ESSENTIALS OF COMPUTERS FOR NURSES

SECOND EDITION

VIRGINIA K. SABA

KATHLEEN A. McCORMICK

ESSENTIALS
OF COMPUTERS
FOR NURSES
• •

SECOND EDITION

VIRGINIA K. SABA
R.N., Ed.D., F.A.A.N., F.A.C.M.I.
Georgetown University School of Nursing
Washington, D.C.

KATHLEEN A. McCORMICK
R.N., Ph.D., F.A.A.N., F.A.C.M.I.
Senior Science Adviser
Center for Information Technology
Agency for Health Care Policy and Research
Public Health Service, D.H.H.S.
Rockville, Maryland

McGraw-Hill

A Division of The McGraw·Hill Companies

ESSENTIALS OF COMPUTERS FOR NURSES

This book was written by Kathleen A. McCormick in her private capacity. No official support or endorsement by the Department of Health and Human Services, the Public Health Service, or the Agency for Health Care Policy and Research is intended or should be inferred.

ESSENTIALS
OF COMPUTERS
FOR NURSES

NOTICE

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required. The authors and the publisher of this work have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication. However, in view of the possibility of human error or changes in medical sciences, neither the editors nor the publisher nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from use of such information. Readers are encouraged to confirm the information contained herein with other sources. For example and in particular, readers are advised to check the product information sheet included in the package of each drug they plan to administer to be certain that the information contained in this book is accurate and that changes have not been made in the recommended dose or in the contraindications for administration. This recommendation is of particular importance in connection with new or infrequently used drugs.

FOREWORD

The computer revolution is rapid and ongoing. It has impacted on the expansion of knowledge in health care and information management. The great strides in and amplification of information management are occurring because it has now been demonstrated that the use of computers in health care can increase the quality, effectiveness, and efficiency of documenting practice; improve administration in many health care settings; and broaden the education of professionals as well as the conduct of research. And there is movement in this revolution toward an electronic superhighway as a national information infrastructure. These new, and other, innovative movements are described in this second edition of *Essentials of Computers for Nurses.*

To many consumers of health care services, the technology seems linked directly to escalating health care costs. But the computer technology is described in several applications in this book as a means of providing care more effectively and efficiently at affordable costs. The use of computers in nursing is described by the authors as essential to improve health and the quality of care through effective documentation and record keeping.

When the first Nursing Information Systems Conference was held at the University of Illinois in Chicago, in June 1977, the concept of information system use in nursing was in its infancy. With nurturing and development, many of the concepts envisioned at that time have become realities for nurses and nursing.

In this new edition of *Essentials of Computers for Nurses*, those historical developments are highlighted, and the advances in computer technology presented. The application sections have been updated to include many new advanced usages of computers, such as in critical paths and outcomes management. The state of the science of nursing vocabulary is presented from both national and international perspectives. This new edition, therefore, should be useful to nursing in all English-speaking countries until the book is translated into other languages.

Like all sciences, nursing information science is not complete. In this book, the authors have defined areas where further research and application studies are needed. Among these, research on the Nursing Minimum Data Set (NMDS) should figure predominantly if nurses are to contribute

to the development of the computer-based health care record. The NMDS was designed to be appropriate for use in any setting where nursing care is provided. This book is designed to serve as a textbook in nursing educational programs. Its objectives will have been achieved if students come to appreciate the place of computers for nurses and identify some of the factors—economic, political, professional—that will advance the profession of nursing as nurses participate in information science.

Harriet H. Werley, Ph.D., R.N., F.A.A.N., F.A.C.M.I.
Distinguished Professor
School of Nursing
The University of Wisconsin–Milwaukee
Milwaukee, Wisconsin

PREFACE

This second edition of *Essentials of Computers for Nurses* is a comprehensive text on computer technology for nurses and other health professionals. There are so many new essentials of computers for nurses that we have selectively described only those applications that have had sustained usage in nursing. It includes issues and trends in the field—such as the electronic information superhighway, computer-based patient record, data standards and nomenclatures—as well as how the new technology is impacting on health policy.

The text provides an update of computer history as it impacts on the nursing profession. It highlights the milestones of nursing informatics and new applications in nursing practice, education, research, administration, community health, and intensive care. Information on new computer technologies that entered the market since the first edition is also covered.

In this revision, we made a concerted effort to direct students and readers to new national resources that update the state of the science. Because there are so many corporate mergers and so many new companies enter this market, we tried to instruct the readers about "where to seek current information." We omitted many of the applications and examples from the first edition; thus, this book has less chance of becoming outdated before it is printed.

The book consists of four parts. The first part provides historical perspectives of the computer and nursing. In the second part, an overview of computer hardware including microcomputers (personal computers), on-line networks, software, database management systems, and data processing provides state-of-the-art information. The third part focuses on computer systems and gives a current review of nursing and other health care systems, including a description of the status of the computer-based patient record system. Another chapter focuses on implementing systems as well as on the upgrading and reengineering of existing nursing information systems.

The fourth part focuses on computer applications in nursing administration, practice, education, and research, including computer applications in intensive care, community health, and home health. The former chapter on prospective payment has been replaced with a new chapter on the integration of guidelines, outcomes, critical paths, and benchmark or pro-

files into information systems. The chapter on community and home health systems highlights the Home Health Care Classification (HHCC) System. This new system is being used for assessing and documenting home health care using its unique HHCC vocabulary.

Many parts of the text have been expanded to incorporate what we currently know about the important advances in computer technology in nursing informatics internationally. We believe that this book will be especially useful to those nurses who contribute to such advancements in Australia, Belgium, Canada, Denmark, Sweden, the United Kingdom, and other countries with whom we network to share our applications in nursing informatics.

In a recent paper to the British Library, Dr. Donald Lindberg, Director, National Library of Medicine, made the statement that, by the year 2000, those health providers who are illiterate in information systems and computer technology will be likened to the reading illiterate at the turn of the twentieth century. Another futurist mentions that the information area is doubling every six months. Other futurists describe the new libraries as libraries without walls. The electronic information superhighway has been described as an "infobahn" with no speed limits. We are all entering an educational framework of lifelong learning because we can no longer learn everything we need to know for our careers in structured and "brief" formal educational programs.

The future is exciting and challenging. Students, faculty, practitioners, and other nurses who wish to avoid becoming the illiterate of the new century are invited to read this book and learn of nursing's proud contributions in nursing informatics—information science, computer science, and nursing science. We need to become articulate spokespersons of the contributions of nursing informatics to health care and of the need for nursing data, information, and knowledge in our profession.

<div align="right">

Virginia K. Saba, R.N., Ed.D., F.A.A.N., F.A.C.M.I.
Kathleen A. McCormick, R.N., Ph.D., F.A.A.N., F.A.C.M.I.

</div>

ACKNOWLEDGMENTS

CONTENTS

• • • • • • • • • • • • • • • • • • • •

HISTORICAL PERSPECTIVES OF THE COMPUTER AND NURSING

Chapter

1

· ·

HISTORICAL PERSPECTIVES OF NURSING AND COMPUTERS

OBJECTIVES

- Describe the historical perspectives of nursing and computers.
- Describe early computer-based nursing applications in hospitals, community health agencies, education, and research.
- List the milestones of computers in nursing and nursing informatics.

The computer, a powerful technological tool, has transformed the nursing profession. Today computers are essential equipment in hospitals, community health agencies, academic institutions, research centers, and other settings where nurses function. Computers are vital tools of the nursing profession, making nursing part of the technological revolution.

Today nurses are concerned not only with computers, computer technology, and computer systems but also with nursing information systems (NISs) and nursing informatics. "Nursing informatics" has emerged as a new term to describe the use of computer technology in nursing and NISs. Nursing informatics encompasses computer technology that enables nurses to manage society's health care needs more efficiently and effectively. At the same time, it makes nurses more accountable. As in all fields of health care, efficiency, effectiveness, and accountability depend largely on how well computers are understood and used.

Computers are used to manage information in patient care, monitor the quality of care, and evaluate the nursing process. NISs are also being used to manage planning, budgeting, and policy making for nursing services. Moreover, computer applications are being used to enhance nursing education with new media modalities. Computers are providing students with computer-based literature, information, and knowledge databases. They are converting libraries into information centers without walls. Computers are also being used to support nursing research, test new systems, design new knowledge databases, and address the changing role of nursing in the health care industry.

This textbook provides an overview of what a computer is and how it functions. It describes computer applications for nursing and discusses how computers affect the nursing profession. It also discusses NISs and nursing informatics, terms that are used interchangeably here.

This chapter provides an overview of the historical perspectives of nursing and computers by describing five time periods and five nursing components. It highlights how early computer-based nursing applications in hospitals, community health agencies, ambulatory care centers, educational institutions, and research centers set the stage for today's NISs. It describes the major milestones that influenced the introduction of computers into the nursing profession.

The chapter is divided into three sections:

- Historical perspectives of nursing and computers
- Early computer-based nursing applications
- Landmark events in nursing and computers

HISTORICAL PERSPECTIVES OF NURSING AND COMPUTERS

Computer technology was introduced into nursing in response to the need to keep the field abreast of changing and developing technologies in the health industry and in nursing practice. It can be analyzed in three ways: (1) according to five time periods: prior to the 1960s, the 1960s, the 1970s, the 1980s, and the 1990s, (2) according to four major nursing areas: nursing administration, nursing practice, nursing education, and nursing research, and (3) from the perspective of nursing standards and legislation that affected the nursing profession and its need for technology.

For nursing to enter the computer age, the profession had to review, revise, and update practice standards so that they could be implemented in computer systems; develop a variety of materials that could be computerized, such as the nursing minimum data set, standardized nursing vocabularies, and nursing care planning protocols; and design several computer instruments to support the use of the new technology. A brief

discussion of the historical perspectives of nursing and computers in five time periods follows.

Five Time Periods

Prior to the 1960s

Beginning in the 1950s, as the computer industry grew, the use of computers in the health care industry grew. In the early days of this evolving field a few professionals formed a cadre of pioneers using computers for health care. During this period the nursing profession was expanding and undergoing major changes. The image of nursing was improving, nursing practices and services were expanding in scope and complexity, and the number of nurses was increasing. These events and initiatives created an incentive to bring computers into the profession.

Computers were initially used in hospitals and community health agencies for basic business office functions. Early computer equipment used punched cards to store data and computer programs and employed card readers and sorters to prepare the data for processing. Very early electronic computers were essentially large calculating machines that were linked together and operated by paper tape and that used teletypewriters to print their output. As the technology advanced, the equipment improved.

1960s

During the 1960s, as the computer began to be used in the health care setting, critical questions such as "Why computers?" and "What should be computerized?" were asked. Nursing practice standards were reviewed, and nursing resources were analyzed. Studies were conducted to determine which aspects of nursing should be automated and how computer technology could be utilized effectively in the health care industry. The hospital nursing station was viewed as the hub of communications and the most appropriate site for the development of computer applications.

During this period, computers improved and technology advanced. Health care facilities grew. The introduction of cathode ray tube (CRT) terminals, on-line data communication, and real-time processing added other essential dimensions to computer systems, making them more accessible and "user-friendly."

Hospital information systems (HISs) were developed primarily to process financial transactions and serve as billing and accounting systems. At that time a few HISs emerged that could document and process medical orders; these systems also offered selected patient and nursing care activities. Vendors were beginning to enter the field and market software applications to automate various hospital functions; however, because of the limitations of the technology, the lack of standardization, and the diversity of paper-based patient care records, progress was slow.