, a mail survey was designed and sent to 685 Registered Record Administrators who were in management positions in various types of healthcare facilities. Survey questions not only addressed future education needs, but also the extent to which computerized patient record systems were either fragmented or fully implemented in these facilities.

Significance of the Study

Health Information Managers, who have always managed the systems and quality of health information data, are now faced with the need to develop expertise in both computer applications in health care as well as in other areas of system technology if they wish to remain active once the computer-based patient record is implemented. The Health Information Manager has, within a very short span, been inundated with a wealth of technology. The market continuously offers new generic software tools that can easily be applied to medical record functions. Vendors have

demonstrated how such technology as optical disks and keyless data can be utilized for the storage and retrieval of data. Customized telecommunication systems are being included in the strategic plans of CEO's and governing boards.

Confidentiality issues, which have always played a major role in HI Managers' training and in their role in the work force, will now be of even greater significance with the advent of the CPR. The HI Manager is caught in a challenging evolution of computer systems. By the end of the twentieth century, the majority of acute care health facilities will not only have established internal major networks that connect all areas related to electronic information, but external data interchange systems between physicians' offices and hospitals and between clinics and hospitals. This electronic data interchange (EDI) will compel the need for HIM educators to reevaluate curriculum content and to address specific issues on what needs to be included in the formal education process versus what can be learned during internships and on-the-job training.

The HI practitioner must be consistently apprised of all changes in order to remain aware of how the CPR has a direct impact on the healthcare of any patient and must be kept abreast of the progress of CPR implementation. This awareness, for the most part, is not only an individual continuing education process but, in the realm of academe, the HIM educator must prepare graduates at the entry-level for

employment that includes the implementation of such. The continuing educational process must assume that all HIM school curricula have included the very basics in the teaching of at least the most commonly used application programs before consideration of any further instruction in information systems or systems analysis. The extent of these issues applies not only for those Health Information Managers who will find employment in the acute care settings, but also to those in nontraditional career paths. It is the responsibility of the HIM educator not only to prepare students for entry into the work force but also to develop a career matrix for them while, at the same time, assisting them to enhance their skills. All of these issues are of present concern for the HIM educator.

Recently, major changes have been made in the Essentials written for HIM programs (AHIMA Essentials for Academic Programs, 1994). "Essentials" are guidelines assigned to each approved HIM academic program to direct the educator in the development of an appropriate curriculum. These changes include directing student studies toward the assessment of patient-related information needs and the design and evaluation of systems for patient-related data. Educators also need to determine how far advanced these patient information systems are in the various facilities where students are being placed for affiliations. The curriculum content also needs to address the major issues of

confidentiality of information and security policies and protocols for which graduates will eventually find themselves responsible.

Because of future trends toward a clinical information infrastructure, educators need to be continuously apprised of information that informs them of the continuing roles of the practitioner. Areas of research need to include examining the knowledge and training involved in advanced computer technology, information systems and, the future role of the Health Information Manager in all of this. As the 1994 message by the President of AHIMA noted, it must be assured that, "our members have the necessary skills to be easily identified by individuals outside our Association as those professionals who should be responsible for health information management" (1994, p.8).

Much of the information on the utilization of computer hardware and software by HIM professionals can be obtained from feedback from credentialed practitioners who are already employed in the traditional and non-traditional healthcare settings and who are already knowledgeable about the status of such systems. Such practitioners, particularly those in administrative positions, and those who have a broader perspective of the information systems in the clinical setting, can better direct educational content.

Research needs to be directed toward determining what the responsibilities are of the HI Manager in the assessment of

patient-related information needs and in the design of systems to meet those needs. Included also in such research should be a focus on what the responsibilities are of the HI Manager in developing security policies and computer-based patient record protocols. Differences in how the computer-based patient record is being implemented in acute care facilities affiliated with medical schools and academic centers and how it is being implemented in acute care facilities other than those affiliated with medical schools and academic centers also need to be examined. Reasons for such an examination of differences rest with determining the present status of the CPR so that HIM educators can improve and update their current curricula to reflect progressive programs. Studies also need to determine whether or not knowledge of information systems and specific technological skills need to be included only in the curriculum of four-year programs, or whether they should be recommended for both four-year and two-year programs. The results of such research will provide the Health Information Management educators, in both programs, with invaluable information in redesigning their curricula and assist the educators in understanding how to better prepare the entry-level student in utilizing the computer-based patient record.

Definition of Terms

ACUTE CARE. Medical care given over a relatively short period of time versus long-term care.

AHIMA. American Health Information Management Association. The national association for RRAs and ARTs.

Application Software. Software that interfaces between the user and the system software, enabling the user to direct the computer to perform specific tasks.

ART. An Accredited Record Technician is a graduate of an approved Health Information Technician program at a two-year college or is a graduate of the Independent Study Program and who passes a national registration examination.

CPR. Computer-based Patient Record. An electronic patient record that resides in a system specifically designed to support users through availability of complete and accurate data, practitioner reminders and alerts, clinical decision support systems, links to bodies of medical knowledge, and other aids (Institute of Medicine, 1991).

Database. A cross-referenced collection of files designed and created to minimize repetition of data.

Decision Support System. An information system designed to allow managers and clinicians to interact directly with a computer for assistance with relatively unstructured decisions.

Hardware. The physical components of a computer system, such as the computer itself, input devices, and output devices.

HIM. Health Information Manager. A credentialed Registered Record Administrator or Accredited Record Technician.

Health Information Practitioner. An active RRA or ART who is employed in a healthcare facility.

Information System. A set of people, data, and procedures that work together to achieve the common goal of information management.

ISP. Independent Study Program. A home-study program consisting of 17 modules. It is controlled by AHIMA. Criteria for entrance into this program are a high-school diploma and 30 college credit hours.

LAN. Local Area Network. A communication system that links work stations within a geographically limited area, usually by coaxial cable, to enable users to share computer resources.

Mainframe. A large scale computer with processing capabilities greater than a minicomputer but less than those of a supercomputer.

Network. A system of computers or terminals interconnected by communications circuits.

Non-Traditional Health Care Facilities. Ambulatory care facilities such as outpatient clinics, health maintenance organizations, surgicenters, etc. Long term care facilities are defined as those in which patients receive care for a period of time longer than 30 days.

Optical Disk. A storage medium on which data are stored and read by a laser; optical laser disks have much higher data densities than their magnetic-disk counterparts.

RRA. A Registered Record Administrator is a graduate of an approved Health Information Administration program at a four-year baccalaureate college or university and who passes a national registration examination.

Software. The instructions that direct the operations of a computer.

Telecommunication. Using communication facilities, such as the telephone system or microwave relays, to send data to and from devices.

Telecommuting. A method of working in which a person uses a computer and a communications channel to establish a link with a remote office computer.

Traditional Health Care Facilities. Acute Care Facilities classified as hospitals in which the average length of time patients stay is less than 30 days.

Voice Recognition. The capability of a computer to accept input in the form of the spoken word.

WAN. Wide Area Network. A computer network in which the computers are geographically dispersed.

Research Objectives

The major research objectives of this study are as follows:

a) To determine how Health Information (HI) practitioners are utilizing specific types of computer technology.

b) To determine the extent of the responsibilities of HI practitioners in the development of security policies and procedures and the development of standards and protocols for a computer-based patient record.

c) To determine the types of educational needs that will be required for HI Managers once the computer-based patient record is implemented.

d) To determine the utilization of automated information systems in various health care facilities (in relation to the computer-based patient record).

e) To obtain feedback from HI practitioners in administrative and middle-management positions regarding their perceptions and concerns as they become more involved in the implementation of the computer-based patient record within their own facilities.

Chapter Summary

The dissertation contains four additional chapters. The following chapter includes a literature review that provides the reader with the perspective of many different professionals in healthcare and how they perceive the advent of the computer-based patient record. Chapter III presents the methodology used in the study and Chapter IV describes the data compiled through the use of various statistical analyses. The final chapter discusses the results and presents recommendations for future research.

CHAPTER 2

REVIEW OF THE LITERATURE

The review of the literature found in this chapter focuses initially on the perceptions of healthcare professionals regarding the computer-based patient record. Their perceptions provide insight into the role of the HI Manager. Current and future trends related to the computer-based patient record are also identified. A review of articles that address the issue of confidentiality and privacy confirm that this is one of the major concerns of both consumers and providers.

The Role of the Health Information Manager

Computer hardware, software, networks and sophisticated telecommunications have all become a part of the current work of the Health Information Manager. Since such technology has swiftly enveloped the present role of the Health Information Manager, both practitioners and educators find themselves caught between the requirements for manual functions related to the medical record and those functions associated with an electronic record. These requirements and standards are continuously modified by changes through new technologies.

These new technologies are indicative of the changes that

the Health Information practitioner and educator must now face. The changing role must constitute not only knowledge of hardware and various types of software programs, but must also include information systems management. Knowledge and skills must be updated in data modeling, data administration and, data base design as well as the integration of systems.

Many surveys have been conducted that demonstrate concerns of Health Information Management professionals. One such study (Amatayakul & Kudirka, 1993) noted that health information systems originally focused on administrative data and futuristic concepts and now provide more appropriate perceptions that include clinical purposes. The role of the Health Information Manager can no longer only include networks in individual hospitals, but must concentrate on more global applications that include all forms of health care technology.

A global perspective has long been recognized by the medical profession. Bradbury (1990) comments that this is a potential multi-billion dollar market that will exemplify major transformations in all of the healthcare industry. He defines the computerized record as "the hub of the wheel" (p.33). His model of data organization demonstrates a complete medical information system with the computerized-patient record in the center and the spokes being a "spectrum of possibilities for medical computing that is mutually limitless and will depend on how creative the information industry becomes" (p. 34). Since the Health Information

Manager has always been the data specialist when handling patient records, Bradbury's comment emphasizes the importance of pursuing changing roles within the profession. Lips (1992) also notes that, "the first Medical Record Special Interest Group was formed . . .in California. The focus of this group was to address those events (an event is defined as the transmission of data about a patient to other systems), messages, and data elements that are produced and received by medical record departments as providers of services and information about the patient record" (p. 46). McDonald (1989) found that computer systems improve the availability of medical records as much as 99%. He also ascertained that the electronic medical record has a dramatic influence on the quality of care because it calls attention to adverse trends and unattended medical problems.

The computer-based patient record continues to be a major turning point for the medical record profession and the Health Information Manager. Morgan (1992), in his article on the challenges that the Health Information Manager will encounter in the 1990's, noted that the use of the computerized patient record (CPR) must be understood by each of the medical and paramedical professions. The CPR must be presented from the nursing perspective, the physician perspective and the perspective of administrators, information managers, information systems personnel, and financial officers.

The computer-based patient record, according to Steen and

Detmer (1991), will also . . ."expand the traditional role of patient records from being a passive storage device to being a resource that actively supports the provision, management, and evaluation of patient care. It will guide clinicians in the clinical problem-solving process . . . and provide support to practitioners in the nonclinical tasks they perform" (p. 49). Health Information Managers must be able to serve as a resource for this network. Singarella and Armbruster (1991) emphasize that . . ."the use and study of information in the health sciences . . . encompasses medical records" (p. 42). They have developed the term "medical informatics" to demonstrate the continued focus on computer applications in health care. Their actions have resulted in the creation of a Department of Health Informatics at the University of Tennessee at Memphis which has begun to support the education of students in this direction. There is no question, then, of the necessity for knowledge that must be assimilated by the already practicing Health Information Manager and the need for the Health Information educator to develop and implement informational changes.

In concentrating on some of the peripheral, sophisticated applications that could assist the Health Information Manager in maintaining quality documentation, Fletcher (1991) notes how imperative it is that Health Information Managers become actively involved in systems analysis. She develops a methodology for preserving the mission of a medical record

department through a formal systems analysis. Miller (1991) also demonstrates how databases (including simple relational and complex relational) can be applied to patient information. She stresses the importance of database management within the Health Information profession. Miller notes that . . ."The real databases help you with data entry, sort on multiple criteria, calculate fields and display the result in a variety of ways, as well as print unlimited report formats" (p. 67). With the capability of the database technology, it is easily understood that database management learned by the Health Information Manager can extend to meeting some of the systems needs of health care executives.

According to the Bits and Bytes Quarterly (Fall, 1992), meeting CEO and CFO information needs is also a systems design challenge for Health Information Managers. Once the type of information required is determined, a basic schema can be designed to meet these needs. Abramson (1991) believes that using a decision support systems approach will also help to resolve the demands for more timely information by health care executives. A Health Information Manager, oriented to database management control, could support such a program with little difficulty. Decision support software can also assist the physician in problem solving. Shortliffe's study (1987) defined a medical decision support system as "any program designed to help health professionals make clinical decisions" (p. 61). And, Childs (1991) quotes Gary F. Braley (President

of Braley Consulting Services) appropriately when he notes:

> The only answer is to have staff personnel more involved in the design and selection of a new system right from the beginning (p.45).

Current Trends in Health Information Management

A review of the literature on current trends in information management in health care has demonstrated that technological sophistication is very fragmented throughout the healthcare industry. Hospitals and other healthcare organizations are investing with many different vendors and the competition in the marketplace for their technological systems is bringing about much administrative confusion. It is the general consensus among most systems analysts that technologies transform societies. Although present computer technologies continue to advance the medical disciplines by way of the development and use of new equipment, the changing state of the art of new systems and new networks continues to add to administrator confusion.

Current trends in Health Information Management are gravitating toward an increase in the involvement, awareness, and management of system models, system architecture and system security, as well as those trends migrating toward the storage of uninterrupted information such as voice and video. There are multiple paradigm shifts that have occurred in patient record systems such as the ability to view a myriad of clinical workstations that have been interfaced and therefore, enable patient information to be obtained on a more timely

basis. Because of this availability, clinical information is being utilized more concurrently to allow physicians and other health professionals to improve diagnostic assistance.

In 1991, when the Institute of Medicine produced its report on the computer-based patient record, an organization was formed, the Computer-based Patient Record Institute (CPRI). This organization was patterned to oversee and coordinate the development of the CPR nationwide. Amatayakul, executive director of the CPRI (1994), notes that presently, the "Institute has developed a program which should help healthcare facilities measure their progress toward implementation . . . of the CPR" (p.48). Since many professionals in the healthcare industry are presently fearful of acceptance of the CPR system, Amatayakul feels that the more they use it, the more valuable the CPR system will become. CPRI has developed a workgroup of national experts who have developed criteria . . ."that can be used as a framework for describing and evaluating computer-based patient record systems projects" (p.49). The criteria are grouped into various sections which will address issues such as strategic planning, CPR users, technical design and the results of the impact of a national CPR system.

Winters (1994) briefly discusses how the CPR is currently evolving into an electronic database. The database concept is becoming the accepted application for healthcare information. As Winters notes, "A structured, integrated database will

facilitate timely, comprehensive, and accurate access to health-related information for individually identifiable patient data as well as aggregate data" (p.25). Many facilities, nationwide, are making significant strides in automating the paper medical record. However, multiple problems are being encountered, particularly with interfacing data. It is assumed that the greater strides are being made in those larger facilities whose resources are more abundant. This research has assisted the author in verifying this hypothesis.

When the computer-based medical record was initially discussed in great length in the 1980s, authors like Barnett (1984) felt that medical information would need to be recorded in a structured format; but, he also recognized that as technology became more sophisticated, office-based systems would eventually gain access to nationally maintained computer systems. This has already become a reality with the variety of data banks available. The 1980s also began to reveal a continued interest by physicians in hospital information systems, databases, and the electronic patient record. A commentary by Friedman and Martin (1987) demonstrated the complexity of computerizing health information and the extensive repercussions if they were not adequately thought out. The authors felt that hospital administrators were developing and implementing systems that were not adequately planned, especially in the realm of the flow of clinical data.

The schema that the authors recommended included six components for a hospital-based information system: Core, Business/Financial, Medical Documentation (which includes the medical record system), Medical Support, Departmental Management, and Communications/Networking. They also recognized that the medical record system (a major element in the Medical Documentation category) would . . ."evolve during the next decade into the largest and most important data base supported by hospitals. This data base would serve as the foundation not only for medical computing, but also for nearly all hospital administrative decisions (e.g., marketing, cost control, changes in programmatic emphasis)" (Golob, 1994, p. 1792). Such a database is now being developed through the concept of a "clinical data repository (CDR)." The CDR would be the sophisticated interface that could serve as the gateway for all clinical data.

In the 1980s, physicians in countries outside the United States were also looking at the electronic medical record, but in a more isolated perspective. For example, Bridges-Webb (1986) in Australia wrote about one database that was developed and contained minimum information needed for continued patient care. It wasn't designed to replace the medical record, but rather to complement it. Bridges-Webb felt that its use in Family Practice would enhance the quality of patient care. DeTore (1988) also discusses health information issues surrounding medical practitioners. He

commented that "computerized medical record systems have the advantage of not being held to the sequence and organization used in recording the data, and not being contained in one fixed physical form" (p. 401). He also recognized that computerized medical information . . ."can be organized in any sequence or format to fit the needs of the user" (p.401) which allows for an improved quality in patient care.

In the United States the process to begin implementing the computer-based patient record has already begun. This is evidenced by the creation of a nationwide electronic healthcare information system. The creation of this system was announced by Louis Sullivan, M.D., Secretary for Health and Human Services (Computerized Patient-Record Updates, Nov. 1992). In addition, federal legislation has been proposed (S. 2878, H.R. 5464) and work groups have been formed by the federal government to address issues related to an electronic health care system. The Institute of Medicine also reported in 1991 that the CPR concept is becoming more organized and beginning to take hold nationally. They perceive, however, that "no one organization currently has the mandate and resources necessary to provide leadership for the CPR effort" (Institute of Medicine, 1991, p. 118). The Institute does recognize that a single organization is needed whose mission is to identify and accumulate resources and pursue the activities of a nationwide CPR system. The Institute's committee does have concerns about the feasibility of a single

organization and subsequently examined a number of organizational models which included federal agencies, private sector sponsorship and a public-private commission or consortium. The committee has concluded that a public-private combination is the most workable because of the needs of the various stakeholders involved, that is clinicians who would be the major users of the system.

Future Trends of the Computer-based Patient Record

The status of hospital information systems is one of fragmentation. These information systems most often exist as stand-alone modules. Since the 1970s, computer systems could be found only in specialized administrative areas such as the healthcare organization's Billing department and Admitting office. Individual personal computers have dominated clinical areas such as the Cardiology department or the medical laboratories.

Even as the 1980s commenced, it was reported by Ball and Boyle (1980) that, . . ."there does not exist a single installation of what could be considered a total hospital information system incorporating all of the possible modules currently existing in a variety of health care institutions" (p. 14). Now, at the midpoint of the 1990s, the focus is being transferred to a patient record that can be manipulated and utilized globally. Because of the future ramifications that the computer-based patient record will have globally,

much is being discussed in regard to the design of the medical record of the future. Weber (1993) believes that a model needs to be adopted for the computerized patient record and that its use will relate to the effectiveness of medicine itself. Gabrieli (1991) agrees that an electronic patient record is the new force in the health care industry. He visualizes a future bank of digitized facts that will allow for free narrative medical texts. And, as many others agree, a focus on physicians and their utilization of a computer-based patient record will eventually assist in the implementation of a CPR via telecommunication networks.

Computer networks are another component that must be considered with the computer-based patient record. Networks are being viewed as the means to integrate various systems that are already in place in acute care facilities. Souhrada (1990) discusses these systems and termed them "integrated services digital networks (ISDN's)" (p. 56). Souhrada notes that they would provide users a myriad of functions. These particular networks would not only give the user the capability of accessing data bases from a mainframe, but would also allow access to many other communication modes such as voice, video, facsimile and telex. These communication modes were also recognized by Belton and Dick (1991) when they discuss voice-recognition technology. They believe that

. . ."until there is wide-spread computerized documentation and analysis of what actually goes on in the front lines of

health care on a day-to-day basis, there can be no adequate assessment of the efficacy of current procedures for patient care" (p. 28).

Taking into consideration the physicians' perspective, it must be recognized that physician's are the ones who dominate the data input. They are seeking sophisticated technology that will allow them greater patient contact, and this technology can be established with the use of a computer-based patient record. Belton and Dick (1991) found that the early 1990s have seen voice-recognition technology being routinely used by over 1,200 physicians (p.28). Although this is a minute population in the vast expanse of the medical profession, it appears to be the basis for another computer alternative in the network of reporting and documenting medical data. A keyless data system is considered to be another major communication mode that is also employed in Health Information departments. Clark (1992) not only discusses voice-recognition but also looks at bar-coding as well. She identifies how both can be utilized as major system methods for collecting medical data.

The primary communication tool for doctors is the patient record and one of the ways of acquiring data for that record is via dictating. Therefore, voice recognition systems that can be integrated with data communication networks will result in the most timely patient services. Beltran (1991) refers to the computerized patient record as "electronic data

interchange" (p.36). He emphasizes its relationship to claims processing and notes how it will affect the medical insurance industry. Once again, data bases, networking and the integration of systems allow for a more sophisticated processing and validation of medical information whose origins are rooted in the medical record. An example of this sophisticated processing is noted by Bahensky (1992) in his review of the Nebraska statewide health information network that includes state and local departments of health, the department of social services, state legislators and the governor's office. This network is already providing drug information, patient educational materials, access to the Medicaid database, a diagnostic-aid database and a variety of other services to physicians, particularly those in the rural areas.

Other examples that include the progressive technology of the CPR include the HL7 Standard. HL7 is a system protocol for electronic "data exchange" of health care information among systems. As noted by Childs (1989), this standard creates a common way for systems applications to trade information. In other words, systems can "talk" to one another. The HL7 standard is a development in medical computing that will assist in providing available interfaces between individual systems. Although other protocols may be in the process of being developed, or already developed, if HL7 were accepted by most vendors, then the inter-hospital

networks would become more standardized. According to Lips (1992), an HL7 organization has already been established. Membership includes vendors, consultants, health care providers and general interest groups (one of which is the American Health Information Management Association).

Problems in Implementing the CPR

The health industry is moving slowly in solving some of the major problems, as noted by the Institute of Medicine, associated with the implementation of the computer-based patient record. Such problems include: clinical interaction and resistance, technological problems and, confidentiality and security problems (Institute of Medicine, 1991). The problem of clinical resistance by physicians is seen by the Institute as probably the single greatest challenge. For clinicians to engage in direct data entry, devices must be available to capture clinical data without human intervention, if possible. Presently, some facilities provide automated speech-recognition systems in which the physician need only dictate rather than manually type into the system. "The bulk of the patient record is still unstructured text . . . which must be entered into the clinical system either by dictation which must be transcribed . . . or by automated speech recognition" (p.81). Some hospitals are resolving this problem of clinical resistance by reimbursing the physicians for their data input.

The technological barriers include "text processing" which is still a complex operation. When text is entered into the computer the problem becomes one of conversion of the text into coded data, assuming that the text is entered through voice-recognition. "Although text processors have improved markedly in recent years, they can approach but never exceed the quality of written or dictated information" (p. 83). A problem of considerable interest is that of privacy and confidentiality. Many technologies, such as passwords and codes, are presently available to ensure such privacy but they have not yet been fully developed for the present CPR systems.

Ethical Issues: Confidentiality and Patient's Rights

It has always been understood that there is not only an ethical, but a legal obligation to keep medical information confidential. The protection of these data is becoming increasingly more difficult with the expansion and reliance on computers. Access to patient information must be available to the scores of health care personnel who deliver the care, the fiscal intermediaries who pay for the care, and special interest groups, such as researchers, who need to be included among those who must be provided with health information. In health care, the privacy of the individual patient will be threatened by the availability of computer data to all of these organizations and individuals.

One of the major challenges being encountered with the

development of the computer-based patient record is noted by the Committee on Improving the Patient Record (Institute of Medicine, 1991, p. 84). The Committee found that "many technologies are available to ensure CPR security and integrity, but, in general, they have not been adequately deployed or embedded in present CPR systems" (p. 84). This committee has also developed what it calls a "three-zone confidentiality model." The innermost zone includes the most sensitive information such as psychiatric and substance abuse data. The outermost zone includes information that may not necessarily be confidential, such as demographic or even some medical information. It is the zone between these two that the committee feels is the most critical, containing mostly health problems and the largest area that would be . . ."most frequently associated with traditional medical confidentiality requirements" (Institute of Medicine, 1991, p. 84). The reason this model was developed was because it was felt that confidentiality has to be addressed at different levels. Also, patients need to have initial input as to what information they wish to have divulged and what information should remain restricted.

Bobyarchick (1993) reports that surveys have shown that consumers are becoming very anxious when it involves technology and their privacy. "Eighty-nine percent believe that computers have made it easier for someone to improperly obtain personal and confidential information" (p. 1).

According to Bobyarchick (1993), computer security has 5 major components: the physical security of the computer hardware; protection against loss of data; safeguarding against improper data manipulation; prevention against unauthorized access; and misuse of both equipment and data by users (p. 1). These components, which are the basis for confidentiality of the patient record, involve a legal issue which, according to Blake (1982), is, . . ."whether the system in which the patient records are stored meets the patient's expectation that those records will remain confidential" (p. 3).

Present statutes regarding confidentiality of health information offer very little uniformity among the states. The reason for this lack of uniformity is that hospital and health care . . ."licensing requirements were written and developed without regard to automation" (p. 3). According to attorney Blake, who quoted a variety of legal cases involving this issue, "In addition to a private cause of action for invasion of privacy, the constitutional right of privacy continues to develop and expand" (p. 5). The expectations of most individuals are based on both constitutional law as well as common-law rights. Obade (1993), in her discussion of legal issues and privacy, notes that the . . ."constitutional 'right to privacy' was first recognized by the United States Supreme Court in 1965 and was applied to personal medical information by the Supreme Court in 1977 (Whalen v. Roe, 429 U.S. 589 [1977])" (p.8) And, "the common-law right to privacy

governs the actions of private parties (243 F. Supp.793 [N.D. Ohio 1965])" (p. 8). Even the Centers for Disease Control in Atlanta recommend that providers use universal precautions with all patient data, not only sensitive data, as is noted in the model provided by the Committee on Improving the Patient Record, but also with any type of medical information.

The issue of confidentiality is addressed in much of the literature (Blake, 1982; Blocker 1992; Bradbury, 1990; Gabrieli & Murphy, 1990; Smith & Kallman, 1993). Even at a Confidentiality Symposium in Washington, D.C., Kelly (1993) reported that the forum focused on health care reform and its relation to confidentiality and privacy. A major issue discussed was the relaxed confidentiality regulations with the transfer of health information data. Speakers at the symposium viewed future trends in privacy laws as gravitating more toward effective legislation. The general consensus of the speakers was that legislation and regulations are not solving confidentiality problems and therefore, there needs to be an impetus toward standardization of state statutes (p. 8). In addition to effective legislation, . . ."future CPR systems must be capable of providing different levels of data confidentiality as required by their users" (Institute of Medicine, 1991, p.85).

In attempting to determine the present status of confidentiality and privacy policies in healthcare facilities nationwide, in addition to the status of the technology

(including both hardware and software) within such facilities, a survey was conducted for this study using a "total design method" advocated by Dillman (1978). The survey was sent to 685 active Registered Record Administrators and a total of 356 (51.9%) of the surveys were returned. Descriptive statistics were then compiled from the data and a level of significance of $p = <.05$ was utilized in analyzing the results.

CHAPTER 3

METHODOLOGY

Population

In 1994, there were 36,847 credentialed Health Information Managers who were employed in a variety of managerial and supervisory positions in health care facilities in the United States (American Health Information Management Association). The credential for Health Information Managers includes two separate categories: Accredited Record Technicians (A.R.T.'s) and Registered Record Administrators (R.R.A.'s). Accredited Record Technicians are graduates of a two-year, collegiate-level approved program who sit for a national accreditation examination. In 1994, there were 23,477 credentialed ARTs registered with the American Health Information Management Association (AHIMA). Registered Record Administrators are graduates of a four-year, collegiate-level approved program who sit for a national registration examination. In 1994, there were 13,370 Registered Record Administrators registered with AHIMA. Of the 13,370 RRA's, some also have an A.R.T. degree.

Approximately 65% of these credentialed professionals (both RRA's and ART's) are employed in acute care (hospitals) facilities, while approximately 25% work in non-traditional

health care facilities such as HMO's, clinics, long-term care facilities, mental health facilities, hospices, insurance companies and, pharmaceutical corporations. Approximately 10% of the RRA's are employed in academe.

Sampling Method

To obtain data concerning the status of the computer-based patient record in health care facilities and to obtain data on the involvement of Health Information Managers in such facilities, a mail survey method was employed. The study sample consisted of a random sample of 685 credentialed Health Information Managers. Names and addresses were computer-generated from the membership files of the American Health Information Management Association headquartered in Chicago, Illinois. This computer-generated list included active RRAs who were self-identified as Administrators, Associate Administrators and Directors of healthcare facilities and excluded all Health Information educators. The list was limited to this population because the researcher felt that RRA's in higher level management positions would best be qualified to address the issues raised in the mail survey.

A list of 3,482 names and addresses was computer-generated for the researcher by the AHIMA. From this list, 57 individuals with foreign addresses were eliminated. From the remaining 3,425 names and addresses, a sample representing 20% of the total was identified by the researcher using a table of

random numbers. The 685 members selected represented those who were employed in both traditional (i.e., hospitals) and non-traditional health care facilities. No faculty were included in the study since the objective of the study was to determine the involvement of the credentialed practitioner with the computer-based patient record.

Research Instrument

The format of the survey instrument included two sections. Section I contained three sets of questions. Question 1 had eight categories which reviewed the responsibilities of Health Information Managers (HIM) and the type of computer software and computer tools that were being assessed and implemented in the various facilities. Question 2 included how the computer-based patient record concept might be utilized in academic programs in the future in relation to four different educational modes. This question also examined whether these methods should be included in the curricula of RRA programs, ART programs, or both. Question 3 was devoted to the CPR system within the facility itself and how the system was functioning in eleven different departments. Question 3 also revealed the level of involvement of the HIM in the development and/or implementation of the CPR in these healthcare facilities. So that the researcher could obtain more information on confidentiality and privacy policies, question 3 included these data and separated them into

information from eleven individual departments.

The second section of the research instrument gathered demographic and institutional data from three different types of facilities: acute care hospitals affiliated with medical schools and/or academic centers, acute care hospitals without any such affiliations and, other types of healthcare facilities. This information was used in analyzing the advancement of the CPR in the different healthcare facilities. A section for narrative comments and opinions of the respondents on the computer-based patient record was also made available.

Pilot Study

Prior to mailing the survey, a panel of six HIM educators and four practitioners were sent the research instrument and asked to provide feedback on the format and content of the survey. The panel consisted of Health Information Managers who were knowledgeable about the computer-based patient record and its impact on the HIM profession. The panel reviewed the research instrument for content validity and completion time and offered recommendations that assisted with the further development of the survey. Minor changes were made in the wording in relation to computer technology.

Data Collection

The survey process was modeled after the "total design

method" advocated by Dillman (1978). A total of 685 surveys were sent by first-class mail. Each questionnaire (see Appendix) was stamped with an individual identification number so that follow-up mailings need be sent only to those not responding to the survey. In the final element of the mailout package a preaddressed, postage-paid return envelope and a cover letter were included (See Appendix). As suggested by Dillman, a mailing date early in the week was chosen. Using the example in Dillman (p. 184), a postcard reminder was sent (see Appendix) after one week after the original mailing to all respondents. Approximately 205 (29.9%) were returned within a three-week period. A letter and replacement questionnaire were sent (see Appendix) three weeks after the original mailing only to nonrespondents. The total returned surveys were 388 (56.6%). Of these, only 356 (51.9%) were used in the analyses. The remaining 32 (4.7%) were either returned blank or were not usable because of a lack of sufficient data. The criteria for insufficient data included respondents who were deceased, returned more than two blank survey pages and/or respondents who had retired or were not employed at the time of the survey.

Data Analysis

Descriptive statistics (i.e., mean, median, standard deviation, and variance) were compiled on all respondents based on gender, years of experience and credential.

Descriptive statistics were also compiled on the eight variables noted in Questions 1 when examining the type of computer software and computer tools that were being assessed and implemented within a Health Information Management department. A compilation of descriptive statistics was made on the educational responses referred to in Question 2 and the CPR systems in the individual departments in a healthcare facility which were extrapolated from Question 3 of the survey.

Cross tabulations were then completed on the following variables:

a) All of the variables in Question 2 of the survey were cross-tabulated with "RRA programs" and "both programs" to determine whether each component should be included in only RRA programs or both ART and RRA programs.

b) All of the variables in Question 1 of the survey were cross-tabulated with acute care facilities affiliated with medical schools and/or academic centers versus non-affiliated acute care facilities.

c) All of the variables in Question 3 of the survey were cross-tabulated with acute care facilities affiliated with medical schools and/or academic centers versus non-affiliated acute care facilities.

d) All of the variables in Question 3 of the survey were also cross-tabulated with acute care facilities

affiliated with medical schools and/or academic centers versus other facilities (i.e., clinics, etc.).

The level of significance at $p = <.05$ was utilized for this study. The level of $p <.01$ was also reported. Any result at the .01 level would strongly impact on recommendations made for Health Information educators.

Chapter Summary

This chapter has presented the method utilized for routing of the research instrument and how the data were collected for the study. Demonstrated also was how a panel of experts was used to review the research instrument for content validity and completion time. Chapter IV will present and summarize the data analyses and results.

CHAPTER 4

RESULTS

This chapter presents the data analyses and other results of the study. Findings will be presented as they relate to the five research objectives listed in Chapter I and restated below. The results will be interpreted as they relate to previously published literature presented in Chapter II.

The major research objectives of this study are as follows:

a) To determine how Health Information (HI) practitioners are utilizing specific types of computer technology.

b) To determine the extent of the responsibilities of HI practitioners in the development of security policies and procedures and the development of standards and protocols for a computer-based patient record.

c) To determine the types of educational needs that will be required for HI Managers once the computer-based patient record is implemented.

d) To determine the utilization of automated information systems in various health care facilities (in relation to the computer-based patient record).

e) To obtain feedback from HI practitioners in administrative and middle-management positions regarding their

perceptions and concerns as they become more involved in the implementation of the computer-based patient record within their own facilities.

Respondent Profile

As described in Chapter III, surveys were mailed to 685 credentialed Health Information Managers who were employed across the United States in a variety of healthcare facilities. Of the 685 surveys sent, 356 responded. This represents a 51.9% response rate. Table 1 reveals that 100 Registered Record Administrators (RRA's) (28.1%) were employed in acute care facilities affiliated with medical schools and/or academic centers; 147 RRA's (41.3%) were employed in non-affiliated acute care facilities; and 109 RRA's (30.6%) were employed in other types of non-acute care facilities (i.e., clinics, outpatient facilities, etc.). Thus, a high proportion (69.4%) of the respondents are employed in acute care facilities. This finding might be explained by the fact that other non-acute care facilities (i.e., clinics and outpatient facilities) are less likely to employ full-time, credentialed Registered Record Administrators because many non-acute care facilities have very small health information departments that would not require the services of a full-time credentialed Registered Record Administrator and many non-acute care facilities utilize RRA's only as consultants.

Table 2 reveals that of the 356 respondents, 132 (37.0%)

Table 1. Respondents Place of Employment According to Program

	Employed in Acute Care Facilities Affiliated with Medical Schools and/ or Academic Centers (N = 100) (28.1%) N	%	Employed in Acute Care Facility Not Affiliated with Medical Schools and/or Academic Centers (N = 147) (41.3%) N	%	Employed in Other than Acute Care Facilities (N = 109) (30.6%) N	%	Totals (N = 356) (100%) N	%
Graduate of approved 4-year program	100	(28.1%)	136	(38.2%)	100	(28.1%)	336	(94.4%)
Graduate of approved 2-year program or from Independent Study Program and an approved 4-year program. All have received a baccalaureate degree.	0		11	(3.1%)	9	(2.5%)	20	(5.6%)
					Total Respondents		356	(100%)

Table 2. Respondents Place of Employment According to Educational Level

	Employed in Acute Care Facilities Affiliated with Medical Schools and/ or Academic Centers (N = 100) (28.1%) N	%	Employed in Acute Care Facility Not Affiliated with Medical Schools and/or Academic Centers (N = 147) (41.3%) N	%	Employed in Other than Acute Care Facilities (N = 109) (30.6%) N	%	Totals (N = 356) (100%) N	%
Highest Level of Education								
B.A.	52	(14.6%)	97	(27.2%)	75	(21.1%)	224	(62.9%)
Graduate Degrees								
M.A.	33	(9.3%)	31	(8.7%)	22	(6.2%)	86	(24.2%)
M.A. in Progress	15	(4.2%)	21	(5.9%)	9	(2.5%)	45	(12.6%)
PhD	0		0		0		0	
PhD in Progress	0		0		1	(0.2%)	1	(.3%)
					Total Respondents		356	(100%)

either have a graduate degree or are completing a graduate degree. These data may indicate a trend within the HI profession which demonstrates that practitioners may be finding it important to acquire a graduate degree with the advent of the computer-based patient record. Recent research (Brown, 1992) compared the total number of credentialed AHIMA members (both RRA's and ART's) in 1985 who had a Masters degree (i.e., 623 RRA's, 120 ART's) to the total number of AHIMA members in 1992 who had acquired a Masters degree (1,085 RRA's, 322 ART's). The results reveal an increase in a seven year period of 564 members who had completed a graduate education. Table 2 also shows that more RRA's who are holding or working on graduate degrees are employed in acute care facilities. This finding might be attributed to the nature of the responsibilities in medical record departments in non-acute care facilities (i.e., patient records in outpatient facilities do not typically contain as much information as in acute care facilities and contain the documentation of fewer healthcare providers). It is reasonable to conclude that those practitioners with advanced degrees are probably assigned additional responsibilities and have a broader managerial role.

Findings Related to Research Objective 1

The first of five research objectives for this study sought to determine how Health Information practitioners

currently utilize specific types of computer technology in their work environment. The identification of specific types of computer technology included in the job responsibilities and duties of the practitioner is considered vital in order to determine the types of technology that Health Information academic directors should include in their curricula. The American Health Information Management Association (AHIMA) has recommended specific guidelines (AHIMA Essentials for Educators) in four broad functional areas. These include: a) assessing patient-related needs; b) designing and selecting information systems for patient-related data; c) implementing information systems for patient-related data; and d) evaluating information systems for patient-related data. These four functional areas were included on the survey sent to all respondents. Specifically, respondents were asked to indicate whether six selected types of computer technology were being used in their healthcare facility for each of the four functions.

The data shown in Table 3 reveal that approximately one-half of the respondents utilize five of the six types of computer technology when assessing patient information needs. The assessment of patient information needs by HI practitioners may include determining the appropriate system(s) that would be beneficial in the maintenance and security of clinical, financial, administrative and statistical healthcare data that are a part of the

Table 3. Respondent Utilization of Computer Technology in the Work Environment (N = 356)

	Assessing Patient Information Needs		Designing Patient Data Systems		Implementing Patient Data Systems		Evaluating Patient Data Systems	
	%	N	%	N	%	N	%	N
Generic Software	54.5	194	30.9	110	36.0	128	30.1	107
Programming Languages	31.5	112	13.5	48	15.2	54	15.4	55
Optical Imaging	57.0	203	20.2	72	17.4	62	25.3	90
Keyless Data Technology	53.7	191	24.7	88	24.7	88	24.2	86
Graphs	48.0	171	24.2	86	28.1	100	25.0	89
Telecommunications	50.6	180	24.7	88	27.3	97	22.8	81

responsibilities assigned to a HI Manager. Among the six types of technology, the highest percentages were found with the use of Optical Imaging (57.0%), Generic Software (54.5%) and Keyless Data Technology (53.7%). It is reasonable to expect that these technologies would be utilized more frequently in a health information department in assessing patient information needs because of their frequent use when completing required functions within the department. For example, Optical Imaging technology may not only be replacing previous storage technology such as microfilming, but it can also be utilized as an information management system for retrospective healthcare data. Generic Software such as word processing, spreadsheets and databases may be replacing manual documentation such as the analyzing of patient charts, preparing budgets or, supporting patient or physician files. Keyless Data Technology such as bar-coding, digital dictation and voice recognition may be replacing manual methods of performing various functions within a health information department. Although the percentage of those respondents using Graphs (48.0%) was not considerably lower, this type of computer technology may have been misrepresented to the respondent. It is reasonable to expect that some respondents may have interpreted the use of graphs to mean sophisticated graphing such as may be used in architectural science while others may have interpreted it to mean simple graphs such as those generated by spreadsheets. The lowest percentage

(31.5%) was found in the respondents' use of programming languages (examples include: BASIC, Fortran, Cobal, etc.). It is reasonable to assume that this category of computer technology is used more by programmers and systems analysts because of their expertise in computer technology than might be used by a HI practitioner. When examining the highest usages of technology under each of the individual functions (i.e., designing, implementing and evaluating patient data systems), Table 3 also reveals that the type of computer technology that had the greatest utilization by HI practitioners in three of the four areas was the use of Generic Software (e.g., word processing programs, spreadsheets such as Lotus 1-2-3, and databases). The high utilization of Generic Software can probably be explained by the more recent addition of application programs to medical record departments (i.e., the use of word processing in a variety of applications and the use of databases when performing specific functions such as quality improvement or tumor registry input), as well as the more recent inclusion of application programs in HI academic program curricula.

Examination of Table 4 reveals the utilization of computer technology by respondents with a graduate degree or a graduate degree in progress. The percentages found on Table 4, when compared to those found on Table 3, were higher in three of the four functions (i.e., the designing, implementing and evaluating of patient data systems). Since many of these

Table 4. **Utilization of Computer Technology by Respondents with a Graduate Degree or a Graduate Degree in Progress (N = 132)**

	Assessing Patient Information Needs		Designing Patient Data Systems		Implementing Patient Data Systems		Evaluating Patient Data Systems	
	%	N	%	N	%	N	%	N
Generic Software	54.6	72	34.9	46	34.1	45	32.6	43
Programming Languages	31.1	41	14.4	19	18.2	24	14.4	19
Optical Imaging	56.1	74	20.5	27	23.5	31	28.8	38
Keyless Data Technology	53.0	70	30.3	40	31.1	41	26.5	35
Graphs	48.5	64	27.3	36	35.6	47	28.8	38
Telecommunications	47.0	62	20.5	27	32.6	43	27.3	36

respondents held a graduate degree, it is reasonable to assume that the higher percentages might be attributed to the fact that additional education may have included a more informed knowledge of computer technology which led to additional administrative responsibilities.

Findings Related to Research Objective 2

The second research objective sought to determine the extent of the responsibilities of health information practitioners in the development of security policies and procedures and in the development of standards and protocols for a computer-based patient record. Table 5 reveals a high percentage (57.3%) of practitioners who report that their responsibilities include the development of security policies and procedures especially when assessing patient information needs. This result can perhaps be explained by examining the curricula in health information academic programs. Both the two-year and the four-year programs must include course work in legal issues. Because of the necessity for confidentiality of a computerized record, the development of security policies and procedures would reasonably be one of the health information practitioner's responsibilities. These findings also seem to support previous research involving confidentiality and other legal issues such as security and privacy (Institute of Medicine, 1991; Obade, 1993); consumer concerns about release of personal medical information

Table 5. Respondent Participation in Security Policy and Standards Development (N = 356)

	Assessing Patient Information Needs		Designing Patient Data Systems		Implementing Patient Data Systems		Evaluating Patient Data Systems	
	%	N	%	N	%	N	%	N
Includes development of Security Policies and Procedures	57.3	204	31.5	112	37.6	134	31.2	111
Includes development of Standards and Protocols	56.2	200	26.4	94	28.1	100	25.0	89

(Bobyarchick, 1993); and lack of adequate federal and state legislation that regulate the transfer of health information data from healthcare facility to healthcare facility (Kelly, 1993). It is reasonable to conclude that health information practitioners are concerned about confidentiality and other legal issues since they are the principal guardians who have always managed the storage of a wide variety of health information data and are responsible for maintaining the quality of the data. It might also be reasonable to conclude that the reason that there is a lower percentage of health information practitioners involved in the designing, implementing and evaluating functions of security policy and procedure development is because computer-based patient records and record systems are affected by many different kinds of laws (e.g., tort liability, reimbursement laws, insurance laws, etc.). Although the health information academic curricula addresses many of these legal issues, it is generally the clinical decision-makers and information systems personnel who are included in these functions.

Table 5 also reveals findings for respondent participation in the development of standards and protocols for the computer-based patient record. When considering standards, it should be noted that they are an integral component of establishing effective computer networks. In other words, networks between hospitals need to have some type of standardization between computers so they can "talk" to one

another. Health information practitioners who have responsibility for computerized data in the future will need to be increasingly concerned about the development of effective standards and protocols.

Since standards and protocols are necessary for the exchange of healthcare data between systems (Childs, 1989; Lips, 1992) it is expected that health information practitioners would be included in the development of these standards. New standards [such as the Health Level 7 (HL7) standard which provides interfaces between individual computer systems] have become an issue for health information practitioners since the early 1990's (i.e., professionals must become knowledgeable about the use of such standards and their relation to health information practitioners). Whether or not a knowledge of standards/protocols will increase the role responsibilities of the health information professional, and to what extent, is important for health information educators to address in curriculum revisions.

As shown in Table 5 the largest proportion of the respondents (56.2%) participated in the development of standards and protocols when <u>assessing</u> patient information needs. It is reasonable to assume that this may indicate that health information practitioners are already knowledgeable about such protocols as HL7. It might also be reasonable to conclude that the lower percentages seen (i.e., for <u>designing</u>, <u>implementing</u> and <u>evaluating</u> data systems) would indicate that

a more extensive knowledge of system design and systems analysis would be required than is normally a health information practitioner responsibility.

Examination of Table 6 reveals respondents with a graduate degree or a graduate degree in progress who participated in the development of security policies and who participated in the development of standards. These statistics were compiled to examine if there were any differences between these percentages and the percentages in Table 5 (i.e., all the respondents who participated). The function that revealed the greatest differences in percentages involved implementing patient data systems when developing security policies and procedures (i.e., 42.4% in comparison to 37.6% as seen in Table 5). The higher percentage seen in Table 6 may indicate that those health information practitioners with additional degrees may assert a more active role and may also be given additional responsibilities than those health information practitioners without graduate degrees. In addition, higher involvement was also seen for practitioners with graduate degrees in the designing of patient data systems when developing standards and protocols (i.e., 30.3% in comparison to 26.4%). Again, because of the additional academic background, it is reasonable to assume that the role of the health information practitioner with an advanced academic degree would be more comprehensive in relation to information systems and their purpose.

Table 6. Respondents with a Graduate Degree or a Graduate Degree in Progress who Participated in the Development of Security Policies and Network Standards (N = 132)

	Assessing Patient Information Needs		Designing Patient Data Systems		Implementing Patient Data Systems		Evaluating Patient Data Systems	
	%	N	%	N	%	N	%	N
Includes development of Security Policies and Procedures	56.1	74	34.9	46	42.4	56	34.1	45
Includes development of Standards and Protocols	56.1	74	30.3	40	29.6	39	27.3	36

Findings Related to Research Objective 3

The third research objective sought to determine practitioner preferences for types of educational delivery systems that will best serve health information managers who are preparing for the implementation of the computer-based patient record in the healthcare environment. Respondents were asked to indicate their preferences for four educational delivery systems that could be utilized in approved academic programs when preparing for four different job-related functions (i.e., the ability to assess patient information needs and the ability to design, implement, and evaluate systems for patient data).

The results shown in Table 7 demonstrate that a large majority of respondents (ranging from 69.1% to just over 78.1%) report that all four types of educational delivery systems should be utilized in preparing the health information student for the approaching computer-based patient record. These high percentages included all four categories (i.e., the ability to assess patient information needs, the ability to design systems for patient data, the ability to implement systems for patient data and, the ability to evaluate systems for patient data). The percentages seen for classroom instruction and continuing education (i.e., ranging from 13.8% to 22.5%) reveal that there is more support for having health information students learn about systems and systems design in

Table 7. Respondent Preference for Educational Delivery Systems Needed by Health Information Students in Preparation for the Advent of the Computer-based Patient Record (N = 356)

	Classroom Education in Approved Programs		Intern-ships		On-the-Job Training		Continuing Education		All Categories	
	%	N	%	N	%	N	%	N	%	N
The ability to Assess patient information needs	13.8	49	7.0	25	12.9	46	15.4	55	78.1	278
The ability to Design systems for patient data	21.1	75	8.1	29	14.0	50	22.5	80	69.1	246
The ability to Implement systems for patient data	15.7	56	8.1	29	20.5	73	19.7	70	70.8	252
The ability to Evaluate systems for patient data	18.8	67	9.6	34	15.7	56	21.6	77	72.2	257

these types of settings than during their internships or through on-the-job training.

Table 8 (Respondent Preference for Inclusion of Academic Emphases in 4-year and/or 2-year Health Information Manager Instruction) reveals that the vast majority (ranging from 61.5% to just over 76%) of respondents report that academic emphases related to preparing students for assessing, designing, implementing, and evaluating patient data systems should be included in both 4-year and 2-year instructional programs. The results also reveal that for "the ability to design systems for patient data" category, 27.8% of the respondents believed that these skills should only be included in a four-year academic program. This finding may indicate that some RRA's believe that designing systems within the health information department would require course work beyond a 2-year degree. Review of Table 8 also reveals 0 percent for all categories found under the two-year program only. This might indicate that the respondent's perception of additional courses in a two-year academic program may be unrealistic because of an already detailed curriculum.

Findings Related to Research Objective 4

The fourth research objective sought to determine the presence of automated information systems that are components of a computer-based patient record in 10 healthcare units. The results shown in Table 9 were ranked in order to determine

Table 8. Respondent Preferences for Inclusion of Academic Emphases in 4-Year and/or 2-Year Health Information Manager Instruction (N = 356)

	Include in a 4-year Program Only		Include in a two-year Program Only		Include in both 4-year and 2-year Programs	
	%	N	%	N	%	N
The ability to Assess patient information needs	13.8	49	0	0	76.1	271
The ability to Design systems for patient data	27.8	99	0	0	61.5	219
The ability to Implement systems for patient data	21.9	78	0	0	66.6	237
The ability to Evaluate systems for patient data	19.4	69	.6	2	69.4	247

Table 9. Health Facility Departments with Automated Information Systems Considered a Component of the Computer-based Patient Record (N = 356)

Units	CPR Stand-alone Computers			CPR System in Transition			CPR System Fully Functioning			N/A or Unknown		
	%	N	Rank	%	N	Rank	%	N	Rank	%	N	Rank
Health Info.	24.4	87	5	33.7	120	1	7.3	26	6	22.8	81	8
Billing Center	30.9	110	2	23.6	84	3	10.1	36	2	22.2	79	9
Patient Reg.	29.8	106	3	23.9	85	2	13.2	47	1	20.8	74	10
Lab.	31.2	111	1	21.3	76	6	9.8	35	3	25.3	90	7
Pharmacy	28.7	102	4	22.5	80	5	8.4	30	5	26.4	94	6
Radiology	21.3	76	7	19.9	71	7	9.0	32	4	33.4	119	5
Bedside Computers	3.1	11	10	14.3	51	10	.6	2	10	55.6	198	1
Materials Management	21.9	78	6	15.2	54	9	4.2	15	8	39.0	139	4
Nursing Stations	9.8	35	8	23.0	82	4	4.8	17	7	39.6	141	3
Emergency Department	9.0	32	9	18.3	63	8	4.2	15	8	45.8	163	2

*Note: Remaining percentages include missing data

the comparative status of clinical departments in relation to automated health information systems. The results indicate that the Health Information Department ranks highest for having a CPR system in progress (i.e., 33.7%). A CPR "in progress" was described on the survey form for the respondents. Factors such as the purchase of equipment specifically for the introduction of a computer-based patient record and/or standards being established would be indicative of a CPR system being "in progress". This department had a much higher ranking because it is the repository for all clinical data and because of the functions for which health information practitioners are responsible (i.e., collecting and analyzing patient care data). It may be safe to assume that health information departments might have many practitioners in the process of preparing for a future electronic patient record which also supports the need for prompt academic modifications to health information program curricula.

Results in Table 9 also reveal that laboratories (31.2%) in healthcare facilities ranked first for having CPR systems that operated independently. By a system "operating independently", a department or unit has computers that are not interfaced with the entire facility but are functioning only within a specific department or unit. Billing centers (30.9%) and patient registration departments (29.8%) ranked second and third with comparable percentages. These results

confirmed the expectations of the researcher that since these were the first departments to have computers installed, it would be safe to assume that the laboratories, billing centers and patient regtistration departments would be among the highest ranked to have independent patient data systems. In addition, Table 9 reveals that pharmacy (28.7%), health information (24.4%), radiology (21.3%) and materials management (21.9%) departments had high levels of utilization of electronic systems that were operating independently. The literature confirms the high usage of computer systems in ancillary departments such as laboratories and pharmacies (Ball & Boyle, 1980; Belton & Dick, 1991; Beltran, 1991) and that the quality of health information (in addition to the quality of patient care) depends on advanced computer technology in a health information department. The data related to fully functioning CPR systems in all of the departments revealed relatively low amounts of usage. These low percentages might be attributed to a variety of reasons including rapidly changing computer technology, unavailable funding and/or resources (particularly governmental) in healthcare facilities, and current healthcare reform. Many of these reasons were also expressed by the respondents on the returned surveys. The patient bedside computers had the lowest rankings in all three categories. Point-of-care systems (as patient bedside computers are referred to include information that is exchanged through a bedside terminal)

accessible to all caregivers who enter the patient's room. This technology is relatively new and may explain why this category also ranked highest for the number of respondents who regarded this technology as either Not Applicable or Unknown. Many of the departments that had low usage for a "fully functioning" CPR system had much higher percentages for a CPR system "in progress." This might be indicative that hospitals are in the planning and development phase of implementing a CPR system.

The data in Table 10 reveal the extent of implementation of confidentiality policies for the 10 different healthcare departments and systems. This information was gathered to determine if the development of confidentiality policies in healthcare facilities were being maintained for all departments that might have easier access to clinical data because of advanced electronic technology. The results indicate that the health information department ranked highest (50.0%). Since legal issues are incorporated into the initial responsibilities of managers and directors of health information departments, it was an expected result of the researcher. Other departments who ranked high for having implemented confidentiality policies had similar rankings for having independent CPR systems (on Table 9). These departments included patient registration (33.7%), laboratory (26.7%), billing centers (26.4%), pharmacies (23.3%) and radiology (23.0%). It is reasonable to conclude that because

Table 10. Health Facility Departments with Confidentiality Policies Implemented for the CPR (N = 356)

Units	POLICIES IMPLEMENTED								
	YES			NO		NOT APPLICABLE		NO RESPONSE	
	%	N	Rank	%	N	%	N	%	N
Health Info.	50.0	178	1	9.0	32	2.8	10	38.2	136
Patient Registration	33.7	120	2	7.3	26	14.0	50	44.9	160
Laboratories	26.7	95	3	7.6	27	19.7	70	46.0	164
Billing Center	26.4	94	4	9.8	35	19.1	68	44.7	159
Pharmacy	23.3	83	5	7.6	27	20.8	74	48.3	172
Radiology	23.0	82	6	7.0	25	18.0	64	52.0	185
Nursing Stations	20.5	73	7	5.3	19	15.2	54	59.0	210
Emergency Department	19.1	68	8	5.9	21	13.2	47	61.8	220
Materials Mgt.	11.8	42	9	6.7	24	21.1	75	60.4	215
Patient Bedside Computers	7.6	27	10	7.9	28	15.2	54	69.3	247

of the number of independent computers, these clinical departments had a greater awareness of confidentiality issues. The lowest ranking was with patient bedside computers (7.6%) and this is in accordance with the low ranking for automated information systems as seen in Table 9 (i.e., 10, 10, 10, and 1).

Cross-tabulations and chi square analyses were also computed on the results to determine whether there were significant relationships between the 10 different units and the CPR variables (i.e., the CPR in progress, the CPR operating independently, and the fully functioning CPR). Because of the manner in which the data were collected (i.e., nominal data rather than continuous data). Chi square results in Table 11 are indicative of associations rather than significant differences. Table 11 reveals findings for acute care facilities affiliated with medical schools and academic centers and non-affiliated acute care facilities. The only significant relationship found between these two categories was the Laboratory department which had a chi square of 12.05, $p \leq .007$. This result indicates a trend in the utilization of the computer-based patient record in both acute care facilities affiliated with medical schools and academic centers and non-affiliated acute care facilities. This result is supported by those previously noted in Table 9 in which Laboratory departments ranked first in having computers that operated independently.

Table 11. Pearson Chi-Square Test of Association for the Computer-based Patient Record by Healthcare Departments between Acute Care Facilities Affiliated with Medical Schools and Academic Centers and Non-Affiliated Facilities

Units	Stand-alone Computers				In Transition				Fully Functioning			
	*ACA		ACN-A		ACA		ACN-A		ACA		ACN-A	
	N	%	N	%	N	%	N	%	N	%	N	%
Health Information	(25)	42.4	(34)	57.6	(43)	44.8	(53)	55.2	(12)	60.0	(08)	40.0
Patient Registration	(37)	46.3	(43)	53.7	(27)	39.1	(42)	60.9	(19)	51.4	(18)	48.6
Laboratories[A]	(44)	48.4	(47)	51.6	(24)	36.4	(42)	63.6	(18)	58.1	(13)	41.9
Billing Center	(37)	46.8	(42)	53.2	(28)	45.2	(34)	54.8	(13)	46.4	(15)	53.6
Pharmacy	(37)	45.7	(44)	54.3	(29)	43.9	(37)	56.1	(12)	46.2	(14)	53.8
Radiology	(29)	43.9	(37)	56.1	(27)	43.5	(35)	56.5	(13)	48.1	(14)	51.9
Nursing Stations	(12)	40.0	(18)	60.0	(30)	42.3	(41)	57.7	(07)	53.8	(06)	46.2
Emergency Department	(15)	51.7	(14)	48.3	(27)	45.0	(33)	55.0	(07)	53.8	(06)	46.2
Materials Mgt.	(28)	45.9	(33)	54.1	(16)	36.4	(28)	63.6	(07)	50.0	(07)	50.0
Patient Bedside Computers	(04)	44.4	(05)	55.6	(19)	44.2	(24)	55.8	(02)	100.0		

[A]Chi square = 12.05, $p \leq .007$

*ACA = Acute Care Facilities Affiliated with Medical Schools and Academic Centers

ACN-A = Acute Care Non-Affiliated Facilities

Table 12. Pearson Chi-Square Test of Association for the Computer-based Patient Record by Healthcare Departments between All Acute Care Facilities and Other Facilities such as Clinics, Outpatient, Long-Term Care, etc.

Units	Stand-alone Computers				In Transition				Fully Functioning			
	*ACF		OTHER		ACF		OTHER		ACF		OTHER	
	N	%	N	%	N	%	N	%	N	%	N	%
Health Information[A]	(59)	67.8	(28)	32.2	(96)	80.0	(24)	20.0	(20)	76.9	(06)	23.1
Patient Registration[B]	(80)	75.5	(26)	24.5	(69)	81.2	(16)	18.8	(37)	78.7	(10)	21.3
Laboratories[C]	(91)	82.0	(20)	18.0	(66)	86.8	(10)	13.2	(31)	88.6	(04)	11.4
Billing Center[D]	(79)	71.8	(31)	28.2	(62)	73.8	(22)	26.2	(28)	77.8	(08)	22.2
Pharmacy[E]	(81)	79.4	(21)	20.6	(66)	82.5	(14)	17.5	(12)	46.2	(14)	53.8
Radiology[F]	(66)	86.8	(10)	13.2	(62)	87.3	(09)	12.7	(27)	84.4	(05)	15.6
Nursing Stations[G]	(30)	85.7	(05)	14.3	(71)	86.6	(11)	13.4	(13)	76.5	(04)	23.5
Emergency Department[H]	(29)	90.6	(03)	09.4	(60)	92.3	(05)	07.7	(13)	86.7	(02)	13.3
Materials Mgt.[I]	(61)	78.2	(17)	21.8	(44)	81.5	(10)	18.5	(14)	93.3	(01)	06.7
Patient Bedside Computers[J]	(09)	81.8	(02)	18.2	(43)	84.3	(08)	15.7	(02)	100.0		

[A]Chi square = 14.57, p≤.002 [B]Chi square = 33.41, p≤.001 [C]Chi square = 69.47, p≤.001
[D]Chi square = 10.36, p≤.015 [E]Chi square = 45.32, p≤.001 [F]Chi square = 54.14, p≤.001
[G]Chi square = 30.74, p≤.001 [H]Chi square = 42.93, p≤.001 [I]Chi square = 18.85, p≤.001
[J]Chi square = 12.05, p≤.007
*ACF = All Acute Care Facilities

Table 12 reveals findings for cross tabulations using the same variables as in Table 11 except that All Acute Care Facilities were compared to Other Types of Facilities (i.e., clinics, outpatient sites, etc.). The results reveal significant relationships for all 10 units. The Health Information department had a chi square of 14.57, $p \leq .002$ which supports the expectations of the researcher that there is a significant trend in the utilization of the computer-based patient record in health information departments in all types of healthcare facilities, whether inpatient or outpatient. Educators in Health Information programs will therefore need to concentrate on including additional course content directed toward the CPR such as database modeling and database administration. Since Health Information practitioners are associated with reimbursement functions, the results revealed for the Billing center (i.e., a chi square of 10.36, $p \leq .015$) would also be of significance for HI educators. A positive relationship was also found for the Patient Bedside Computers (i.e., chi square 12.05, $p \leq .007$) which signifies a pattern that might indicate an increase in point-of-care systems from manual charting to automated documentation systems. The remaining six departments (i.e., Patient Registration, the Laboratory, Pharmacy, Radiology, Emergency Department and Materials Management) also revealed a significant association at $p \leq .000$. It is plausible that there is not only a strong awareness in all of the healthcare facilities of the advent of

the computer-based patient record, but that all healthcare facilities are making positive and rapid progress in preparing for this approaching computer technology.

Findings Related to Research Objective 5

The fifth research objective sought to obtain feedback from the health information practitioners on their perceptions and concerns of the computer-based patient record. Review of all the comments written by the respondents revealed that there was a positive attitude among the majority of respondents about the advent of the CPR. Many of the issues that were of concern were addressed in the study (i.e., the education of both students and practitioners in information systems, confidentiality issues and understanding national standards for the interfacing of networks). Health information practitioners appear to be very aware of the necessity for being knowledgeable about information systems and computer technologies. The practitioners appear to realize the importance of congenial relationships with systems analysts and programmers and the need to support a team effort. More specific concerns were with the adoption of a universal patient number and the ability to change old behaviors of clinicians and other healthcare professionals who are not as computer literate. The biggest problem communicated was that a lack of sufficient funds appears to be a universal problem for the majority of healthcare facilities.

It is logical to assume that the understanding of computer technology itself by the strategic planners and decision makers is secondary to locating the funding for the hardware and software.

Chapter Summary

This chapter has presented the study findings as they relate to previously published literature and to the objectives delineated in Chapter I. Chapter V will summarize the study; set forth conclusions; and present practical recommendations as well as suggestions for future research.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this chapter is to summarize the study, present conclusions, and make recommendations for future educational curricula to be utilized by Health Information educators and future research on computer technology as it applies to the Health Information Manager.

Summary of the Study

The primary purpose of this study was to examine the extent which computer technology (as related to the computer-based patient record) was being utilized by Health Information (HI) practitioners so as to provide new information to HI educators for use when revising academic curricula. A HI practitioner is defined as an individual who is credentialed as a Registered Record Administrator or as an Accredited Record Technician after completing an approved four-year and/or two-year academic program and who is employed in a healthcare facility. This study utilized a descriptive exploratory study approach which had the following objectives: a) to determine how Health Information practitioners are utilizing specific types of computer technology; b) to determine the extent of the responsibilities of Health

practitioners in the development of security policies and procedures and the development of standards and protocols for a computer-based patient record; c) to determine the types of educational needs that will be required for HI Managers once the computer-based patient record is implemented; d) to determine the utilization of automated information systems in various healthcare facilities (in relation to the computer-based patient record); and, e) to obtain feedback from HI practitioners in administrative and middle-management positions regarding their perceptions and concerns as they become more involved in the implementation of the computer-based patient record within their own facilities.

As no single body describes the utilization of the computer-based patient record, several streams of research were brought together to provide a framework for this study. The literature contains a number of overlapping variables concerning the HI professional and various modalities of computer technology. The researcher employed these variables in the design of a research instrument (See Appendix) which was administered to a sample of 685 active Registered Record Administrators(RRA's) in managerial positions. Of the 685 credentialed RRA's in the sample, 356 returned useable surveys for a response rate of 51.9% The following section summarizes the major findings of the study.

Background Characteristics of Respondents

Analyses of the sample revealed that the majority of respondents were graduates from an approved four-year program with a baccalaureate degree, who were employed in acute care facilities (i.e., over 70%). When the levels of education in the sample were examined, it was apparent that a significant percentage of HI practitioners (i.e., 37.0%) either had a graduate degree or were pursuing a graduate degree. This may indicate that HI practitioners are experiencing a necessity for further education. These results are supported by a recent study (Brown, 1992) completed on the number of health information practitioners who have a masters degree which showed that 743 members of the American Health Information Management Association (AHIMA) had a masters degree in 1985 and 1407 members had a masters degree in 1992 (an increase of 89.3%). Changes that are occurring with the responsibilities of the HI Manager (due to the advent of the computer-based patient record) may also have influenced decisions on the part of the HI practitioner to pursue graduate studies. Further research should investigate whether the development of additional graduate programs in Health Information Management are imperative for future stabilization of the profession (e.g., should more Master-level programs be developed by the HI educators and will it be necessary for future Accredited Record Technicians to acquire a four-year baccalaureate degree and for Registered Record Administrators to procure a graduate

degree?). These are questions that need to be addressed to assist in the future curriculum revisions of HI academic programs.

When the analyses of the utilization of computer technology by HI practitioners was completed, it revealed that the present responsibilities of the HI practitioner included providing input when healthcare facilities were investigating computer-based patient data systems. This was demonstrated by the high percentages of involvement in the category of assessing patient information needs. Percentages tended to decline in the remaining categories of designing, implementing and evaluating patient data systems. It would be safe to assume that these areas of expertise were embraced more by information systems designers and analysts because of the necessity for advanced technological knowledge, particularly in the development of database models needed to support a CPR system and protocols, such as HL7 and MEDEX (Ball & Collen, 1992), needed to connect and interface a CPR system.

In analyzing the utilization of computer technology by the health information respondents, it was expected by the researcher that high percentages would be found in the utilization of generic software, since the use of application programs is now associated with many healthcare functions. Also, the use of such software as word-processing and databases lends itself well to health information departmental functions. It was interesting to note that there were similar

high percentages for optical imaging, keyless data and telecommunications. This might indicate that the role of the health information practitioner already includes responsibilities for more sophisticated technology and therefore, health information educators must envision a new academic curriculum that will address more highly advanced technological concepts. These concepts should also include the development of standards and protocols since policy and procedure and standard and protocol development revealed high percentages in the assessment category. It might also be reasonable to conclude that the present health care environments are moving quite rapidly in interfacing within their own facilities and therefore, it is necessary for the HI practitioner to be able to communicate intelligently when assisting with the design and implementation of patient data systems.

When all educational methodologies in the study were examined, it revealed that a significant percentage of HI practitioners reported that when preparing for the advent of the CPR, all of the educational methods should be employed in both the four-year and two-year programs. The educational methods included: Formal education in an approved program, participation during internships, on-the-job training, and continuing education. Participation during internships was ranked as a less preferred educational method. It can only be assumed that since complete CPR systems are not yet incorporated into most hospital networks, HI practitioners do

not yet have access to adequate hardware and software and therefore, would not be able to accommodate students or prepare adequate student schedules that could be included in the internship process.

CPR Systems in Independent Clinical Departments

Cross-tabulations were computed to determine the status of electronic CPR systems in the facilities which employed the HI practitioners in the study. Relationships between acute care facilities affiliated with medical schools and/or academic centers and non-affiliated hospitals and electronic data systems were analyzed. There were eight departments and two additional systems that were included in the cross-tabulations. The eight departments are major clinical departments that can be found in all acute care facilities and also in the majority of outpatient facilities. They are: the Health Information (medical record) Department, Billing Center, Patient Registration, Laboratories, Pharmacy, Radiology, Materials Management, and the Emergency Department. The two additional systems include Patient Bedside Computers and Nursing Stations. All the departments will eventually be included in a complete CPR infrastructure. Nursing stations' and patient bedside computers were also included as these point-of-care systems will be necessary for a complete CPR to support the nursing documentation process.

Using Chi Square analysis, relationships between the CPR systems and the departments were analyzed. There were significant positive relationships found between the Laboratory, the Health Information Department, the Billing Center, the Patient Registration Department, the Pharmacy, Radiology and Emergency Departments and the electronic CPR systems. This supports the premise that since these departments were the first to have computers and computer systems, it is reasonable then to conclude that the electronic CPR system is fast becoming an integral part of these departments. The computer technology in healthcare facilities is very diversified and the completion of a fully functioning CPR system in all healthcare facilities may be found to require a significant amount of time before adequate implementation. Low percentages were found for the point-of-care systems (i.e., patient bedside computers) and nursing stations. Since the electronic CPR systems are more correlated with the clinical departments, one might assume that the integration between bedside computers and nursing station systems and computer-based patient data systems may be prolonged as the technology changes.

Security Policies and Procedures and Standards and Protocols

Analyses of the percentage of respondents who participated in the development of security policies and procedures revealed that a significant number participated

when assessing patient information needs. Levels of participation decreased in the remaining categories (i.e., for the designing, implementing and evaluating patient data systems). It is reasonable to expect that since confidentiality policies for computer technology involve broad legal aspects that include federal and state legislation, as well as the participation of numerous other health professionals in their development, that the role and responsibilities of the HI practitioner might be minimal in these categories. It is, however, reasonable to conclude that the HI practitioner can frequently participate in these administrative functions because of their academic training and experience with issues of confidentiality and security.

A factor which appeared to be extremely important was whether or not the individual departments in the healthcare facilities had developed and implemented confidentiality policies for an electronic system. Therefore, the research instrument included a special section in which these factors were addressed. Low percentages were seen for most of the departments in the category of "confidentiality policies had been implemented". Many of the respondents had marked the "unknown" category. It is reasonable then to assume that since the CPR is only fully implemented in very few healthcare departments, that such policies may not yet be in the development phase. One could also conclude that the healthcare facilities have maintained their present

confidentiality policies for medical data.

An analysis of the development of standards and protocols revealed high percentages for the HI practitioner when assessing patient needs. It might be safe to assume that because of the volume of literature that has focused on the computer-based patient record in recent years, as well as workshops and seminars that have been offered to health information professionals, that HI practitioners have been able to become more knowledgeable about CPR standards and are now included in making decisions about standards and protocols.

Conclusions

Although this study examined only the computer-based patient record in relation to the role of the Health Information Manager, the findings suggest that healthcare facilities are in a critical transition that may not reach completion for the next few decades. The completion of this infrastructure will require a complete reengineering of the health information system as it has previously existed. The advancement of computer technology and the complexity of the interaction between healthcare professionals and the technology will have a significant impact on the Health Information Management profession as it exists today. The next section will address the implications of the CPR on the HI professional, particularly the HI educator, and will present recommendations based upon the results of the study.

Implications for the Health Information Manager

Although the literature presents very little as to how the Health Information profession will actually evolve in relation to the computer-based patient record, it does present both the positive and negative aspects of the automated healthcare record in relation to the HI Manager (Morgan, 1992; Picukaric, 1993). Results of this study suggest that HI practitioners are participating in many of the technological changes (especially those related to the assessment of patient information needs) and that those practitioners with graduate degrees or a graduate degree in progress are more apt to be a part of these changes. The responsibilities of the HI Manager have always included the maintenance of quality patient data and since the CPR has brought about different models of data organization in the healthcare industry (Bradbury, 1990; Morgan, 1992; Singarella & Armbruster, 1991), it now becomes imperative for the HI Manger to acquire the technological skills necessary to meet these demands. Part of these skills may include becoming more involved in systems analysis (Fletcher, 1991) and databases (Abramson, 1991; Beltran, 1991; Miller, 1991; Winters, 1994). For those already in the profession and seeking further formal education so that they can have an active participation in the design and selection of new systems, there is confusion as to the academic direction that needs to be taken. Since there are so few graduate schools that are specifically affiliated with the

four-year baccalaureate Health Information Management programs, HI professionals are attempting to acquire graduate degrees in other related areas [i.e., Math and/or Computer Science (Brown, 1992)]. Since the process to begin implementing the CPR has already been initiated, those HI practitioners already in the work force may have some advantages in acquiring needed skills in that they are experiencing the changes first-hand. Even though experiences with hospital information systems are an advantage, the fragmentation that exists within these systems and the lack of integration of networks (Souhrada, 1990) and the lack of system protocols (Childs, 1989) can place the HI practitioner at a disadvantage. Presently, HI practitioners are utilizing many electronic medical record systems [i.e., a system which "...provides the architecture to maintain in a database the text and image files that represent the paper documentation in the medical record" (Davis, 1993, p. 62)]. But, very few HI practitioners have experience with a true CPR system. Many groups, including health care professionals, clinicians, and information systems professionals, are presently experimenting with CPR systems. Therefore, in order to understand and operate a complete computer-based patient record system, everyone in the healthcare industry will require "re-education".

Implications for the Health Information Educator

Health Information educators are experiencing even more confusion than the practitioners in relation to these technological changes. If changes in the Health Information Management curricula need to include modifications which identify systems analysis, data administration, data modeling, database management, and application programs, then what needs to be eliminated from the curricula so that this additional information can be added? Will HI educators need to further their own formal education in computer science so that they can develop appropriate courses or will HI curricula require more technological courses by "computer science" faculty for the student? Since the study has shown that more healthcare facilities have independently operating CPR systems than fully functioning systems, will this prolong the advent of a true CPR system? Notwithstanding, the study did reveal that this assumption may not be proven because of the number of facilities that now have a CPR "in progress." Because of the limited nature of this study, none of these questions can be answered at this time. However, what has been determined is the necessity for HI educators to include at least the basic computer application programs in their curricula as well as a modified background in information systems. Since the study of legal issues has always been a requirement for all Health Information programs and has always been included in the academic program curricula, HI educators need to continue to

update these already established courses.

Limitations of the Study

One of the primary limitations of this study was a lack of generalizability when focusing on the classification of respondents (i.e., Registered Record Administrators in Managerial positions). Replication of the study would need to include all AHIMA members (i.e., Accredited Record Technicians as well as Educators), regardless of position, in order to obtain a broader perspective of the types of courses that should be included in the academic programs.

A second limitation addresses the respondents' comprehension of the technical terminology on the survey instrument. The manner in which some of the items on the survey were conveyed may have generated confusion with the readers' interpretation (e.g. the use of "programs" instead of the use of "programming languages"). It is hoped that the use of this terminology would not have affected the correct response to the information that was being requested.

Part III of the survey instrument listed the ten units that were thought to be the most likely places where computerized data would be generated. Many of the respondents may not have had access to the information and its relation to the CPR in all of these sections. It is assumed that because of their administrative positions that access to such information could have been obtained.

Recommendations

A number of practical recommendations for Health Information Management educators can be derived from the results of this study. The goal of these recommendations is to enhance the awareness of needed curriculum changes in computer technology in the two-year and four-year Health Information programs and apprise health information practitioners of changes in the profession as they relate to the computer-based patient record. The present utilization by HI practitioners of the various types of computer technology will also assist HI educators in modifying academic program curricula and developing new courses.

Recommendations for Health Information Educators

Educators must continuously further their own education in computer science and information systems, specifically in those areas of database administration, database modeling and decision support systems. Because of the rapid changes in technology, students must be prepared to work with systems analysts and programmers so that they can effectively participate in administrative decision-making for computer-based patient data. Since some of the basic information traditionally taught in HI academic programs may no longer be essential (i.e., studying manual systems) and once healthcare facilities become more and more oriented toward computerized systems, HI educators must identify and update these courses.

As telecommunications is a necessary component in preparing for the computer-based patient record (i.e., networks, standards, etc.), HI educators must also keep apprised of the various interfaces and protocols that need to be included in the clinical information infrastructures and incorporate these components in their instruction.

Both two-year and four-year Health Information programs have always included specific legal aspects courses as a requirement. Because of the added confidentiality issues with computerized health data, HI educators need to keep abreast of all new legal changes involving computer-based patient information and need to modify course content to include material that covers system security and data integrity.

Recommendations for Future Research

A number of questions and issues which need further investigation are derived from this study and are as follows: 1) As this study was conducted only with Registered Record Administrators in management positions, its generalizability is limited. Additional research needs to be completed with a more diverse population which should include a random sampling of all credentialed HI practitioners to determine a more comprehensive perspective of computer utilization in designing, implementing and evaluating patient information systems. This would provide a broader insight for HI educators and assist them in the modification of course

content.

2) Although this study examined the electronic CPR systems in various departments of healthcare facilities, additional studies need to review this status. As systems become less fragmented and interfacing becomes more commonplace within and between healthcare facilities, changes will also occur for the Health Information practitioner. The role of the HI practitioner in developing security policies and procedures may increase and added responsibilities as a decision-maker for the release of confidential information may become more conventional.

3) A study should be done which further examines the perspective of all HI professionals as to future instructional and continuing education requirements. It is reasonable to conclude that graduate-level courses and/or graduate degrees are going to be imperative with new healthcare information infrastructures and the changes within the HI profession will need to be supported by further academic instruction.

4) An additional educational issue that may need to be researched is the present credentialing concept. Since the CPR is propelling the practitioner into more involved stages of information systems, future research may need to focus on the necessity for graduate studies as an additional

requirement for "registration" and a baccalaureate degree as and additional requirement for the "technician" level.

This study has examined a sample of credentialed health information practitioners in relation to their experience with computer technology and the computer-based patient record. Several significant findings emerged from the data analyses, suggesting that the role of the health information professional is increasing in information systems technology and that involvement by health information practitioners in systems analyses is necessitating health information educators to continuously update curricula as well as their own educational needs.

APPENDIX 1

FIRST LETTER SENT TO RESPONDENTS

March 18, 1994

Dear HIM Colleague:

As part of my doctoral dissertation requirements at Loyola University Chicago, I am conducting a national survey of Health Information Management professionals. The objective of this study is to determine perceptions of experienced practitioners in relation to the computer-based patient record. I hope that this study will benefit both educators as well as practitioners.

Although there have been (and still are) many studies in this new area of technology, no significant study has been conducted about what specifically health information educators should be including in academic program curricula.

This study represents a first attempt to elicit the perceptions of experienced practitioners as key sources of information. Because of your "first hand" experience, I count on your generosity in sharing your knowledge with a fellow colleague.

I have enclosed a self addressed return envelope for your use. I plan on utilizing the results of this study for both publications and presentations. It should take no longer than 15 minutes to complete the survey and any personal information will be kept confidential.

Would you kindly return the completed survey by Friday, April 8th. Please use the return envelope enclosed. The number code on your survey will only be used for follow-up. In no way will any confidential information be disclosed.

I thank you in advance for your cooperation and your greatly needed assistance. I recognize the intensity of your administrative commitments, hence I am all the more grateful for your participation.

Sincerely,

Rosemary Van Vranken
PhD Candidate
Loyola University Chicago

APPENDIX 2

REPRINT OF POSTCARD SENT TO RESPONDENTS

Last week a questionnaire seeking your opinion about the computer-based patient record was mailed to you. Your name was drawn from a random sample of credentialed Health Information professionals. The list was acquired by me from AHIMA.

If you have already completed and returned the survey to me, please accept my sincere thanks. If not, please do so today. Because the survey has been sent to only a representative sample of Health Information professionals, it is extremely important that your returned survey be included in the study if the results are to accurately represent the opinions of those practicing our profession.

If by some chance you did not receive the questionnaire or it got misplaced, please call me collect (312) 769-4398 and I will get another one in the mail to you today.

Thank you.

Sincerely,

Rosemary Van Vranken
PhD Candidate
Loyola University Chicago

Note: This is a reprint of a postcard sent to all respondents who did not reply to the first request.

APPENDIX 3

SECOND LETTER SENT TO RESPONDENTS

April 29, 1994

Dear HIM Colleague:

About three weeks ago I wrote to you seeking your opinion on the computer-based patient record. As of today, I have not yet received your completed questionnaire.

I have undertaken this study because of the belief that it would be beneficial to the members of our profession, especially those in academe. It was also felt that appropriate results could only be obtained from those practitioners who were in administrative positions, as they would be the most knowledgeable about the status of the CPR in health care facilities.

After requesting a list of such names from AHIMA, your name was drawn from a scientific sampling process, in which all credentialed members had an equal chance of being selected. In order for the results of this study to be truly representative of the opinions of all our members, it is essential that each person in the sample return their questionnaire.

In the event that your questionnaire has been misplaced, a replacement is enclosed.

Your cooperation is greatly appreciated.

Cordially,

Rosemary Van Vranken
PhD Candidate
Loyola University Chicago

APPENDIX 4

SURVEY: THE COMPUTER-BASED PATIENT RECORD

1. Within the department(s) for which you maintain responsibilities, please determine your duties, in relation to the Computer-based Patient Record, after reading columns A - D. Read each column carefully and decide whether components 1 - 8 were a consideration with each of these responsibilities. (Please circle only **ONE** number in each column) For example, have you done an assessment of the patient-related information needs in your department? If so, have you used any of the generic software tools?

1 = In Progress 2 = Completed

	A **Assessment** of patient-related information needs		B **Designed & Selected** information systems for patient-related data		C **Implemented** information systems for patient-related data		D **Evaluated** information systems for patient-related data	
1) The use of generic software tools such as spreadsheets, etc.	1	2	1	2	1	2	1	2
2) The use of programs such as BASIC, PASCAL, etc.	1	2	1	2	1	2	1	2
3) The use of optical storage technology	1	2	1	2	1	2	1	2
4) The use of keyless data such as bar-coding, etc.	1	2	1	2	1	2	1	2
5) The use of graphs	1	2	1	2	1	2	1	2
6) Included the development of security policies and procedures	1	2	1	2	1	2	1	2
7) Included the need for telecommunications	1	2	1	2	1	2	1	2
8) Included the need for the development of standards and/or protocols	1	2	1	2	1	2	1	2

II. In the following areas, please assess what you would consider to be the most preferable way for a Health Information Manager to prepare for the advent of the computer-based patient record.

(Please circle ALL that apply OR column #5 and/or column #C)

	FORMAL EDUCATION	INCLUDED IN INTERNSHIPS	ON-THE-JOB TRAINING	CONTINUING EDUCATION	ALL OF THESE	FOR RRA PROG ONLY	FOR ART PROG ONLY	FOR BOTH PROG
1) Ability to **ASSESS** patient-related information needs	1	2	3	4	5	A	B	C
2) Ability to **DESIGN** and **SELECT** information systems for patient-related data	1	2	3	4	5	A	B	C
3) Ability to **IMPLEMENT** information systems for patient-related data	1	2	3	4	5	A	B	C
4) Ability to **EVALUATE** information systems for patient-related data	1	2	3	4	5	A	B	C

III. Are you (or have you been) on a committee(s) or a task force that was specifically established for the implementation of the computer-based patient record?

YES NO

In your work facility, which of the following departments or unit(s) have an automated information system that is considered to be a component (or future component) of the computer-based patient record?

SYSTEM IN PROGRESS: By "system in progress" it is meant that committees have met, and/or equipment has been purchased, and/or standards have been established.

SYSTEM OPERATING INDEPENDENTLY: By "system operating independently" it is meant that this department or unit has an independent system, but it is not considered to be a fully functioning CPR system.

SYSTEM FULLY FUNCTIONING: By "system fully functioning" it is meant that your facility considers itself to have a fully functioning computer-based patient record system.
(PLEASE CHECK ALL THAT APPLY):

	ELECTRONIC CPR SYSTEM IN PROGRESS	ELECTRONIC CPR SYSTEM OPERATING INDEPENDENTLY	ELECTRONIC CPR SYSTEM FULLY FUNCTIONING	NOT APPL OR UNKNOWN	CONFIDENTIALITY POLICIES IMPLEMENTED YES	NO	UNKNOWN
1) Health Information (Medical Record) dept.							
2) Billing Center							
3) Patient Registration							
4) Laboratories							
5) Pharmacy							
6) Radiology							
7) Pts. Bedside computers							
8) Materials Mgt.							
9) Nursing Stations							
10) Emergency dept.							
11) Other:							

PART II

PLEASE COMPLETE THIS SECTION IN ITS ENTIRETY. INCLUDE ALL THAT APPLY:

1) During what time period did your graduation take place?

FROM A FORMAL HEALTH INFORMATION PROGRAM: Before 1960____ 1961-1970____ 1971-1980____ 1981-Present____

FROM THE CORRESPONDENCE COURSE OR ISP: Before 1960____ 1961-1970____ 1971-1980____ 1981-Present_____

2) Which of the following best describes your highest level of education?
(Please circle ONE)

a) Associate degree b) Bachelors degree c) Masters degree d) Masters in progress
e) Doctoral degree f) Doctorate in progress g) Other_____
(specify)

3) Which of the following best describes your primary place of employment?
(Please circle ONE)

a) Hospital (acute care) (affiliated with medical school and/or academic center)
b) Hospital (acute care) (not affiliated with medical school and/or academic center)
c) Health Care Facility other than Acute Care Hospital
(please specify)_____

4) Your job responsibilities include what departments? (Please list all that apply; e.g., Q.I., U.R., etc.)

_____

5) Your credentials include: _____RRA _____ART _____BOTH

6) PLEASE COMMENT ON ANY VIEWS OR OPINIONS YOU MAY HAVE CONCERNING THE IMPLEMENTATION OF THE CPR:

_____

_____

_____

7) Do you wish to receive an abstract of this study? YES NO

Thank you for your support of this research. Please return this form by _____ to:

ROSEMARY VAN VRANKEN
1505 West Hollywood
Chicago, Illinois 60660

REFERENCES

Abramson, A. V. (1991, July). Success factors in the design and development of a decision support system. Healthcare Informatics, 8(7), 13-14.

Amatayakul, M., & Kudirka, G. (1993). Survey of attitudes and understanding about the computer-based patient record. Journal of American Health Information Management Association, 64(2), 46-47.

Amatayakul, M. (1994). How close are we to computer-based patient records? Journal of American Health Information Management Association, 65(12), 48-49.

Bahensky, J. (1992, March). University's statewide network links rural doctors. Healthcare Informatics, 9(3), 10-12.

Ball, M. J., & Boyle, T. M., Jr. (1980, February). Hospital information systems: Past, present and future. Healthcare Financial Management, 34(2), 12-24.

Barnett, O. (1990). Computers in medicine. Journal of American Medical Association, 263, 2631-2633.

Belton K., & Dick, R. (1991). Voice-recognition technology: Key to the computer-based patient record. Journal of American Medical Record Association, 62(7), 27-32.

Beltran, C. M. (1991, April). EDI revolutionizes the healthcare marketplace. Healthcare Informatics, 8(4), 36-37.

Bennett, J. J., Alligood, R., Beck, K. L., Dardeen, K., & Payne, L. (1993). A computer-based patient record: Emory's approach. Topics in Health Information Management, 13(4), 51-62.

Bishop, C. (1990). A new format for the medical record. M.D.Computing, July/August, 208-215.

Blair, J. S. (1994). Clinical information systems: Putting them in perspective. Journal of American Health Information Management Association, 65(10), 30-32.

Blake, M. B. (1982). Computerized medical records. Confidentiality and authentication. Legal Aspects of Medical Practice, 10(3), 3-8.

Blocker, W. P., III. (1992). Electronic medical records and social benefit records: Issues of standardization and confidentiality. Journal of Health Information Management Association, 63(8), 66-73.

Bobyarchick, A. (1993). The confidentiality-access maze: Can it be negotiated? Bits and Bytes. Health Information Management, 2(2), 1-3.

Bradbury, A. (1990a). Computerized medical records: The need for a standard. Journal of American Medical Record Association, 61(3), 25-35.

Bradbury, A. (1990b). The computerized medical record: An invitation to dialogue. Journal of American Medical Record Association, 61(7), 32-37.

Bridges-Webb, C. (1986). A computer summary for general practice. Medical records: MEDSUM. The Journal of Family Practice, 23, 389-392.

Brown, M. (1992). A look at master's degrees among health information management professionals from 1985 to 1992. Journal of American Health Information Management Association, 63(12), 30-32.

Cade, T., & DeBerg, C. (1992). Keyless data capture: A report of the automatic identification teacher's institute. Journal of American Health Information Management Association, 63(12), 58-63.

Childs, B. W. (1989, August). HL7: The promise of tomorrow. U.S.Healthcare, 6(8), 26-32.

Childs, B. W. (1991, May). Healthcare information systems: Issues and answers. Healthcare Informatics, 8(5), 45-50.

Clark, L. A. (1992). Voice-activated reporting systems: An innovative technology. Topics in Health Record Management, 12(4), 58-63.

Coley, M. B. (1992). Clinical database: An interim step to the computer-based patient record. Topics in Health Record Management, 12(4), 1-7.

Davis, M. W. (1993, June). Reaping the benefits of electronic medical record systems. Journal of the Healthcare Financial Management Association, 60-66.

DeTore, A. W. (1988, September). Medical informatics: An introduction to computer technology in medicine. The American Journal of Medicine, 85, 399-403.

Dillman, D. A. (1978). Mail and telephone surveys. The total design method. New York: John Wiley & Sons, Inc.

Eight most promising emerging computer technologies. (1990). Computers and Health, 11(6), 4-6.

Fletcher, D. M. (1991). The system analysis as a tool for medical record department improvements. Journal of American Health Information Management Association, 62(12), 38-50.

Friedman, B. A., & Martin J. B. (1987). Hospital information systems. Journal of American Medical Association, 257, 1972.

Gabrieli, E. R., & Murphy, G. (1990). Computerized medical records. Journal of American Medical Record Association, 61(1), 26-31.

Gabrieli, E. R. (1991, June). The changing concept of computerized patient records. Healthcare Informatics, 8(6), 16-17.

Gabrieli, E. R. (1993). Aspects of a computer-based patient record. Journal of American Health Information Management Association, 64(7), 70-82.

Gabrieli, E. R., & Speth, D. J. (1992). Basic paradigms for electronic patient records. Journal of Health Information Management Research, 1(1), 1-15.

Gardner, E. (1990, February). The coming evolution in computer systems. Modern Healthcare, 20(6), 29-44.

Golob, R. (1994). Securing a bridge to the CPR: Clinical data repositories. Healthcare Informatics, 11(2), 50-58.

Hammond, W. E., Stead, W. W., Straube, M. J., & Jelovsek, F. R. (1980). Functional characteristics of a computerized medical record. Methods of Information in Medicine, 19, 157-161.

Hospital statistics 1994-1995. (1993). Statistical abstract of the United States. (Available from the American Hospital Association, 1 North Franklin, Chicago, IL 60606)

Huffman, E. K. (Eds.). (1994). Health Information Management. (9th ed.). Berwyn, Illinois: Physicians Record Company.

Institute of Medicine. (1991). The computer-based patient record: An essential technology for healthcare. Washington D.C.: National Academy Press.

Johns, M. L. (1990, January). The functional description of computer related tasks performed by Medical Record Departments in acute care hospitals. (Available from the Fore Resource Center, American Health Information Management Association, 919 North Michigan Avenue, Suite 1400, Chicago, IL 60611)

Kelly, C. K. (1993, August 9). Medical records confidentiality to be affected by health care reform. Advance for Health Information Professionals, 3(16), 8-17.

Kohn, D. (1992). Health information management using optical storage technology: Case studies. Topics in Health Record Management, 12(4), 42-57.

Lavelle, F. W. (1994). Looking ahead to the year 2000: Future applications of the electronic information highway. Journal of American Health Information Management Association, 65(8), 44-46.

Lips, E. T. (1992). HL7. Journal of American Health Information Management Association, 63(8), 45-46.

Longe, K. M. (1992). Bar codes in health information management: Status, standards and selections. Topics in Health Record Management, 12(3), 12-19.

McDonald, J. (1989). Computers. Journal of American Medical Association, 261, 2834-2836.

Meeting CEO/CFO information needs: A design challenge. (1992). Health Information Bits and Bytes, 2(1), 1-4.

Melrose, J. P. (1993). The three R's for CPR implementation: Regulation, reengineering and rightsizing. Healthcare Informatics, 10(10), 58-66.

Miller, M. F. (1991). H.I.M. Today. Quality healthcare through quality information. Journal of American Health Information Management Association, 62(12), 66-76.

Morgan, J. D. (1992). The computer-based patient record challenges the health information management profession. Journal of American Health Information Management Association, 63(6), 79-85.

Obade, C. C. (1993). Legal issues: AIDS and privacy. Advance for Health Information Professionals, 3(24), 8-9.

Picukaric, J. M. (1993). The health information manager of the years 1993 to 2000. Journal of American Health Information Management Association, 64(6), 41-48.

Randall, A. (1991). Bedside systems offer positive incentives. Healthcare Informatics, 8(8), 26-28.

Shortliffe, E. H. (1987). Computer programs to support clinical decision making. Journal of American Medical Association, 258, 61-66.

Singarella, T., & Armbruster, D. (1991, July). An academic department of health informatics: A vision for the 21st century. Healthcare Informatics, 8(7), 42-44.

Smith, J. H., & Kallman, E. A. (1993). Information privacy: Medical record directors' perceptions of policy and practice. Journal of American Health Information Management Association, 64(2), 48-51.

Sneider, R. M. (Eds.). (1987). Management guide to health care information systems. Rockville, MD: Aspen Publishers, Inc.

Souhrada, L. (1990, May 20). Strategy: Communication links with physicians. Hospitals, 55-62.

Stafanchik, M. F. (1991). Point-of-care revolution. Computers in Healthcare, 12(4), 19-24.

Steen, E. B., & Detmer, D. E. (1991). A vision for future patient records. Journal of American Medical Record Association, 62(9), 48-54.

Weber, J. W. (1993a). Power of the computer-based patient record. Journal of American Health Information Management Association, 64(2), 42-44.

Weber, J. W. (1993b). On the Road to CPR: A preparatory guide for the coming of the computer-based patient record. Manuscript in preparation.

Winters, B. (1994). Database management: An emerging role for the health information management professional. Journal of American Health Information Management Association, 65(12), 25.

Zinn, T. K. (1990, October). Confronting 2000 and beyond: Tomorrow's healthcare information system. Computers in Healthcare, 14-18.

VITAE

Rosemary Ann Van Vranken was born in Hazleton, Pennsylvania on April 25, 1933. She attended the College of St. Mary, Omaha, Nebraska where she received a certificate as a Registered Record Administrator. She attended Loyola University, Chicago graduating in 1973 with a major in Psychology. She received a Masters degree from Roosevelt University, Chicago in Public Administration in 1979. She is the mother of three children; John, Robert and Michele Van Vranken, M.D.

She has held positions as Director of Health Information Management departments, Director, Quality Improvement and, Director of Utilization Review at Middlesex General Hospital, Middlesex, New Jersey; Passavant Memorial Hospital, Chicago; Illinois Masonic Medical Center, Chicago; South Shore Hospital, Chicago; and, Holy Family Hospital, Des Plaines, Illinois.

She has been a part-time faculty member at the College of Lake County, Grayslake; Moraine Valley Community College, Palos Hills; and Oakton Community College, Des Plaines, Illinois.

She has also served as a correspondence instructor for the American Health Information Management Association for twelve years.

She is currently employed as a full-time faculty member at Chicago State University in the College of Nursing and Allied Health Professions where she held the position of Program Director, Health Information Management program from 1984-1994.

APPROVAL SHEET

The dissertation submitted by Rosemary Ann Van Vranken has been read and approved by the following committee:

Dr. Terry E. Williams, Director
Associate Professor
Loyola University Chicago

Dr. Todd Hoover
Associate Professor
Loyola University Chicago

Dr. Kathy Westbrook
204 Chanticleer Lane
Hinsdale, Illinois 60521-5022

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

June 22, 1995
Date

Terry E. Williams
Director's Signature