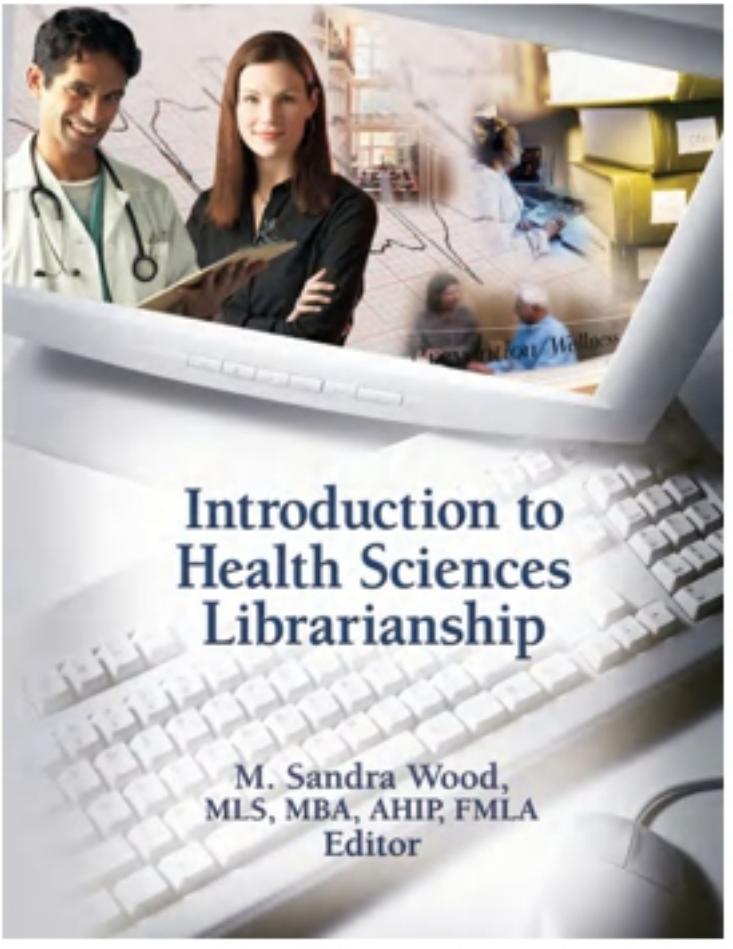
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Health Sciences
Librarianship
M. Sandra Wood,
MLS, MBA, AHIP, FMLA
Editor

Introduction to Health Sciences Librarianship

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Routledge
Taylor & Francis Group
LONDON AND NEW YORK

First Published by

The Haworth Press, Taylor & Francis Group, 270 Madison Avenue, New York, NY 10016.

Transferred to Digital Printing 2008 by Routledge
270 Madison Ave, New York NY 10016
2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

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Cover design by Kerry E. Mack.

Library of Congress Cataloging-in-Publication Data

Introduction to health sciences librarianship / M. Sandra Wood, editor.
p. cm.
ISBN: 978-0-7890-3595-0 (hard : alk. paper)
ISBN: 978-0-7890-3596-7 (soft : alk. paper)
1. Medical librarianship. 2. Medical librarianship—United States. I. Wood, M. Sandra.

Z675.M4I58 2007
026'.61—dc22

2007047081

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doi:10.1300/6041_a

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doi:10.1300/6041_b

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Foreword

Above all else, the strength of a profession depends on the richness of its knowledge base. Not only does the knowledge base have to exist, it also has to be recorded and shared in an organized and coherent manner. In this book, M. Sandra Wood has brought together twenty-four authors who are experts in their respective areas within health sciences librarianship. Her selection of authors and topics and her organization of the content in a single volume have resulted in a valuable resource that will serve us now and well into the future. The content is suitable for use by a wide range of audiences, including students, educators, associations, library and information service managers, practitioners, and the myriad of for-profit and not-for-profit organizations whose products and services are essential to the work of health sciences librarians.

The publication of this comprehensive text is particularly timely because we are entering a period of major change in the age structure of the library and information services workforce. The first of the baby boomers, a group born between 1946 and 1964, turned sixty in 2006, and the next two decades will be characterized by increasing numbers of retirements. Librarianship will likely be affected even more by this demographic shift than other professions due to the high proportion of second career entrants to the field and the reduced hiring in libraries during the 1970s and 1980s. Never has there been a more important time for us to attend closely to issues of recruitment of new entrants to the field, retention of experienced librarians, succession planning, and the recording and sharing of our knowledge base. If we are to maintain the strength of our workforce, professional education will have to take place in multiple contexts. We need to strengthen the range of not only educational activities in our schools of library and information science but also continuing education offerings in our professional associations and in the workplace itself. Creating educational opportunities for new entrants to the field as well as for experienced health sciences librarians will be keys to our future success.

Health sciences libraries have always held a special appeal for those of us who have been fortunate enough to work in them. Health is a vital resource for everyday life for all human beings, and quality information services are important components of the broad infrastructure needed to support health. In addition to supporting research and educational programs in the health sciences, libraries also serve a vital function in providing up-to-date information to support patient care locally and globally. Libraries are also increasing their support of areas such as health care administration, health policy, public health, and specialized areas such as bioinformatics. In recent years, the patient care support function of libraries has broadened beyond the provision of information services to health care providers to include patients and their families and the general public. All of these trends illustrate the ever growing importance of library and information services to the health field.

This book begins with an introductory chapter on the field and a chapter on the health care environment that looks at the context of our practice. As special librarians working in the health field, our role demands that we be ever mindful of, and responsive to, the changing milieu in which we work. Given that health care continues to be one of the most volatile and changing sectors of the economy, we have shown tremendous ability to morph and move with the times and we must continue to do so. The chapter on health informatics that appears later in the book re-

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doi:10.1300/6041_c

minds us of the second major trend that is affecting our work as health sciences librarians: changing information technologies. The combination of the ongoing challenges created by the changing health care system as well as changing technologies will ensure that our jobs will never be dull!

Regardless of who our users are and what information formats are being employed to deliver information, the basic functions of libraries continue to be at the center of our practice. The book is well stocked with chapters on these key functions, including collection development; information access; information retrieval; and the management of information services. The management area is further developed in chapters on special services related to media, such as podcasting and course management systems, planning, communications, and marketing. Librarians are increasingly playing an instructional role with their users, as reflected in the chapter on information literacy. The book includes a look at the complementary roles played by academic and hospital libraries in the network of health information provision and the importance of the work done by libraries in both collecting and preserving unique special collections.

Trends suggest that the need for health information in all formats, especially in electronic form, will continue to grow in the future. Health care providers look to libraries and librarians as trusted sources of information, a role that is highly dependent on our own knowledge base and its application to practice. In the health sciences, we have participated in the development of evidence-based health care by providing information services that support health care professionals who are applying the best available evidence from the research literature to patient care. While service to others will continue to be one of our major roles for the future, the time has now come for the library profession to further develop, codify, and implement on a large scale its own version of evidence-based practice as library and information professionals. All librarians need to consciously seek out and use the best available evidence from their own literature and from demonstrated best practices in the field to continuously improve their services. The chapter on evidence-based practice and the contents of this book as a whole provide an excellent guide for us to use as we strive to meet the challenges of the present and the future.

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Preface

When I retired in December 2005 after more than thirty-five years as a medical librarian and over twenty-five years as an editor of a professional journal *(Medical Reference Services Quarterly),* I had no idea that a short time later, I would begin to work on a textbook for health sciences librarianship. However, with retirement, came the time to reflect on the need for such a book, and the time to actually devote to the project. Thus began the concept of a single volume that would reflect current and future trends in health sciences librarianship, a volume that could be used in both graduate library schools for beginning librarians and also for practicing health sciences librarians, and a volume that would be "fast-tracked" through the writing and publication process so that it would not be outdated immediately upon publication. Little did I know that it would consume much of my time for more than a year and would involve twenty-four authors and multiple volume and chapter reviewers. In the end, hopefully, the profession will benefit from the content that so many talented health sciences librarians have shared with both their colleagues and those new to the profession.

To keep content current and relevant, authors were asked to write their chapters within a six-month time period, with several months for editing, and a shortened production time. An ambitious eighteen-month cycle was established at the outset. Most authors were "on board" fairly early in the project, although there were some changes in chapter authors along the way. Ultimately, I believe that the volume has assembled one of the finest groups of authors representing all aspects of the profession of health sciences librarianship.

Authors were informed that the textbook would be used in graduate library schools, by beginning and practicing medical librarians, and by experienced librarians catching up on newer developments in the field. The intent was that the work would capture current practice along with an indication of where the field of health sciences librarianship is going. Emphasis was to be placed on the last five to six years, the current status of the field, and the near-term future. It was noted that some areas would require historical background, although, with some exceptions, this was not the focus.

As the volume progressed, chapter authors had many questions, among which was the question of standardized terminology. "What do we call the users of health sciences libraries?" Also, would we use "medical libraries" or "health sciences libraries"? Being a democratic person, I put these questions to a vote among the chapter authors. Authors were asked to vote on their preference for "clients," "patrons," or "users" to describe persons served by libraries. The vote was literally evenly split; therefore, chapter authors have been allowed to use their preferred terminology. While this makes for inconsistency in the volume, it meant that authors felt more comfortable using the terminology that they preferred. With the question of health sciences versus medical libraries, the vote favored health sciences libraries, but authors have been allowed to use either health sciences or medical, as they preferred.

Authors were also asked to vote on the title of the book. From a selection of about eight potential titles, the one selected was *Introduction to Health Sciences Librarianship,* a reflection of the content of the volume. The more general "health sciences" enlarges the scope of the content to apply not just to medical libraries but to libraries in biomedical, nursing, allied health, phar-

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doi:10.1300/6041_d

macy, and veterinary settings, and more. "Introduction" was chosen over words such as "Handbook" and "Principles" as reflecting the intent of the content—that it would provide all of the information necessary to introduce a new librarian to the state of the art of the profession.

Determining the order of chapters themselves proved to be more difficult than I anticipated. Ultimately, chapters in the book fall into five sections:

Section I: Introduction/Overview—Chapter 1, "Overview of Health Sciences Libraries," and Chapter 2, "The Health Care Environment"

Section II: Technical Services—Chapter 3, "Journal Collection Development"; Chapter 4, "Monographic and Digital Resource Collection Development"; and Chapter 5, "Organizing Resources for Information Access"

Section III: Public Services—Chapter 6, "Access Issues"; Chapter 7, "Information Services in Health Sciences Libraries"; Chapter 8, "Information Retrieval in the Health Sciences"; Chapter 9, "Marketing, Public Relations, and Communication"; Chapter 10, "Information Literacy Education in Health Sciences Libraries"; Chapter 11, "Evidence-Based Practice"; and Chapter 12, "Health Informatics"

Section IV: Administration—Chapter 13, "Management in Academic Health Sciences Libraries"; Chapter 14, "Management of and Issues Specific to Hospital Libraries"; and Chapter 15, "Library Space Planning"

Section V: Special Topics—Chapter 16, "Special Services Provided by Health Sciences Libraries"; Chapter 17, "Health Sciences Librarianship in Rare Book and Special Collections"; and Chapter 18, "Consumer Health Information"

As part of the overall writing and editing process, chapters in the book were reviewed by several librarians, including Lynda Baker, Associate Professor of Library Science at Wayne State University, who served as overall reviewer of the volume. Individual chapters were reviewed by other colleagues. A list of reviewers appears in the acknowledgments.

While the textbook is intended as an introduction, some topics, of necessity, may be more advanced than others. For example, evidence-based librarianship is a fairly advanced concept that is new even to many practicing librarians, but is important enough to be included in the textbook. Health informatics is another topic that may be advanced for a beginning librarian, but it's important for health sciences librarians to be aware of this related field. These chapters were placed further back in the volume so that the reader could gain a background in the overall field of health sciences librarianship before being exposed to these topics.

In several of the chapters readers will find features called "A Day in the Life of . . ." These are intended to introduce new librarians to specific types of jobs, and what to expect in a typical day. Practicing health sciences librarians contributed a summary of a single day, or of a composite day, to create these "scenarios."

Throughout the book, you will notice bolded terms. These are the glossary words chosen by each chapter author. Usually, first use of the word in a chapter, excluding use in the summary or a section heading, is bolded. If a glossary word was used in one chapter but not designated as a glossary term by the author of another chapter, it will not be bolded; thus, there will be some inconsistency among chapters. The editor has merged definitions provided by authors, where applicable. Outside sources of definitions are acknowledged in the glossary.

Also throughout the book, readers will note the frequent mention of many organizations, but three stand out: the Medical Library Association (MLA), the Association of Academic Health Sciences Libraries (AAHSL), and the U.S. National Library of Medicine (NLM). This reflects the major influence that these organizations play in the practice of health sciences librarianship. Two are professional organizations; one is a government library.

All of the chapters address topics that are important for beginning and practicing health sciences librarians to be knowledgeable about. Taken together, they provide a sound foundation for all levels of health sciences librarians—students through experienced librarians—to gain both practical and theoretical knowledge about the profession. I am pleased to note that many of the chapters are reflective of librarianship in general, so that librarians in academic, public, and special libraries will also benefit from this book.

As I finished editing this volume, it occurred to me how ironic a situation this was. I was retiring at a time when health sciences librarianship—in fact librarianship in general—was in the midst of significant technological change that would open up exciting new roles for librarians. How I wish that I might be starting all over again—at the beginning of a new, thirty-five-year career as a health sciences librarian. What a wonderful time for a new librarian to be entering the profession!

M. Sandra Wood
Librarian Emerita
Penn State University Libraries

Acknowledgments

I would first like to acknowledge the dedication and hard work of all of the authors and contributors to this textbook. Each author brought unique talents and expertise to the book; I am indebted to them for their valuable contributions. Their knowledge and attention to detail is evident in the quality of each chapter. Throughout the writing and editing, several authors helped to maintain my good spirits and to keep me focused with their great sense of humor.

I am also grateful to the many individuals, including practicing health sciences librarians, library school faculty, and library school students, who have reviewed the chapters in this text. Their comments have resulted in revision and editing that has improved the overall quality of this textbook.

I especially would like to acknowledge the time and effort of Lynda M. Baker, PhD, Associate Professor, Library & Information Science Program, Wayne State University, who took on the role of reviewing the entire content of this volume; her wide-ranging knowledge was invaluable. Lynda's efforts were tireless, as she provided immediate, constructive feedback to help keep the textbook on track.

I am appreciative also of the foreword written by Joanne Gard Marshall, one of the most respected librarians in the field, a former president of the Medical Library Association, and a well-known library educator.

The following individuals also need to be acknowledged for reviewing specific chapters of the book; some reviewed multiple chapters; others reviewed just one chapter. All comments contributed to and improved the final content of the book.

Lynda M. Baker, PhD: All chapters
Cheryl R. Dee, PhD: Chapters 3 and 13
Jon Eldredge, PhD: Chapters 3, 9, 10, and 12
Jean Estrada: Chapter 13
Marie Fitzsimmons: Chapters 7 and 8, with special thanks for graphics support
Carole M. Gilbert: Chapter 14
Gale G. Hannigan, PhD: Chapter 13
Crystal Helcel: Chapter 13
Carol G. Jenkins: Chapter 13
Mellanye Lackey: Chapter 13
K. Ann McKibbon, PhD: Chapter 11
Michelynn McKnight, PhD, and students in her Louisiana State University School of Library and Information Science Course: Approximately half the chapters, and especially Chapters 1 and 2
Students of the School of Information and Library Science, University of North Carolina at Chapel Hill: Chapter 13

doi:10.1300/6041_e

SECTION I:
INTRODUCTION/OVERVIEW

Chapter 1

Overview of Health Sciences Libraries and Librarianship

Mary Moore

SUMMARY. Similar in many aspects to other librarians, health sciences librarians are distinctive in their professional values, training, and in the nature of the work they perform. Professional organizations assist health sciences librarians by offering opportunities for continuing education, communication, and advocacy. Most health sciences librarians work in libraries that are located in academic health science centers, hospitals, corporations, associations and societies, the government, and other settings. These libraries are diverse in their mission and goals, collections, facilities, clients, and services offered. With the largest health sciences library collection in the world, the U.S. National Library of Medicine is central to health sciences library services, providing leadership and direction, and producing comprehensive services and products. Among the many trends and issues influencing health sciences librarianship, the impact of technology is probably the largest. Information technologies pervade every aspect of health sciences librarianship and provide new career opportunities for health sciences librarians. Librarians must be alert to changes in health care, education, information technologies, communications, and research, as these are likely to impact the future of health sciences librarianship.

INTRODUCTION

Libraries are in the most rapid period of transformation in their history, facing revolutionizing technologies, an overabundance of information, and a magnitude of transformations in the environment. In the not too distant past, people came to the library when they needed information. Now information is everywhere, and this radically redefines what a library is and what it does. Library mission and goals statements, organizational structures, and physical facilities are being redesigned for increased relevance to client needs. Libraries face more competition than in the past, and librarians must find and communicate the unique competitive advantages of libraries in comparison to bookstores or Google. Most people would agree that libraries have a unique advantage in that they offer the highly qualified, professional services of librarians. Librarians organize and find information, teach others how to use information, and have taken on new roles in making existing information more useful (value-added services and products).

Health sciences libraries are similar in many ways to other libraries. The most important distinctions in health sciences libraries are shown in Figure 1.1 and described as follows:

- *The **profession** of health sciences librarianship.* These libraries have specialized health sciences librarians and informationists,[1, 2] who are trained to deliver services for clients

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doi:10.1300/6041_01

who specifically need biosciences information. Professional organizations support health sciences librarians.

- *The nature of the library collection.* Generally, health sciences libraries have digital and print resources, such as books, journals, and multimedia materials, on topics in the biosciences. Electronic resources are especially useful, and the collections of some health sciences libraries are almost entirely online. In addition, these libraries often provide access to value-added databases. These databases consolidate and synthesize information from research studies or journal articles to help with patient care decisions.
- *The nature of the organizations served, their mission, and goals.* Health sciences libraries may serve universities, medical center complexes, hospitals, government organizations, corporations, associations, and more. Library facilities in these organizations may vary in support of their missions. One particular library, the U.S. **National Library of Medicine (NLM),** provides leadership, products, and support for health sciences libraries and those they serve.
- *The services provided.* Health sciences librarians help health professionals and students access and use the information they will need to provide patient care and conduct research. Health care professionals may need education and training on how to use complex health sciences information resources. They may need specific answers to health care questions. They often need accurate, current information, delivered quickly. Health sciences librarians deliver all of these services.
- *Specific trends.* These trends may affect health care, education, information technologies, communication, and research, as well as library and information sciences.

This chapter provides an introduction to these topics, many of which will be covered more thoroughly in the following chapters.

THE PROFESSION OF HEALTH SCIENCES LIBRARIANSHIP

Professions can be characterized as having common philosophies or values, a knowledge base that provides context, advanced education, competencies and skills, guidelines for ethical behavior, professional organizations, admission requirements (such as licensing, certification, or credentialing), and continuing education.[3] Health sciences librarianship meets the criteria for a profession. Aspects of the profession will be touched upon throughout this chapter, and elaborated upon throughout this book.

Values

Health sciences librarians share common values. Some examples follow:

1. Libraries are important, and information found in libraries can improve the quality and reduce the costs of health care.
2. Clients have a right to privacy. Requests for health sciences information must be confidential.
3. Health care information should not be censored or withheld because it presents a particular point of view that is unpopular with one group or another.
4. People should have access to information that is needed for them to make informed health decisions. Within the guidelines of fair use and intellectual property rights, health sciences and research information should be shared.

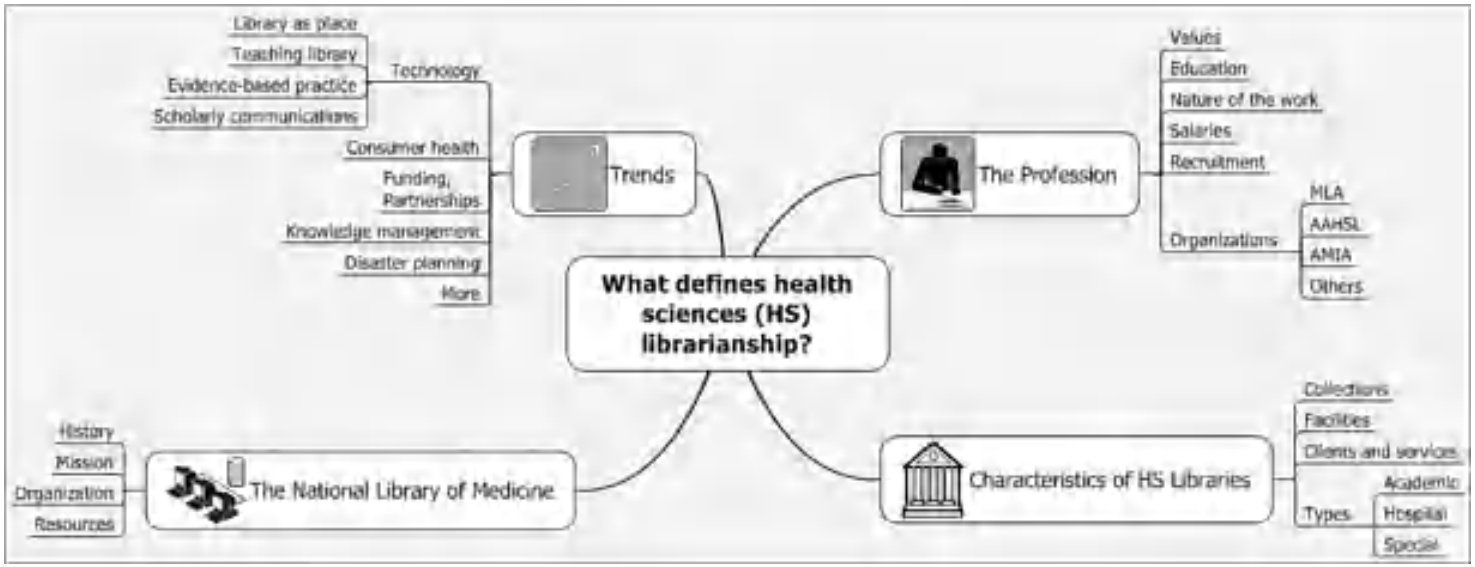

FIGURE 1.1. What Defines Health Sciences Librarianship?

In 1994, the *Code of Ethics for Health Sciences Librarianship*[4] was approved by the membership of the **Medical Library Association (MLA),** the major professional organization of health sciences librarians. This code guides the behavior of health sciences librarians and is discussed in detail in Chapter 7 under the topic Information Service Ethics.

Knowledge Base and Education for Health Sciences Librarianship

Preparation for work as a health sciences librarian generally requires a master's degree in library or information science from an American Library Association accredited program, as well as coursework specific to health sciences librarianship. Coursework could cover the health sciences environment, health sciences information resources, health informatics, or a practicum in a health sciences library. Some specialized librarians or informationists[1] may need additional graduate or professional degrees in the biosciences. An informationist is an expert in finding and retrieving literature to support informed decisions in research or health care. In addition to searching databases, informationists can read, interpret, and evaluate information, and then synthesize results. They may create products from what they have learned, such as flowcharts, databases, or white papers (authoritative written reports) for the research or health care team they serve.

The Medical Library Association, described later in this chapter, is the foremost professional organization for health sciences librarianship. MLA publishes a statement of the competencies, knowledge, and skills needed for health information professionals.[5] This policy statement provides guidance for the educational programs that prepare students for careers in health sciences librarianship. The statement also helps health sciences librarians identify additional skills and competencies they need to further their training.

In 1991, MLA first drafted an educational policy statement, called the ***Platform for Change*.**[6] Sixteen years later, the organization is revising the original document. The revision is called ***The Platform for Lifelong Learning and Professional Success*.**[7] Some competencies and examples of knowledge and skills are included in Table 1.1.

Nature of the Work

Health sciences librarians may provide services for clients (often called public services); services related to obtaining, organizing, and making library collections available (often called technical services); information technology services (often related to library systems, Web services, or personal computer support); administrative services to manage the library; outreach services (for the community or unaffiliated health care providers); services to manage the knowledge generated by the parent organization or institution (**knowledge management**); and more. Table 1.2 provides more details, with examples of the work that might be performed. In an academic library, an individual might perform activities in just one column. In a one-person library, an individual might perform some activities from every category.

In larger academic or government libraries, health sciences librarians are more likely to specialize, while in smaller libraries, duties may be more diverse. Health sciences librarians are often called upon to do things out of the ordinary because they have shown success in dealing with clients' questions. Some librarians take on duties in creating databases, organizing continuing education for health professionals, coordinating telemedicine, training others to deliver distance education, managing institutional records, and more.

TABLE 1.1. MLA Competencies and Skills for Health Sciences Librarianship

Competency	Examples of Skills
Practice-related competencies	• Goal-setting and outcomes assessment • Anticipation of trends • Management of the change process
Personal characteristics	• Commitment to lifelong learning • Ethical behavior • Self-motivation
Knowledge of health sciences and skills	• The health care environment • Information technologies and policies • Trends of organizations and government agencies
Leadership and management	• Planning • Staff development and mentoring • Demonstrating the relevance of the profession to institutional goals
Health sciences information services	• Assessing and understanding client needs • Forging and maintaining alliances • Managing electronic resources
Health sciences resource management	• Selection and acquisition of resources • Negotiation of purchase and licensing • Copyright, privacy, and intellectual property issues
Information systems and technology	• Principles of automated systems, databases, networks, and IT security • Informatics applications • Integration of systems and technologies
Curricular design and instruction	• Adult learning theory • Instructional development • Educational needs assessment
Research, analysis, and interpretation	• Ability to formulate a research question • Knowledge of research methodologies • Ability to communicate results

Source: Adapted from Medical Library Association. MLANET. *Platform for Lifelong Learning and Professional Success.* The Educational Policy Statement of the Medical Library Association. Revised Edition. Rev. Draft April 13, 2006. Available: <http://www.mlanet.org/pdf/ce/mlplatprof success26.pdf>. Accessed: March 5, 2007.

Salaries

Mean salaries for librarians working in colleges and universities and for federal government librarians are listed in the *Occupational Outlook Handbook,* available online.[8] As described later in the chapter, the **Association of Academic Health Sciences Libraries (AAHSL)** is the

TABLE 1.2. Examples of Duties of Health Sciences Librarians

Public Services	Outreach	Technical Services	Information Technology and Multimedia Services	Knowledge Management	Administration
• Teaching clients about health sciences resources • Reference desk duties • Attending clinical rounds • Developing content for online education • Conducting in-depth searches of the biomedical literature • Attending institutional review boards (IRBs)	• Writing plans and proposals for services to unaffiliated health professionals or the community • Exhibiting on library services at professional conventions • Exhibiting and training at community health fairs • Working with school nurses, teachers, public librarians, senior centers, public health workers, emergency operations centers, etc. • Conducting evaluations and writing reports	• Selecting library materials • Processing materials for the collection • Reviewing or developing contracts for library resources • Negotiating to purchase electronic resources • Working with consortia to jointly purchase or share resources • Managing acquisitions • Making materials available by cataloging or assigning metadata	• Managing library systems and desktop support • Developing Web sites • Conducting usability studies • Collection development for nonprint and multimedia materials • Developing services, such as podcasting, RSS feeds, streaming media	• Managing institutional archives • Developing institutional repositories (usually collections of materials developed locally that are digitized and organized using special software) • Developing databases • Analyzing data, articles, or reports • Synthesizing information from numerous sources and creating white papers • Managing institutional records • Training about options in scholarly communications	• Strategic planning • Assuring needs of multiple constituents are met • Gathering information and analyzing trends • Personnel management • Budget management • Identification of alternative funding options • Creating and coordinating accreditation or other reports • Promotion of value of library • Officially representing the library

foremost organization for academic and university health sciences center libraries. Each year the organization gathers and publishes key statistical measures to help its members evaluate their own performance. The AAHSL *Annual Statistics* reports mean salaries for health sciences librarians working in academic libraries.[9] In the 2007 AAHSL salary survey, the median starting salary was $40,966, the mean was $41,522 and the standard deviation was $8,552. Information on hospital and other medical librarian salaries is also available through the Medical Library Association. MLA collects salary data from its membership approximately every three to four years. In the 2005 MLA survey, the median starting salary was just under $40,000, and the average salary was $57,952.[10]

Recruitment for Librarianship

In the past, it was not uncommon for librarian supply and demand to have been uneven.[11] Now it appears those leading many health sciences libraries may be nearing retirement, and there may not be enough new librarians entering the field to meet demand in the future. The *Occupational Opportunity Handbook* estimates that three of five librarians age forty-five or older will be retiring in the next ten years, providing good opportunities for those in the field.[8] The Medical Library Association's Salary Survey also confirmed the aging of the profession.[10] Recruiting new librarians into the profession is a priority for MLA and AAHSL. However, some trends show librarians are working later in life and postponing retirement, so it is difficult to know how imminent the crisis is.

Health sciences librarianship could be strengthened with increased diversity in race, ethnicity, age, and gender. There appear to be salary gaps based on gender and race that need to be addressed.[10, 12]

Professional Organizations and Associations

Professional organizations are important to the work of all health sciences librarians, providing opportunities for continuing development, communication, and advocacy. Some of the relevant organizations, including MLA and AAHSL, are described in this section.

The Medical Library Association

The Medical Library Association,[13] the major association for health sciences librarians, was founded over a hundred years ago by four librarians and four physicians, including eminent physicians John Shaw Billings and William Osler. A comprehensive history of the organization, *Guardians of Medical Knowledge,* reveals details of how the association was established, including how physicians of the day perceived the role of medical libraries in promoting gentility and culture, and how it took the leadership of MLA many years to allow women librarians to lead the organization.[14]

Now MLA has grown to include 1,200 institutions and 3,800 health information professionals, primarily in the United States and Canada, but also worldwide. Regular, institutional, international, affiliate, and student memberships are available.

The organization provides various programs to meet the needs of its members, including meetings, publications, career information resources, professional credentialing, honors and awards, scholarships, advocacy for the profession, and more. Each year the participating libraries in the MLA Exchange offer thousands of surplus volumes of journals to other libraries. MLA hosts an annual meeting with continuing education, a conference program, business meetings, committee meetings, and exhibits. The Web site <http://www.**mlanet**.org> lists the MLA sec-

tions on special topics and geographic groups, or chapters. These chapters, affiliated with the MLA, also meet regionally each year.

Among MLA's publications are a professional journal, a newsletter, books, booklets, and published hospital library standards. The *Journal of the Medical Library Association* is the profession's premier peer-reviewed journal in the field and is available as an **open access** journal through **PubMed Central.**[15] In addition, the *MLA News* provides current information, as does MEDLIB-L, an e-mail discussion list. Many items, including the membership directory, are published online.

The association is well-known for its active focus on professional development. MLA's educational policy statement, described previously in this chapter, has been widely distributed, and is the basis for educational programs for health information specialists. MLA continuing education programs are available at the annual meeting, chapter meetings, and locally, as well as online. Courses to help information professionals gain knowledge, skills, and competencies are available at the annual meeting, regional meetings, online, or by teleconference.[16] MLA's **Academy of Health Information Professionals (AHIP)** recognizes librarian achievement in academic preparation, professional experience, and professional accomplishment.[17] MLA is the only professional library association with a comprehensive credentialing program.

Table 1.3 provides information on other organizations and how they support the profession of health sciences librarianship.

More International Organizations

There are organizations to support health sciences libraries and librarians in many countries, as well as organizations supporting health information management that may be of interest to librarians. Many of the organizations listed in Table 1.3 maintain links to additional relevant associations on their Web sites.

HEALTH SCIENCES LIBRARIES

Health sciences libraries differ from many other libraries in the content of collections, aspects of the facilities, clients served, types of libraries, and the emphasis placed on certain services. One particular library, the U.S. National Library of Medicine, is especially noteworthy. It provides leadership and services for other health sciences libraries and clients around the world.

Collections

Clients of health sciences libraries need the most current and comprehensive health information. Because of this, a larger percentage of the library collection may be devoted to journals. Most health sciences libraries strive to provide as much of the collection as possible through electronic materials, but not all resources are available electronically. Some specialty areas lag behind others in providing electronic access.

In addition, clients need help sifting through the huge volume of information that is available. Therefore, health sciences libraries may provide access to online databases to support clinical diagnosis and treatment decisions. They may also provide multimedia materials. Examples might include videos on dissection of the human body, or how to perform physical examinations or medical procedures. Many health sciences libraries also provide materials for health consumers. In addition, health sciences libraries may also have special collections of rare, unique, or historical materials, sometimes including the archives and records of the organizations they serve.

TABLE 1.3. Other Organizations Supporting the Profession of Health Sciences Librarianship (in alphabetical order)

Organization	How the Organization Supports Health Sciences Librarianship
American Medical Informatics Association (AMIA) <http://www.amia.org>	Supports the use of health information and technology for patient care, teaching, research and health information. Working groups on clinical information systems, genomics, knowledge discovery, open source and public health informatics. Special working group for student members. Each group has an online discussion group. Publishes the *Journal of the American Medical Informatics Association.*
The Association of Academic Health Sciences Libraries (AAHSL) <http://www.aahsl.org/>	Founded by medical school library directors in 1978. Promotes cooperation among academic health sciences libraries and with the Association of American Medical Colleges. Membership includes directors of medical school and osteopathic libraries in the United States and Canada. Publishes the *Annual Statistics of Medical School Libraries in the United States and Canada,* which reports comparative data about academic health sciences library collections, budgets, personnel, and services. More than 100 libraries submit data annually.
Canadian Health Libraries Association/ Association des bibliothèques de la santé du Canada (CHLA/ABSC) <http://www.chla-absc.ca/>	Seeks to improve health and health care by promoting excellence in access to information. Began in 1976, growing from the Canadian Group of the MLA and the Canadian Association of Special Libraries and Information Services. Represents about 400 members. Has chapters and interest groups and provides conferences, continuing education, and awards. *The Journal of the Canadian Health Sciences Libraries Association* is available in open access at <http://pubs.nrc-cnrc.gc.ca/jchla/jchla.html>.
European Association for Health Information and Libraries (EAHIL) <http://www.eahil.net>	Established in 1984, the membership represents about thirty European countries. EAHIL seeks to unite and motivate those working in European health and medical libraries. Provides professional development, interlibrary cooperation, and professional exchanges of librarians. Publishes the *Journal of the European Association for Health Information and Libraries.*
International Federation of Library Associations (IFLA) <www.ifla.org>	IFLA seeks to promote high standards in the delivery of library and information services and encourage widespread understanding of the value of good library services throughout the world. Membership includes 1,700 individuals, associations, and institutions in 150 countries. Health sciences librarians may join the Section of Health and Biosciences Libraries in the Division of Special Libraries. The International Congress of Medical Librarianship meets under the auspices of IFLA approximately every five years. IFLA publishes the *IFLA Journal.*
International Medical Informatics Association (IMIA) <http://www.imia.org>	IMIA works to promote informatics in health care and research and to further international cooperation. Represents medical and health informatics in its close ties with the World Health Organization. Membership is available to national, institutional, and affiliate members and to fellows. IMIA hosts a World Congress on Medical and Health Informatics.
Special Libraries Association (SLA) <http://www.sla.org>	The Medical Section of the Biomedical and Life Science Division is for members in the biomedical and health sciences. SLA offers a discussion group, meets annually, has a strong continuing education program, and publishes *Information Outlook.*

Facilities

Library facilities can range from large (more than 100,000 square feet) to almost completely online, with a small staff. Because health care decisions depend on the most current and accurate information, health sciences libraries need to assure that this information is available anytime, anywhere. The library facility therefore may become less important to some researchers and clinicians. However, the health sciences library may continue to be a home away from home for medical students, residents, and graduate students, who may spend many hours reading and studying.

New buildings, additions, and renovations are listed in the December issue of *Library Journal,* usually called the "Architectural Issue" or "The Year in Architecture." The list includes libraries, the status of the project, the cost, the gross area, and the square foot cost, as well as seating capacity and book capacity. For example, in 2006-2007, the Biomedical Library at the University of California in San Diego was building an addition and renovating the existing library, with a project cost of $40 million.[18]

Clients

Libraries must consider all constituent groups in providing services and developing policies and procedures. Since it is useful to compare and contrast different groups of users, basic comparative information is provided in this section, and more information is provided in Chapter 7, "Information Services in Health Sciences Libraries."

Almost all clients can be categorized according to their role in the organization. The main roles in health care organizations are education, research, patient care, community service, and administrative support. Some of these clients also can be further categorized according to whether they work in the **basic sciences** or **clinical sciences.** These distinctions may become confusing, however, because there is often overlap among groups, and one individual may have multiple roles or affiliations with several institutions.

Basic Sciences and Clinical Sciences

Clients can include those working in basic sciences and those working in the clinical sciences. Basic scientists might include anatomists, biochemists, cell biologists, immunologists, microbiologists, molecular biologists, geneticists, pharmacologists, or physiologists, among others. Basic scientists often hold PhD degrees, and they often work in laboratories. In many medical schools, students spend the first two years studying the basic sciences so they can apply this fundamental knowledge to learning clinical concepts and skills in the second two years.

The clinical sciences are concerned with patient care. For instance, the departments of family medicine, internal medicine, obstetrics and gynecology, pediatrics, psychiatry, and surgery would be considered clinical sciences departments. Clinical sciences faculty often hold MD degrees and may also include individuals with other degrees.

Education

Those working in educational services and programs include students and faculty. Students in the educational programs for each of the health sciences disciplines will have different needs. Students in undergraduate programs (for example, the biosciences, premedical, undergraduate nursing, or allied health programs) may have more in common with other university students than with health care researchers. They may look to the library for a place to study, benefit from education and training programs on how to use its resources, and use monographs for broad overviews on various topics. They will use the library to write papers, and they will begin to learn how to use the library for patient care.

Graduate students might be enrolled in master's or doctoral programs in the biosciences, nursing, or allied health. Graduate students in the biosciences are more likely to use journal articles to find the latest information. Those pursuing advanced degrees may need library resources to complete theses and dissertations.

Medical and dental students have first completed a bachelor's degree. Postbaccalaureate students beginning studies in medicine or dentistry may use the library in ways that are similar to undergraduate students. In programs where students have primarily didactic (teaching class-

room) experiences in the first two years, they may spend longer periods of time studying in the library. When they reach the clinical years, they may be more interested in journal articles and databases that help them understand treatment protocols.

Teaching faculty may include basic scientists, clinical scientists, physicians, nurses with advanced degrees, allied health practitioners, and more. Teaching faculty primarily use the library to support their educational activities, often looking for illustrations of principles and procedures and video to demonstrate processes. Librarians are often teaching partners with faculty members, helping to bring an understanding of information resources into the classroom. Many libraries are adding online repositories of materials locally developed (such as lecture notes, PowerPoint slides, and test questions) to support teaching and learning. Some librarians work with teaching faculty to select and acquire materials to help students become more successful learners.

Patient Care

Those working in patient care include practitioners who treat patients and support staff. Clinical practitioners or health practitioners might include physicians, nurses, dentists, allied health practitioners, pharmacists, and students studying in these fields.

Physicians generally complete a four-year medical degree, followed by residency training, and sometimes postgraduate fellowships. They can be generalists, specialists, and subspecialists. Physicians' information needs are often for patient care and are sometimes urgent; physicians are often interested in information that helps identify a course of action, rather than everything that has ever been published on a topic. Some physicians conduct research and publish review articles, examining the state-of-practice on a particular topic. Physician information behavior has been well studied, but because information technology is changing behavior so rapidly, it is difficult to predict physician information needs by past studies.

Residents are physicians who have completed medical school, are in a residency program, and are receiving specialized advanced training. They were once called house staff because they virtually lived at the hospital, and although that is no longer true, the name persists. Residents are continuing their education, and so may request comprehensive information on a patient care situation encountered. They may be assigned to use library resources as part of learning activities.

Nurses may have different levels of education, postdegree training, specialties, or certification. Nurses are often the information providers for many on the health care team. They may learn to search databases as part of undergraduate programs and to perfect those searching skills in graduate programs. Competency statements on developing skills in nursing evidence-based practice[19] mean nurses will become more involved in obtaining and producing needed literature for patient care.

Allied health professionals can include physician extenders or physician assistants, physical therapists, occupational therapists, dental hygienists, medical records professionals, and more. Their information needs vary according to the competencies required for their individual professions. Each career generally has at least one professional journal for the specialty.

Evidence-based information (see Chapter 11, "Evidence-Based Practice") is especially relevant to health practitioners. Databases that serve as clinical decision support tools may be particularly needed by this client group.

Research

Researchers can be categorized as basic science researchers or clinical researchers. Clinical researchers often work on what are called **clinical trials** of new procedures or drug treatments.

Many researchers are completely supported by grant funding. They create grant proposals, conduct research, and report the results to the funding agency. Results are also reported to the public through publications or open access on the Web. In general, researchers need extremely thorough, accurate, and current information to support research and teaching. They often want immediate access to that information from their laboratories, offices, or homes. They especially need information to support writing grant proposals, and the resulting publications. Researchers are often very knowledgeable about the impact of changes in scholarly communications.

Community Service

Community clients can include patients, family, friends, or just interested individuals, such as schoolchildren. Patient libraries date back to the early 1900s.[20, 21] However, those libraries were to exclude "morbid, gruesome and unwholesome" materials.[22] Where once it was believed that the value of treatment depended on a completely trusting relationship with one's physician,[23] the current perspective is more likely to be that an informed patient is a valued participant in the health care delivery team. Most health sciences libraries provide the same services to consumers that they do to health care professionals, although some private and corporate libraries are closed to the public. There are specific works developed using plain language and more general terminology, but consumers may also want technical materials, as well.

The term "unaffiliated health professionals" is generally for those practicing health care services in a community who are not faculty or employees of the parent organization of the library. These individuals may request access to academic health sciences library collections as a free community service or as a paid membership.

Administrative Support

Administrators may need the library to help them make informed decisions quickly. Librarians can help administrators research what other health science centers or hospitals are doing (called "benchmarking," comparing the institution to a peer organization, or **competitive intelligence,** identifying the services and strengths of rival institutions) or construct databases of best practices in certain activities. Librarians can research the comparative advantages of one software package over another, or create databases of area donors.

Types of Health Sciences Libraries

Health sciences libraries can be located at academic health sciences centers (which include universities with health sciences degree programs), hospitals, health research companies, insurance agencies, medical publishers, health academies, government agencies with health missions, and more. Within health sciences librarianship, most libraries fit into the categories of academic health sciences libraries, hospital libraries, and special (corporate, association, or government) libraries.

Academic Health Sciences Libraries

Academic health sciences libraries support the mission and goals of the parent organization. In general, these libraries provide information resources and services to support the educational, research, clinical care, and community service missions of their health sciences universities.

Description and duties. Each year, AAHSL describes a composite library, constructed from the means and medians of various responses. The 2005-2006 composite health sciences library

is compiled from data from 125 academic medical libraries in the United States and Canada.[12] Table 1.4 draws data from the 2005-2006 composite academic health sciences library.

Working in a large university environment often means the librarian has a more specialized job. Mean salaries are reported to be higher than in hospitals (however, not as high as some federal librarian positions).[10] Opportunities for advancement may be more obvious in academic health sciences libraries with large numbers of librarians.

Accreditation. The library is part of the accreditation process of the professional schools of the university. For example, the Liaison Committee on Medical Education (LCME)[24] may review a university's health sciences library as part of the accreditation review of the university's medical school. In addition, there may be a regional accreditation of the university as a whole. For instance, a health sciences university in Chicago might undergo the accreditation process of the Higher Learning Commission of the North Central Association of Colleges and Schools,[25] and the library would be reviewed in this process. Health sciences libraries are generally evaluated in terms of their abilities to support the mission and goals of the professional program or university undergoing accreditation, and on having qualified library staff, appropriate resources, and training for faculty and students available.

Growth. The number of academic health sciences libraries has grown only slightly over many years. An analysis of academic library statistics in the United States and Canada by Byrd and Shedlock in 2003[26] found that, when controlled for inflation, the total expenditures of these libraries had remained level over a twenty-five-year period. Over time, there have been declines in circulation, interlibrary loan, and on-site use. There has been steady growth over time in size of collections, number of library staff, reference questions, and service hours. Recently, sizable increases in electronic resources, Web use, and teaching activities have been measured.

TABLE 1.4. Composite Academic Health Sciences Library

Measure	Mean Values	Trend from 2004-2005
Hours the library is open weekly	98	No change
Professional staff	12.4	No change
Total staff	34	–1.5%
Total print monograph volumes	192,989	–9.1%
Health sciences electronic serials	4,009	+5.8%
Health sciences databases	110	+11%
Total annual expenditures	$3,583,397	+9%
Collection expenditures	$1,622,438	+11.5%
Gate count	243,926	–2.6%
Circulation of print materials	72,484	–19.7%
Reference questions	15,894	–10%
Education sessions taught	310	+17%
Libray home page views (median)	1,831,676	Not available

Source: Adapted from 2005-2006 AAHSL *Annual Statistics*.

Hospital Libraries

The goals of hospital libraries reflect the goals of their parent hospitals and health sciences centers. The main purpose of the hospital is to provide effective patient care, while protecting patient safety and constraining costs. Hospital libraries provide the resources and services so hospital employees can accomplish those goals.

Description and duties. Although there can be large, complex hospital libraries, work in many hospital libraries may have much in common with special libraries. Many hospital libraries are staffed by just one librarian. Hospital libraries generally focus on providing access to materials rather than owning large collections. Hospital libraries may have a small core collection and request other needed materials from large academic health sciences libraries. The emphasis is on relevance of the collection and on quick and expert customer service. Because there may be fewer clients, the librarian often knows client needs well and anticipates needs before they arise. In this environment, librarians may take on responsibilities beyond those commonly associated with library work. They may be asked to apply their organizational or problem-solving skills to manage other services, possibly including education, electronic health records, or more. They are often asked to serve on hospital-wide committees, such as continuing education, patient education, information technology, research, ethics, and more. In a survey of hospital committee participation in 2006, the authors found that 94.5 percent of responding hospital librarians participated in hospital committees.[27]

Accreditation. No specific standards are enforced for accrediting hospital libraries, but the Joint Commission on Accreditation of Healthcare Organizations (Joint Commission, formerly JCAHO)[28] has several standards, rationales, and elements on management of information, information planning, and information-based decision making. Hospitals must provide information services for the purpose of improved patient outcomes, patient safety, and health practice. Medical Library Association Standards for Hospital Libraries help to define the Joint Commission standards.[29] This will be further discussed in Chapter 14, "Management of and Issues Specific to Hospital Libraries."

Growth. The expansion in numbers of large teaching hospitals in the late 1960s and 1970s probably led to the increase in hospital libraries. In 1962, there were 3,192 hospitals that had professional libraries, but few had professional librarians. The **American Hospital Association (AHA)** survey in 1989 found 2,167 hospital libraries that had organized collections, trained staff, schedules of services, and facilities.[30]

The Medical Library Association has an active Hospital Libraries Section (HLS), with a newsletter, online discussion list, and blog.[31] In 2003, the HLS had 1,388 members.[32] At the end of 2006, it had 1,132 members,[33] which seems like a substantial decline. However, another measure, the number of hospital libraries that are members of the National Network of Libraries of Medicine (NN/LM) of the National Library of Medicine shows only a slight decline (see Table 1.5).

TABLE 1.5. Change in Numbers of Hospital Libraries Between 2004 and 2007

Hospital Libraries	April 2004*	December 2007**	Percent Change
Full network members	1929	1911	–1 percent
Total network members	2911	2887	–1 percent

Source: *Dudden, R. F.; Corcoran, K.; Kaplan, J.; Magourik, J.; Rand, D.C.; and Todd Smith, B. "The Medical Library Association Benchmarking Network: Development and Implementation." *Journal of the Medical Library Association* 94(April 2006):107-17. **NN/LM Members Directory Advanced Search. Available: <http://nnlm.gov/members/adv.html>. Accessed: December 29, 2006.

The NN/LM is a program of the National Library of Medicine, which is described later in this chapter. The NN/LM was originally designed to establish a network of medical libraries, especially for resource sharing and interlibrary loan. To be a full network member, a library is required to have a library or information center that is fully staffed, have an Internet connection, have a collection, lend materials in that collection, and provide services such as collection sharing and reference. Libraries or information resources that do not meet the requirements for full members may become affiliated network members.

Special Health Sciences Libraries

The category of special libraries often includes corporate libraries and association or society libraries. Sometimes it includes government libraries. To make things even more confusing, some people would place all medical or health sciences libraries into a particular group under the general category of special libraries.

Mission and goals. Like other health sciences libraries, the missions and goals of special libraries are reflective of the missions of the parent organizations. For example, corporations are likely to be in the business of making profits, and a corporate health sciences library would therefore support this endeavor. Librarians must prove they are cost-effective and could face downsizing if they are not. Likewise, they sometimes share the earnings when the company is profitable.

Description and duties. Special libraries can include corporate libraries, and also professional association libraries and government libraries, such as the National Library of Medicine. Some health sciences librarians are employed in the private sector, working for research organizations; in companies with pharmaceutical, health technology, or insurance services; or at health care associations. Others are privately employed as health information consultants, sometimes gathering or analyzing information for U.S. and international companies. Still others work in government libraries, dealing with health sciences issues, such as the U.S. Food and Drug Administration.

Accreditation. Special libraries are not generally accredited.

Growth. No current studies report on the prevalence of corporate health sciences librarians. The Corporate Information Section of the Medical Library Association has around seventy members.[34] The Special Libraries Association (SLA) has a section devoted to biosciences and health sciences librarians. SLA also has established competencies for special librarians, available at <http://www.sla.org/content/learn/comp2003/index.cfm>.

In corporate libraries, librarians are more likely to be able to follow through on the answer to a question from start to finish. They may write white papers on the background of legislation on a particular topic or explore the feasibility of providing a product to a new market segment. They may use the Internet or other tools to conduct corporate intelligence, finding information on competitors. Corporate decisions are sometimes based on the librarian's research.

Special health sciences libraries also include government libraries, such as the library at the Centers for Disease Control or the Food and Drug Administration Library. The largest of these government health sciences libraries is the National Library of Medicine. It influences the practice of health sciences librarianship worldwide.

THE U.S. NATIONAL LIBRARY OF MEDICINE

History

The National Institutes of Health (NIH),[35] a part of the U.S. Department of Health and Human Services, began in 1887 as a one-room laboratory at the Marine Hospital in New York. Now

the NIH in Bethesda, Maryland, funds more medical research than any other organization in the world, with a budget in 2005 of $28 billion. The NIH has supported research that resulted in awards of more than eighty Nobel Prizes. Its primary mission is to pursue knowledge about living systems and to apply that knowledge to extend healthy life, reducing the burdens of illness and disability. The NIH includes twenty-seven institutes and centers, such as the National Cancer Institute; the National Heart, Lung and Blood Institute; and the National Human Genome Research Institute.[36]

The U.S. National Library of Medicine[37] began as a small collection of books and journals in the U.S. Army's Office of the Surgeon General in 1836.[38] NLM became part of NIH in 1956. In 1962, it moved to its current location on the National Institutes of Health campus in Bethesda, Maryland.

Almost twenty years in the making, Wyndham Miles's book, *A History of the National Library of Medicine,* provides colorful details, photos, and illustrations.[38] Miles elaborates on the significant skill of founder John Shaw Billings for talking people out of their collections of rare medical books, but he also tells how a library clerk who spoke ten languages was denied a promotion because he was "too valuable to the library" and describes various idiosyncrasies of the early NLM librarians. Eminent heart surgeon Michael DeBakey also published a personal perspective on the National Library of Medicine in 1991.[39]

Mission

The mission of NLM is to collect, organize, and make available biomedical information for scientists, educators, health practitioners, and the public. It carries out programs to strengthen and develop health sciences library services in the United States. NLM's Web products include **PubMed®,** a massive online index to biosciences literature, and MedlinePlus, which provides consumer health information as a benefit to people around the world. Other services include research in biomedical communications; resources in molecular biology, biotechnology, toxicology, and environmental health; and supportive funding for research, training, bioinformatics product development, and more.

The NLM building, itself, serves as a symbol of how important health sciences information is to the nation and how important it is to preserve that information. Built during the Cold War in 1962, the library's walls are made from thick stone. The roof is designed to collapse in case of physical disaster, protecting the collections that lie underground in fifty miles of shelving.

Today, NLM serves in a leadership role for other health sciences libraries, setting the tone for nationwide priorities. For example, in the past, NLM primarily provided services for health care practitioners. When NLM expanded its mission in 1997 to include Web site services for health consumers, most academic libraries followed suit.

Organization

NLM is composed of seven divisions: Library Operations, the **National Center for Biotechnology Information (NCBI), Lister Hill National Center for Biomedical Communications (LHNCBC), Specialized Information Services (SIS),** the Office of Health Information Programs Development (OHIPD), the Office of Computer and Communications Systems (OCCS), and the Extramural Grants Program.

Library Operations provides services for other biomedical libraries and the public. It acquires, organizes, and preserves materials included in the largest collection of health sciences resources in the world. It also provides technical processing (indexing and cataloging) for these materials; reference and customer services for all NLM products and services; the **MEDLINE®** database, including the **Medical Subject Headings (MeSH)** thesaurus and a da-

tabase with indexing for most of the health science journal articles in the world; the historical collections and services; and the National Network of Libraries of Medicine.

NN/LM[40] has the mission of advancing medicine and improving public health by providing all U.S. health professionals with access to biomedical information. NN/LM also seeks to help the public make informed health decisions by improving its access to health information. This mission is administered through a national network of health sciences libraries. Figure 1.2 depicts the regions of the NN/LM.

There are eight Regional Medical Libraries, around 160 Resource Libraries (primarily at medical schools), and almost 6,000 total network members in the NN/LM. The network promotes NLM products and services and teaches people how to use those resources, as well as coordinating services, such as an interlibrary loan network. Programs target underserved health professionals in rural or inner-city areas. NN/LM promotes projects to reduce health disparities by increasing access to information.

LHNCBC supports research and development in areas of knowledge management, data visualization, medical imagery, medical language processing, and more. NCBI focuses on molecular biology and genetic information and tools. SIS provides a minority outreach program, as well as databases on drug reactions and chemical structures. OHIPD plans, develops, and evaluates nationwide outreach and consumer health, and conducts international programs. OCCS provides computer support for all NLM programs and services, and the Extramural Program provides grants, contracts, and fellowships to support research and services related to the NLM programs.

FIGURE 1.2. Regions in the National Network of Libraries of Medicine, March 2007

NLM Resources and Tools

NLM's electronic resources that are available worldwide through the Web include these and more:

- PubMed:[41] 15 million references to articles in 5,000 peer-reviewed biomedical journals.
- MedlinePlus:[42] Consumer health information on thousands of health topics from primarily government sources, drug information, a medical encyclopedia and dictionary, illustrations, tutorials, and directories of health providers, facilities, and support groups. MedlinePlus en español is the Spanish version.
- **ClinicalTrials.gov:**[43] Information on thousands of research trials on drugs and medical treatment that are sponsored by NIH, including information on the purpose of the study, criteria for participation, location of the study, and contact information.
- Entrez:[44] The search system for biomedical and molecular biology databases, including PubMed, Nucleotide and Protein Sequences, Protein Structures, Complete Genomes, Taxonomy, and others.
- **TOXNET:**[45] A collection of databases on toxicology, toxic chemicals, and environmental health. The TOXNET databases include **Toxline,** a database of bibliographic information; HSDB, the Hazardous Substances Data Bank; Gene-Tox, containing information about genetic toxicology; and CCRIS, the Chemical Carcinogenesis Research Information System. NLM also provides Haz-Map, an occupational health database; AltBib, a list of references about alternatives to animal testing; and links to related Internet sites. To explore TOXNET and other NLM databases, link to <http://toxnet.nlm.nih.gov>.
- **PubMed Central:**[46] PubMed Central is a service maintained by the NLM that provides free online access by the public to health information. It is committed to long-term preservation of materials. In 2005, NIH enacted a policy on **public access.** This policy asked scientists who received NIH funding to place full-text copies of the results of the studies on PubMed Central, where the information could be available to the public. However, almost a year later, the rate of compliance was reported to be very low, fewer than 4 percent.

NLM has multiple publications, electronic mailing lists, and opportunities for training and professional development. The **Associate Fellowship Program** is a year-long competitive program developed for new graduates with leadership potential to learn in depth about NLM programs and services. Other programs provide opportunities to focus on informatics. NLM supports funding for fellowships in medical informatics and medical librarianship, as well as training on specific databases and resources. More information is available from the *Fact Sheet on Opportunities for Training and Education Sponsored by the National Library of Medicine.*[47]

TRENDS AFFECTING HEALTH SCIENCES LIBRARIANSHIP

A brief discussion of trends affecting health sciences librarianship is presented here to give the reader a broad understanding of the issues that may have a significant impact on the profession. The chapters that follow will focus on the specifics of health sciences librarianship and will expand on many of the topics. Figure 1.3 diagrams the trends discussed here.

The Impact of Technology

Beginning with library automation in the early 1960s, librarians were among the first professionals to see the practical value of information technology. Now information technology per-

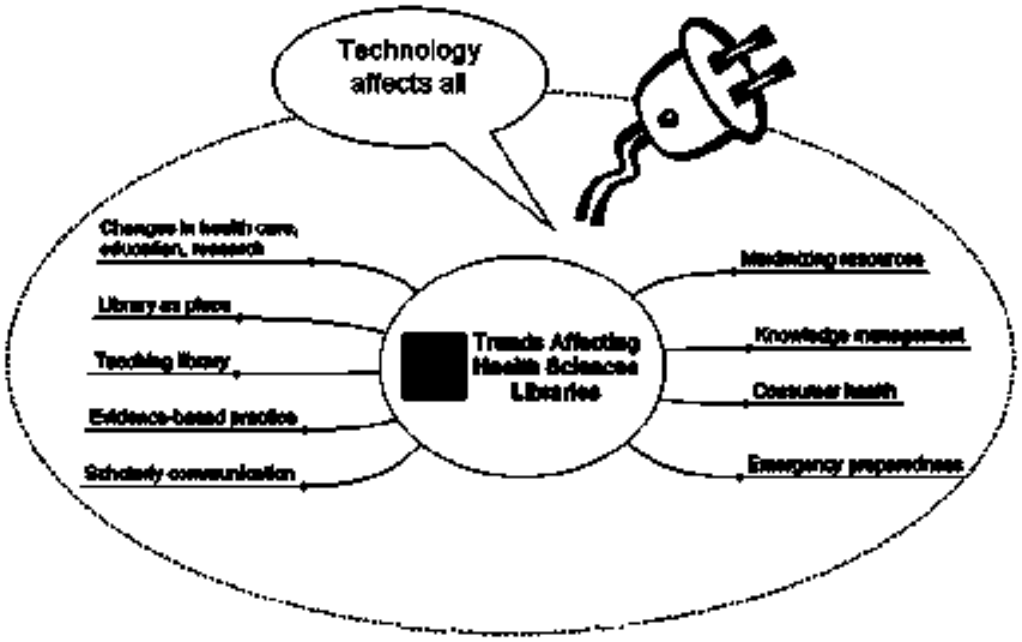

FIGURE 1.3. Trends Affecting Health Sciences Librarianship

vades everything health sciences librarians do. Technology is no longer a trend but has become the norm. Technology has an impact on library collections, personnel, services, and space, as described in Table 1.6.

Technology has spawned an expectation for immediate gratification in users. A wait of three days for an interlibrary loan or two hours for a remotely stored item is too long. Health sciences libraries provide access to their collections through the Internet, as well as providing access to resources through portable or handheld devices that could be used at patients' bedsides or in clinics. Many librarians help keep health professionals aware of how information technology can be used to provide immediate access to health sciences information.[48]

In 2004, President George W. Bush announced the intention to develop a national electronic health record.[49] This initiative is called the Nationwide Health Information Network. He established a National Coordinator for Health Information Technology within the Department of Health and Human Services to lead the effort. The impact of this effort would be significant if these systems of health records could be connected and then researched. State and regional health information exchanges would present a step toward the nationwide network. Libraries continue to strive toward the integration of health information resources with the electronic health care record.[50] This topic is more fully described in Chapter 12, "Health Informatics."

Concern has grown about what some have called a "digital apocalypse" where the Internet, or even electricity, would become unavailable. This might be caused by events such as terrorism, power overloads and outages, or natural disasters. Of course, challenges to how information is distributed freely on the Web can also come from laws and policies that restrict access, corporate decisions to charge for information, or the limitations placed on Web use in some nations. As health sciences libraries become increasingly dependent on technology to provide services, interruption of electricity or Internet services could have a disastrous impact on information used for patient care.

TABLE 1.6. Impact of Technology and Implications for Health Sciences Libraries

Impact of Technology	Possible Implications for Health Sciences Libraries
Information anywhere, anyplace	Less need to come to the library. Changes in why clients do come to the library (to focus, use superior technology, or obtain expert training or assistance, rather than to use print collections). Librarians can work outside the library more easily. Need for real-time services, like virtual reference.
The information blastoma: too much information, too many choices	Too much to read, too many places to look for information. Valuable information can be overlooked. Much information is useless. "Satisficing": settling for the first answer, rather than finding complete solutions. Time wasted trying to find unfamiliar or lost information. Difficulty making decisions on what is relevant.
Anyone can publish; anyone has access to information	Changes in scholarly publishing patterns from traditional published journals to more immediate or informal possibilities. Opportunity for others to filter information for quality, or for online peer review of information. Opportunity for value-added, synthesizing products. Opportunities for health sciences Wikipedias. Opportunities to teach people to evaluate quality of information.
Immediate gratification; no need to wait for answers	Less patience and more complaints about waiting for interlibrary loan delivery. Less patience to read through lists of results, or entire articles. Need for value-added products that help save time. Need for creative approaches to save time, like the related articles algorithm in PubMed.
Disintermediation: the loss of respect and need for experts (People are not required to be journalists to blog, or librarians to search PubMed.)	The decline of expert searching. Changes in how the reference desk is staffed. Assumption that anyone who works in a library can help. Possible loss of job satisfaction if expert skills are less appreciated.
Expectation that all information is free because most information is free on the Web (PubMed and MedlinePlus are free.)	Lack of understanding that other online resources, like many online journals, have charges. Unwillingness to pay for anything—photocopying, printing, document delivery, library fees. Less income leads to cost cutting in libraries.
More complex information	More opportunities for training.
When the lights go out . . .	Libraries must implement robust disaster plans.

The Library As Place

In the 1930s, Andrew Keogh, Yale Librarian, joked about what should be engraved above the door to the Sterling Memorial Library, by saying, "This is not the Yale library. That is inside." (What was actually carved by the entrance was, "The library is the heart of the university."[51]) If this story were rephrased for today for a health sciences library, Keogh might have said, "This is not the library. That is online." Because health sciences clients need accurate, current, and relevant information, as quickly as possible, librarians seek to place more and more resources online.

Many libraries were built before information technologies became ubiquitous. Eventually, it becomes necessary to rethink library space and how it has been assigned. It may become readily apparent that expansive shelves for print journals will not be needed as much as computer stations or study space.

All libraries—university, research, public, school, and health sciences—face challenges with space and design. Leighton and Weber, in their comprehensive update of Keyes Metcalf's work, *Planning Academic and Research Library Buildings,*[52] reiterate that a library building must first reflect the purpose of the library and the mission of the university. Demas and Scherer list trends that help make libraries more useful, distinctive, and attractive places:[53]

1. Reading and study spaces
2. Collaborative workspaces for group study, tutoring, and conversations
3. Spaces for group gatherings
4. Learning and teaching spaces
5. Technology-free zones
6. Archives, special collections, and exhibit spaces
7. "What's new" spaces
8. Cultural events spaces
9. Age-specific (or in the case of health sciences libraries, client-specific) spaces
10. Shared spaces (multiuse spaces—libraries paired with senior centers, for example)
11. Art spaces
12. Nature, natural light, and landscapes
13. Interior design trends (such as creating spaces that resemble living rooms)

Two opposing perspectives of the future of the library have emerged. In one, administrators with a limited view of libraries might think the ubiquity of information on the Web means they can convert library space into needed staff offices or patient services, but this might be premature, as library facilities have continued to be needed long past the time a completely virtual library was originally visualized. Presenting a progressive alternative, some university libraries have been reconceptualized as the academic heart of the organization. Rather than storehouses for books and journals, libraries become multipurpose shared spaces to support education and research.

So what aspects of this discussion are unique to health sciences libraries? The answer comes back to the mission of the institution and the distinct needs of the clients that it serves. The National Library of Medicine and the Association of Academic Health Sciences Libraries held a symposium in 2003,[54] and a consensus of experts on the future of the **library as place (Delphi study)** was developed.[55] Here are some expert opinions for the future (2010-2025):

- Libraries will have chief responsibility for obtaining, providing access to, and teaching how to use genomic and other databases, and image repositories.
- Libraries will collect and make accessible faculty lectures, institutional archives, and other locally developed resources.
- Libraries will support information needs of remote users.
- The electronic article, rather than the book or journal issue, will be the chief unit for scholarly information.
- Remote storage will become more practical, and stacks will decrease.
- Libraries will support knowledge management and clinical trials.
- Clients will use the library for time-saving or value-added information services.
- Library space will be less consistent and more tailored to institutional needs.

Those clients who come to study in a health sciences library, come to stay, and so require conveniences that may be seen as luxuries in other libraries. Temporary cubicle space or individual study rooms (called "hotelling") may be assigned for conducting library research or studying. These spaces may include whiteboards, footstools, seat cushions, or accommodations for food and drink.

Planning manuals from the 1970s (the latest such manuals are available) recommend medical libraries should allow seats in the library for 20 percent of undergraduate students and 25 percent of graduate students in the life sciences.[56] Library planning literature prior to the popularity of the Internet underestimates the need for access to information technology services. Because advanced technology is crucial to their missions, health sciences libraries include computer lab-

oratories, information and learning commons, multimedia development pods, or **collaboratories.** The term "collaboratory" originally meant online laboratories where researchers could work, interact, use instrumentation, share data, and use digital libraries,[57] but it has now evolved to also include physical spaces that are equipped with state-of-the-art technologies. The purpose of collaboratories is to promote computer-supported cooperative work. With new initiatives, library staff space may need to be renovated to support things such as knowledge management, offices for scholarly communication, or research and development. More information is provided in Chapter 15, "Library Space Planning."

The Teaching Library

As information resources become more numerous and complex, clients must learn how to become skilled in using those resources. Guskin writes, "A **teaching library** [emphasis added] is a library that is more than a support unit for academic programs and research. It is a library that is actively and directly involved in advancing all aspects of the mission and instructions of higher education: teaching, research and community service."[58]

Some academic librarians serve on curriculum committees for the professional schools they serve. Hospital libraries have an increased role in teaching residents, physicians, and nurses about things such as evidence-based resources, described in the next section and in Chapter 11 on evidence-based practice. Library renovations generally now include increased numbers and size of classrooms and seminar rooms within the library. See Chapter 10, "Information Literacy Education in Health Services Libraries," for more information on the educational role of the library.

Evidence-Based Practice

Evidence-based practice takes into account both the clinical expertise of the practitioner and the best available evidence from research studies. Health practitioners should use both to make decisions about an individual patient's care. Librarians at health sciences universities can teach students, faculty, staff, and researchers techniques to evaluate the literature and determine the strength of the evidence behind written reports. In addition, librarians at some health centers have systematically reviewed published literature and evaluated and summarized the quality of the evidence presented.[59] This topic is covered in Chapter 11.

Scholarly Communications

When scholars find, use, and create information, the end product is called "scholarly communications."[60] Scholarly communications might be informal or formal. Early studies of informal communications coined the phrase **invisible colleges** and encouraged sociological research on how scientists communicate.[61-64] Now informal scholarly communications might include e-mail or blogs intended for a small group of specialists. Formal scholarly communications (also called scholarly publishing) are often more permanent and include journal articles, books, multimedia, software, and databases. The Web and electronic publishers have influenced significant changes to scholarly publishing, as more and more materials move from print to electronic formats.

This change has had a large impact on libraries, in terms of how to manage journal subscriptions and make materials available to users. Libraries may have hundreds of licenses with various publishers providing electronic resources. Libraries must determine how to best make resources available to clients within the restrictions of the licenses.

Many health sciences libraries also encourage researchers to make research results available to the public as quickly as possible, in accordance with recommendations from the U.S. federal government. New methods for scholarly communications have arisen, including open access resources, provisions for increased public access to research results, and local publishing opportunities, including institutional repositories. In May 2005, the National Institutes of Health issued a policy encouraging researchers to submit electronic versions of manuscripts resulting from NIH funded research to PubMed Central.[65] This policy is called the National Institutes of Health Policy on Enhancing Public Access Resulting from NIH-Funded Research, commonly referred to as the "Public Access Policy." Authors submit to PubMed Central the final versions of manuscripts when they are accepted for publication. Other proposed legislation would strengthen this recommendation and extend it to other U.S. federal government agencies. More information on the important topic of how scholarly communication is changing appears in Chapter 3, "Journal Collection Development."

Consumer Health

Although many libraries have missions that included outreach, libraries were given an important tool in 1998, when the U.S. National Library of Medicine introduced MedlinePlus,[42] one of the most comprehensive Web tools for consumer health information. MedlinePlus includes hundreds of health topics, a health dictionary, an encyclopedia, drug information, tutorials, and more, all provided free and without advertising. This resource, plus the supportive funding for outreach projects available through the National Network of Libraries of Medicine, described earlier, meant the majority of health sciences libraries were able to provide some services for the general public, if this is supported by their missions. The **Go Local** project took this a step further. Go Local Web sites are developed by local or state organizations or institutions. These sites link databases of local health care providers, facilities, and support groups with health care topics in MedlinePlus. So, while MedlinePlus provides authoritative information on diseases, conditions, and wellness, Go Local provides links to community services. More information on consumer health is provided in Chapter 18, "Consumer Health Information."

Maximizing Resources

Health sciences libraries have struggled to maintain adequate funding over the years. Problems often have been related to annual increases in the cost of research journals that have outpaced the cost of inflation. The result has been that libraries repeatedly had to reduce the number of journal subscriptions in their collections. With the movement to electronic journals, if a library has budget problems, it is now more likely it will have to consider reducing journal packages of many titles, rather than individual subscriptions.

The American Library Association has reported, "Right now, America's libraries are facing the deepest budget cuts in history. Across the country, libraries are reducing their hours, cutting staff or closing their doors—drastic measures that were not taken even during the Great Depression."[66]

Some hospital libraries are affected by budget reductions and even closures, but the budgets of academic health sciences libraries have remained steady, even when accounting for inflation, according to AAHSL.[26] Nonetheless, some academic libraries are hiring experienced development officers and increasing usage fees to raise funds for innovative services.

Health sciences libraries have become especially successful in developing partnerships to increase access to materials and stretch their funding, sometimes saving their institutions millions of dollars. For many years, health sciences libraries have joined with one another in **consortia** and created group agreements for document delivery, collection development, or collective pur-

chasing. Participating libraries may agree to charge reduced rates, or even no fees, for interlibrary loan. They may agree that each participating library would concentrate on specialized areas and develop stronger collections in those areas. Perhaps the most consequential partnerships have been those in which libraries cooperate to negotiate reduced prices for journal packages and databases. Consortia also provide forums for libraries to share information on best practices.

A consortium may be composed of libraries in a particular city, state, or region, or a particular type of library (for example, a consortium of cancer libraries). Described previously, the U.S. National Network of Libraries of Medicine might be the largest consortium of health sciences libraries in the world.

Knowledge Management

In 2003, AAHSL issued the document *Building on Success: **Charting the Future** of Knowledge Management Within the Academic Health Center*.[67] This important work, written for leaders of key U.S. health institutions, alerts them to new roles health sciences libraries could play that would have a positive impact on the quality and cost of education, clinical care, research, and community outreach. These roles are related to documenting and making available the institution's most important asset, the knowledge of its people.

Knowledge management has to do with acquiring, storing, analyzing, and making available for use the results of human knowledge. This could include publications, but it could also involve capturing successful processes in achieving a certain outcome, for example, what works best in delivering library outreach services to a community. Knowledge management is more fully described in Chapter 14 on hospital libraries.

Health Sciences Research

Two events have helped strengthen the role of the health sciences librarian in supporting research:

1. In 2001, Ellen Roche, a twenty-four-year-old volunteer in an asthma research trial at one of the nation's most prestigious institutions died during the study. The death could have been prevented with a comprehensive literature search, as the drug being studied had been shown to be dangerous thirty-five years previously.[68] In some universities and hospitals, this event led to the appointment of librarians on institutional review boards, to confirm that comprehensive literature searches have been conducted before research trials were conducted.[69, 70]
2. In 2005, Dr. Elias Zerhouni of the U.S. National Institutes of Health, reported that the United States had invested more money in health research per person than any other nation in the world; however, the quality of health in the United States was lower than other nations, according to health outcomes rankings.[71] In an effort to make research more relevant to patient care and health, NIH reconfigured its support of health research. The term "translational science" relates to how well research results can translate into improved patient care and health. Funding for this initiative comes from clinical and translational science awards (CTSAs) available to U.S. academic health sciences institutions. These awards encourage innovative training programs for new researchers, and collaborations and partnerships among health care organizations and the communities they serve. The CTSA initiative could elevate the role played by informatics and libraries. This is described further in Chapter 2, "The Health Care Environment." Several health sciences libraries are playing key roles in their institutions' CTSA initiatives.

Emergency Preparedness and Disaster Planning

After Hurricane Katrina, the United States realized what might happen when a major population center is struck by a serious disaster. Katrina clarified that, in times of emergency, a nation needed health information, not just immediately for those health practitioners providing emergency services, but also for health facilities and providers attempting to continue to provide health care services after the emergency. Networks of libraries came together to provide services for libraries that had been incapacitated, including reference, document delivery, and services for displaced students. Katrina emphasized the value of planning ahead for disaster, and emergency and disaster planning is a high priority for NLM. Katrina also helped librarians understand how accustomed people had become to having health care information readily available online. In 2005, the National Library of Medicine sponsored a symposium on the Role of Information Services for **Emergency Preparedness** and Response.[72] In 2006, the National Library of Medicine and the Medical Library Association convened an Emergency Access Initiative. The purpose was to provide full-text access to key medical or scientific journals from participating publishers in the event of an emergency.

These are only a few of the trends having an impact on how the profession of health sciences librarianship is changing. Health sciences librarians should be especially aware of trends in information technology, health care, education, research, and communications, as these have a significant impact on the future of the profession.

CONCLUSION

This chapter has provided a brief introduction to the profession of health sciences librarianship; a description of health sciences libraries; an introduction to the National Library of Medicine, the largest health sciences library in the world; and a discussion of some trends that are having an impact on health sciences librarianship. The following chapters will elaborate on many of the topics presented here. In particular, the next chapter will describe the health sciences environment, which is essential in understanding how health sciences libraries have evolved.

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