The education of informationists, from the perspective of a library and information sciences educator

By Ellen G. Detlefsen, D.L.S.
ellen@mail.sis.pitt.edu
Associate Professor

School of Information Sciences
University of Pittsburgh
135 North Bellefield Avenue
651 LIS Building
Pittsburgh, Pennsylvania 15260

This article explores the background of, and some of the current models for the education of, the individuals known as ''informationists.'' A definition, an historical overview, and a literature review are followed by a description of the current practices in a variety of institutions and organizations. A series of five ''case reports'' illustrates some of the possible tracks that individuals seeking education as informationists may follow. A proposal for a rigorous planning process is made, followed by a list of recommendations for this planning process.

INTRODUCTION

The context for this exploration of educational issues in preparing a new class of health information professionals was drawn from several initiatives. The most obvious beginning point was the *Annals of Internal Medicine* editorial by Davidoff and Florance [1], which introduced the term ''informationist'' to the current debate. Plutchak's editorial reply in the *Bulletin of the Medical Library Association (BMLA)* [2] further piqued the audience. The panel discussion, and lively audience reaction [3], that took place a few months later at the October 2000 meeting of the Philadelphia Chapter of the Medical Library Association (MLA) sparked the idea for a formal symposium on various issues arising from the Davidoff and Florance editorial. However, the seeds had been sown earlier in the efforts of the National Library of Medicine (NLM) to jump-start change in health sciences librarianship education, with a group of planning grants to university-based teams. When Davidoff and Florance issued their editorial challenge, it was met with enthusiastic acclaim by a number of individuals in the library and information science education community as well as by many in the community of medical librarianship. A second set of presentations and discussion was scheduled for October 2001, just about a year after the Philadelphia meeting, this time sponsored by the Upstate New York and Ontario Chapter of MLA.*

Any discussion of the education of an informationist needs to begin with a definition; thus, for the purposes of this particular paper, an *informationist* is a ''clinical health information professional with added qualifications, gained either through graduate education or experience, which enable that individual to work collaboratively and on an equal footing with medical and health professionals to meet information needs that arise during both direct patient care and medical research.''

These informationists are, in some ways, clinical professionals similar to those medical specialists who now carry the titles of ''intensivist'' and ''hospitalist,'' but are also ones who share characteristics with individuals whose titles are ''clinical medical librarian.'' Informationists may also be likened to a number of other health professionals who practice their specialties in the clinical setting—clinical pharmacists, clinical dietitians, clinical social workers, and clinical nurse specialists. Informationists may or may not differ from clinical medical librarians by when and how they are educated, by or to whom they report, and, alas, by salary and present availability of reimbursement from third-party payors, but the professional tools of informationists and librarians are similar.

The professional education and training for this new role as clinical information professionals is likely to be strikingly similar to the graduate education of spe-

* Information about the Upstate New York and Ontario Chapter (UNYOC) of the Medical Library Association UNYOC 2001 Annual Conference: ''Information Behavior & the Librarian's Role: The Shape of Things to Come'' may be viewed at http://www.unyoc.org/conference/.

cialized medical librarians. These individuals will need training in the use of medical information resources in many formats, including databases, Web tools, electronic and print journals, reference materials, and standardized and specialized subject materials. They will need instruction in the use and design of multimedia tools and in the construction and implementation of large-scale health files. They will need to be comfortably at home in the highly technological environment of modern health information, replete with hardware ranging from palm tools and Web phones to networked computers and supercomputers. They will have to use, with ease, a variety of integrated software products, including tools that access both the knowledge-based and evidence-based literature as well as those that provide patient-specific information. They will need to learn about the information behaviors of clinicians and researchers and understand how these clients make decisions. Not all medical librarians will want to be, or qualify to be, informationists, nor will all informationists be librarians.

The specific issues of educating informationists are twofold: first, there is the problem of appropriate specialized education for beginning professionals in the context of the classical ''first professional degree,'' and then, there is the issue of ''continuing education,'' leading to additional or advanced training for established and experienced professionals. How have programs of library and information science education responded and how will they respond?

A second set of issues arises when the education of informationists is seen either as education for *information* professionals or as education for *health* professionals. The end product of informationists may be the same, but the starting points may be very different. Individuals intending to become clinically specialized librarians, who come through the door marked ''librarians,'' bring different skill sets to the table than do individuals intending to become clinically specialized health information professionals, who come through the doors marked ''doctors,'' ''nurses,'' ''pharmacists,'' or ''physician assistants.'' Again, how have programs of library and information science education responded and how will they respond?

LITERATURE REVIEW

Several threads occur in the existing literature, primarily appearing in the *BMLA* or in the journals of general librarianship, with an occasional article in a medical journal that covers issues in health professions education. Three review articles are useful for establishing the history of library education for the world of medical librarianship: Rees's 1970 *BMLA* article [4], Roper's 1979 *BMLA* piece [5], and Detlefsen and Galvin's 1986 *BMLA* article, which won MLA's Ida and George Eliot Prize for the ''most significant article in medical librarianship'' that year [6]. In 1992, in its concern for the education of another generation of medical library professionals, MLA commissioned and published its Platform for Change: The Educational Policy Statement of the Medical Library Association [7], with several sections specifically targeted to library and information science (LIS) schools and programs.

Detlefsen published a piece in a 1993 theme issue of *Library Trends*—an issue focused on the future of education for special librarianship—that described the likely future of library and information science education for the ''new world'' of medical informatics and the Integrated Advanced Information Management Systems (IAIMS) environment. That article reviewed the state of medical library education, and specifically identified ''success factors for health sciences information education'' that would need to be present in any setting that hoped to prepare its graduates for the changing and changed environment of health care at the close of the twentieth century:

- one or more full-time, tenured, faculty members in a doctoral-degree-granting LIS program with a declared interest in health information
- a group of associated medical or health sciences faculties and programs nearby, preferably within walking distance and preferably a medical school
- a large academic health sciences center library nearby, preferably within walking distance
- medical informatics research and training initiatives underway in the university, of which the LIS program is a part
- personal, professional, and electronic links among the four groups (LIS faculty members, health sciences faculties, academic health sciences center library, and medical informatics researchers) [8]

In 1993, only five institutions appeared to have these success factors, and only fourteen individuals could be identified who were active, full-time LIS educators committed to the specialized area of medical librarianship. At that time, there were fifty-eight North American universities with accredited graduate programs leading to the first professional degree, with thirty-four of these programs offering at least one specialized course in health sciences or biomedical librarianship.

In 1995, Matheson's inspirational piece on the medical library in the twenty-first century appeared in the *BMLA* [9]. In that same year, concern was expressed about educational issues in medical librarianship at the highest levels of NLM, which issued the report of its blue-ribbon Planning Panel on the Education and Training of Health Sciences Librarians [10]. The panel called for a round of planning grants to make rapid change possible and, after a round of grants competition, funds to be provided to six university-based teams to study and propose changes in the processes

by which medical librarians were educated. Reports from these six sites formed the basis for a symposium in the *BMLA* in October 1996 [11–16]. In an effort to promote change in the professional education of physicians, the Association of American Medical Colleges issued their comprehensive list of ''medical informatics objectives'' in the late 1990s; its Section IIA, entitled ''The Role of the Life Long Learner,'' specifically lists a variety of information tasks and skills that should be included in a medical school education [17]. MLA's own executive director, Carla J. Funk, CAE, called for change, growth, and new roles for medical librarians in a 1998 *BMLA* article, based on a keynote speech at a funded institute on new services in the life sciences [18]. The stage was set for the Davidoff and Florance editorial on informationists, which appeared in the June 2000 issue of the *Annals of Internal Medicine,* followed by Plutchak's editorial in the October 2000 *BMLA* and by the Rein editorial piece in MLA's Hospital Libraries Section *National Network* issue for January 2001 [19].

THE CURRENT SCENE

The currently available training opportunities for individuals seeking to become informationists can best be described as following one of five different models for professional education:

- taking a first degree program in universities with an American Library Association (ALA)–accredited LIS program
- training in universities without LIS programs or in medical informatics centers with NLM training grants and library traineeships
- attending medical informatics short courses or continuing medical education (CME) courses at academic health sciences centers and medical or nursing schools
- attending librarian continuing education (CE) courses, primarily at MLA national and regional meetings
- seeking instruction by distance education from the medical informatics community or from the LIS and MLA CE community

Most who are entering the field of medical librarianship in 2001 seek the classical master's of library and information science degree (MLIS), that ''first professional degree,'' from a university with an ALA-accredited LIS program. In 2001, there were fifty-five such programs. Two-thirds of these degree programs offer at least one course in medical librarianship or health sciences information; seven schools offer two courses in the area of medical libraries, and four of them—University of North Carolina at Chapel Hill, University of Pittsburgh, Pratt Institute, and Wayne State University—offer three courses in the field. Seven of these MLIS programs offer course work specifically in medical informatics, and four universities—University of Michigan, University of Missouri–Columbia, University of Pittsburgh, and University of Texas at Austin—offer graduate course work in both medical librarianship and medical informatics.†

In 1999, the newsmagazine *U.S. News & World Report* ranked MLIS programs in health librarianship. The magazine repeated these rankings in its recent 2001 publication on ''best'' graduate schools:

1. University of Pittsburgh
2. University of North Texas
3. University of North Carolina at Chapel Hill
4. University of South Carolina, Columbia
5. University of Missouri–Columbia
6. University of Maryland, College Park [20]

Twenty ALA-accredited programs report having at least one full-time faculty member with a specialization in medical or health sciences librarianship, and four of these schools have deans or directors who come to those positions from a base in health sciences and medical librarianship. Roughly fifty additional adjunct faculty members—usually practicing medical librarians from academic health sciences center libraries or large teaching hospitals—are also listed as teaching part-time in accredited programs. In addition, three of the NLM-funded training centers for medical informatics are in universities with LIS programs, offering students in those particular schools—University of Missouri–Columbia, University of North Carolina at Chapel Hill, and University of Pittsburgh—added opportunities to take courses and attend lectures with the informatics community. In the main, these MLIS students take master's degree programs that include one or two courses in medical and health sciences librarianship, in addition to a standard array of core courses and frequently a field placement, internship, or practicum in medical librarianship.

Those individuals who do not want traditional MLIS degrees, and those who live where there is no access to MLIS degrees, sometimes train in degree-granting and fellowship programs in universities without LIS programs, including centers with NLM training grants and library traineeships. Eight of the twelve centers with NLM-funded training programs [21] are in universities that do not have LIS programs, and these programs increasingly offer both fellowship opportunities for health professionals and so-called ''categorical'' degree programs leading to master's degrees and doctoral degrees in medical informatics. This education can often lead to careers as informationists. Five places specifically offer library or informatics traineeships for MLIS students, recent gradu-

† These data were compiled by Catherine Arnott Smith and presented at a contributed papers session at the 101st MLA Annual Meeting in Orlando, FL, in May 2001.

ates, or mid-career librarians—University of Missouri at Columbia, University of North Carolina at Chapel Hill, Oregon Health & Science University, University of Pittsburgh, and Vanderbilt University.

NLM itself offers several opportunities for education in medical informatics and advanced medical librarianship, largely through the Lister Hill National Center for Biomedical Communications and its Medical Informatics Training Program, which provides support for visiting scientists and students at the center for visits ranging from a few months to one or more years. Other NLM training opportunities include its library associates program, its short courses for indexers, and its National Center for Biotechnology Information Scientific Visitors Program [22].

For those who are not interested in a formal degree program, the option of attending workshops or short courses offers a means by which to acquire training appropriate to the informationist role. Among these options are the medical informatics short courses at Woods Hole‡ or at Stanford University§ or information-oriented CME courses at health professions conferences and in medical schools. Many of these activities are designed for health professionals seeking additional training or updating, but they serve the needs of health information professionals who want to move into the world of informationists. Several of the short courses are actually designed for ''change agents'' in their institutions and have a tradition of welcoming medical librarians as part of the multidisciplinary training class.

For those who can afford the time and dollars to do so, attending librarian CE courses is an attractive option. These courses are generally designed by librarians for librarians and cover a wide range of topics that are appropriate for practicing professionals who want to update and upgrade skills or make career shifts within medical librarianship. Because the primary provider of accredited CE units for this kind of work is MLA (through its professional development department), these CE courses occur most often at MLA's annual meetings and its regional chapters' annual meetings. MLA maintains a roster of courses that have been approved and a list of dates and locations for upcoming courses. It also lists opportunities for ''Independent Education Opportunities,'' including online journal clubs and self-designed CE experiences that carry credits.**

In addition to MLA, the National Training Center (NTC) for the National Network of Libraries of Medicine also presents an annual array of CE courses targeted to medical librarians.†† In particular, these NTC courses feature workshops on new NLM products and services and update sessions for familiar NLM tools.

The most recent initiatives for those who want to acquire medical librarian and informationist credentials and skills are focused on instruction by distance education from the medical informatics community or from the LIS and MLA CE communities. A handful of activities are available and more opportunities are announced each month; both MLA and its Medical Library Education Section maintain lists of distance education opportunities.‡‡ The most popular options at present are CE workshops and short courses. The highly regarded Stanford University short course in medical informatics is available as an online course, as well as a week-long course on the Stanford campus.§§ In 2001, MLA sponsored online CE courses on ''Evidence-Based Health Care'' and the ''Myth and Reality of Electronic Publishing.'' The MLA experience with Web-based courses is an attempt to set a high standard for this form of continuing education [23].

While there are a number of online and distance-delivered MLIS degree programs available from ALA-accredited programs, there is very little distance course work specifically in the health sciences and medical librarianship area. A single semester-long, MLIS-level course in medical librarianship is available by distance education from the University of South Florida, taught by Dee.*** The Department of Library and Information Science at the University of Pittsburgh

‡ Information about the National Library of Medicine/Woods Hole Marine Biological Laboratory's ''Medical Informatics: A Course for Health Professionals'' may be viewed at http://courses.mbl.edu/Medical_Informatics/.

§ Information about Stanford Medical Informatics's ''Short Course'' may be viewed at http://www.smi.stanford.edu/projects/shortcourse/.

** Information about the Medical Library Association's (MLA's) Continuing Education Clearinghouse may be viewed at http://www.mlanet.org/education/cech/index.php3, and MLA's Independent Educational Opportunities may be viewed at http://www.mlanet.org/education/career.html. Information about the MLA Medical Library Education Section's Resources on Educating Health Sciences Librarians may be viewed at http://mles.mlanet.org/resources.htm.

†† Information about the National Network of Libraries of Medicine's National Training Center and Clearinghouse may be viewed at http://nnlm.gov/mar/online/.

‡‡ Information about MLA's distance learning opportunities may be viewed at http://www.mlanet.org/education/telecon/, and MLA's Medical Library Education Section Distance Learning Page may be viewed at http://mles.mlanet.org/distance.html.

§§ Information about the Stanford Center for Professional Development's online ''Short Course: Medical Informatics'' may be viewed at http://www.smi.stanford.edu/projects/shortcourse/onlinecourse.html.

*** Information about Dee's ''Medical and Consumer Health Information Sources'' (LIS 5937–322) course at the School of Library and Information Science, University of South Florida, may be viewed at http://www.cas.usf.edu/lis/syl/sum01/5937Dee/5937intro.htm.

has announced that it expects to field its MLIS ''FastTrack'' online degree with a specialization in health and medical information by sometime in 2003.†††

FIVE CASE STUDIES

What follows are fictional case studies of five individuals from a variety of backgrounds who seek education as informationists. These cases describe hypothetical individuals who are broadly representative of students presently seeking further education; their names and their biographies are fictional. The institutions and organizations described are not hypothetical, however; the programmatic details are taken from actual Websites, brochures, articles, and personal communications from principals in these institutions and organizations.

The University of Pittsburgh master's of library and information science degree

Theresa L. was a thirty-four-year-old medical technologist who had ten years of progressively more responsible experience in the medical laboratories of a medium-sized general hospital in the suburbs of Pittsburgh. She had no interest in becoming an administrator in the laboratory, and she was frankly bored with the daily minutiae of the medical laboratory. She found herself increasingly intrigued by the new information technology to which she had been introduced by colleagues in the hospital's medical library. After researching the job market, she concluded that a career change was appropriate, and she applied to and was accepted in the MLIS program at the University of Pittsburgh, for the medical librarianship and medical informatics specialization. She received a partial scholarship and stipend from the school's partners program, for which she worked fifteen hours a week in a hospital library in town. She began her one-year graduate program with four courses—two core courses (on the foundations of the field and on information retrieval) and two courses in her specialization (a basic health sciences bibliography course and a introductory course in biostatistics at the university's Graduate School of Public Health). In her second of three semesters, she took her two remaining core courses (a cataloging and a special libraries management course) and two more courses in her specialization (consumer health resources and an introduction to medical informatics from the university's Center for Biomedical Informatics). In the final term of study, she enrolled in three classes (an advanced biomedical information retrieval course, a course on indexing, and a course on digital libraries) and signed up for field experience in the university's academic medical library, where she spent 150 hours with the clinical medical librarian team supporting the Department of Internal Medicine. By the time of graduation, she accepted an offer to become an informationist at another local teaching hospital, which was establishing its first clinical medical librarianship program [24].

Vanderbilt's on-the-job training

Irwin G., age twenty-six, was a recent graduate of the distance MLIS degree program at a major Midwestern university, but his course work, while professionally excellent, had had no special preparation for medical librarianship. He had been a pre-medicine/biology major as an undergraduate, but chose not to apply to medical school after all, and sought the MLIS degree because he had enjoyed a part-time and later a paraprofessional job in his alma mater's medical library. After completing the distance degree and lurking on the MEDLIB-L list, he came upon a notice describing a position as a library intern at the Biomedical Library at Vanderbilt University. He applied for and was chosen as the one-year intern, and he moved to Nashville. His on-the-job training in medical librarianship included daily work with ''traditional'' library services and involvement with a couple of special projects in the library—the clinical medical librarian program and the library's consultation services, where he spent time working with clinicians on their patient care–related literature requests. He was able to work closely with the director of the library, a physician with an MLIS degree; she was particularly helpful to him in developing practical skills for setting priorities and time management. In addition to this experiential training, he was able to audit two basic sciences classes at the Vanderbilt School of Nursing and go to the regular medical informatics seminars. To his great pleasure, he was able to do a lot of literature searching and have his searches critiqued by experienced librarians and clinicians. After the year's internship was over, Irwin felt he was ready for his ''first'' job and accepted a position as an informationist in an Ivy League university's medical library [25–29].

The Texas Woman's University dual master's degree

Geneva L., a twenty-two-year-old native Texan with a bachelor's degree in education (major in science education, minor in library science), did not want to become a teacher, even though her degree certified her for the high school science classroom. She had heard from her student teaching supervisor about a new dual degree graduate program in library science and health studies at the Texas Woman's University and

††† Information about ''The FastTrack MLIS: The Path to a New Career'' from the Department of Library and Information Science, School of Information Sciences, University of Pittsburgh, may be viewed at http://fasttrack.sis.pitt.edu.

applied for the two programs simultaneously. Upon acceptance into both and with the help of a scholarship from the university, she enrolled in the forty-five-credit-hour program, which took her about two years to complete. She took classes in both library science and health studies, including two specifically in health sciences information services and two each in health education and health promotion. Despite her very creditable Graduate Record Examination scores, she did have to do some additional ''leveling'' work in health studies to make up for her lack of prior knowledge in that field. She was particularly happy with her course work on medical terminology and health promotion with teenagers. Part way through the program, she took a required course in research methods, which she liked, and was able to put that knowledge to good use when she wrote her professional paper on health promotion techniques for use by clinicians in adolescent medicine. She completed a required practicum in an inner-city AIDS information center, where she helped to organize a collection of materials for nurses doing community education programs with teenage mothers in minority neighborhoods. At graduation, she received two degrees—a master's of library science and a master's of science in health studies. She had several job offers and accepted one as a clinical medical librarian in a pediatric hospital where she could continue her work with adolescent-medicine clinicians [30].

The Stanford University short course

Vernon H., M.D., a board-certified internist, aged forty-five, was fed up with the bureaucracy and pressure of his busy practice and was happiest in the evenings when he had time to surf the Web and ''play'' with PubMed. Having been a computer science major at Stanford University before medical school, he had kept up with the field by reading and attending workshops. He had been thinking for some time about a sideways move into hospital administration, into a position where his computer experience and his interest in information management might be useful. He was a popular and well-liked colleague at the local hospital, and people often turned to him as a gatekeeper when they needed medical information. He stumbled on a notice in his alumni magazine that the Stanford Medical Informatics division was offering a short course in informatics and decided to apply. He was accepted for the week-long course and happily returned to campus. The week was fantastic; he learned in both lecture and hands-on experience formats about a number of new initiatives for information retrieval, management of clinical information, and increased emphasis on evidence-based medicine. He was impressed with the excitement of the others in his short course group, which included not only physicians, but also nurses, several medical librarians, and medical Web managers. Upon completion of the intensive week, he returned home to begin a slow but steady withdrawal from his practice and worked to convince the hospital trustees that they needed to establish a position as an informationist, who could act as a liaison between the medical staff and the medical library and who could facilitate information services that could save the hospital money while improving clinical care. When last seen, he was in the hospital's medical library, showing a colleague how to use a complicated practice guideline from the Agency for Healthcare Research and Quality's (AHRQ's) clearinghouse and preparing a workshop for staff nurses on Web access to integrated pharmacy information [31].

The MLA continuing education model

Lee P. was a forty-eight-year-old hospital librarian with fifteen years of experience as a solo librarian in a community hospital in New England. She had earned her master's of library science degree from a library school that had since closed and had earned it in the era before the advent of computing changed librarianship forever. She had, by dint of personal energy and native intelligence, made the transition to mainframes, then to personal computers, and finally to the Web. Excited about the possibilities of information technology, she served on the information management team at her hospital through two rounds of Joint Commission on Accreditation of Healthcare Organizations (JCAHO) site visits, and she was an active member of both MLA and the North Atlantic Health Sciences Libraries Chapter (NAHSL). In her drive to improve her personal knowledgebase and her desire of a more remunerative position, she began a disciplined effort to acquire CE credits for new skills. She took CE courses in evidence-based medicine, information technology, Web development, and information behaviors of health professionals, offered at her regional MLA meetings. She attended two successive Hospital Libraries Section symposia at annual MLA meetings; she visited the Medical Informatics Section's Self-Education Resources Website‡‡‡ regularly to read new material on telemedicine and networks. She was able to collect and document enough CE points to move up to the highest level of membership in the Academy of Health Information Professionals. Her CE efforts were partly supported by the professional development budget of her hospital and partially out of her own pocket. The investment paid off when she successfully competed for a better-paying position as associate director of a larger hospital library, where

‡‡‡ The MLA Medical Informatics Section's Self-Education Resources Project may be viewed at http://www.medinfo.mlanet.org/profdev/selfed.html.

she was instrumental in establishing a clinical medical librarianship program for the hospital's residency program in family medicine, and she began attending morning report and grand rounds to work with the clinical staff on the wards.

FUTURE NEEDS

The world of library and information science education and programs in medical informatics, together with a myriad set of continuing education offerings, are currently offering a patchwork approach to the education of informationists. What is needed now is a disciplined effort to make these opportunities more widely known and more affordable to those who want to move from their bases in librarianship and clinical health services into work as informationists.

No one sector—LIS education, medical informatics, large medical libraries, professional associations—can do the job alone. A cooperative effort, perhaps home based in a small group of ''centers of excellence'' at universities that already possess many of the success factors or key elements identified in 1993, is necessary, and planning funds need to be made available to multidisciplinary teams to propose strategies and pilot programs for meeting the educational needs of future informationists. Key players probably include faculty members from library and information science, medical informatics, public health, and nursing, together with association activists from the Medical Library Association, the American Medical Informatics Association (AMIA), the Association of Academic Health Sciences Libraries (AAHSL), and the Association of American Medical Colleges (AAMC); extramural officers from NLM; and practicing clinicians and librarians. Individuals already working as informationists, without titles or formal training as such, need to be involved. If the planning is shared from the outset, then the turf wars described by Davidoff and Florance can be minimized.

To make significant progress in the education of informationists, some recommendations for this planning should be made at the outset: two tracks to the role of informationist will probably emerge—one for medical librarians and one for health professionals or clinicians. Separate schools for the two tracks may remain, although emphasis on interdisciplinarity and mixed classrooms and workshops will increase. Medical librarians and students of librarianship without formal training in the biomedical sciences as undergraduates will need to add course work and fieldwork designed to increase individuals' knowledge of clinical medicine, medical terminology, and biostatistics, while health professionals and clinicians or health professions students will need course work in information resources in different formats and hands-on training with the information tools and technologies more familiar to medical librarians.

Schools of library and information science will need to enter into partnerships with schools of medicine, nursing, or public health to offer new opportunities to MLIS students, particularly for recommended or required graduate-level courses in medical terminology, biostatistics, medical decision making, and provider-patient communications. LIS programs will need to adopt successful teaching techniques from medical schools; for example, the MLIS program at the University of Wisconsin at Milwaukee already offers a problem-based course in health sciences librarianship [32].

Hospital administration programs, often in schools of public health, are beginning to offer ''mini-medical school'' experiences to their master's of health administration (MHA) students, so MLIS programs that expect to meet the niche market in medical librarianship or to train new informationists should do the same and, at least, merge those two sets of students. Academic health sciences center librarians, in conjunction with LIS program faculty, will have to continue to offer information skills training to medical, nursing, dental, and veterinary students; some will branch out into CME courses for practicing clinicians whose own professional education predated the information explosion of the last ten years of the twentieth century.

Overlap areas for education and training do exist; these topics are the ones that aspiring informationists from both tracks—librarians and clinicians—will need equally. The obvious solution is to teach librarians and clinicians together, to introduce them to a team approach to studying and mastering such fields as information retrieval and quality filtering, to evidence-based health care, and to decision making under uncertainty. Some training programs in medical informatics already do this, with classes that include people with a variety of backgrounds and experience. As a result, a joint form of program accreditation may need to be devised for programs preparing informationists—with MLA, AMIA, and AAMC involvement—or a joint board of national examiners may need to be impaneled, if there is to be a board certification of informationists at some future date.

Because some, if not all, informationists will come to the new field after working in another aspect of medicine, some people will, in effect, be cross-trained by virtue of their original professional education. Thus, there will be medical technologists and nurses who choose to earn MLIS degrees, and there will be physicians who complete medical informatics fellowships. Pharmacists can already earn special qualifications in drug information, and health educators will seek additional training in consumer health information. Some informationists may actually choose the specialization early on and be trained from the outset

in programs resembling a first professional degree experience, but most of them will take positions as informationists after having previously been trained as clinicians or librarians and after considerable experience in their original career field.

Special attention will also have to be paid to the CE and CME needs of practicing professionals, whether those individuals are librarians or health professionals. For at least another generation or two, physicians and nurses will need to be educated in information skills, including new hardware, software, Web-based tools, and information management products. Medical librarians are often the most knowledgeable instructors for this kind of education. Medical librarians will need instruction in breakthrough areas of medical knowledge, especially in bioinformatics and the new gene sciences. Faculty from the health professions schools will be excellent instructors in these areas.

CONCLUSIONS

The outlook for education for informationists appears bright. Opportunities abound for additional education to provide the skill sets and new knowledge that will make it possible for individuals to become health information professionals with special qualifications enabling them to work collaboratively with medical and health professionals to meet information needs that arise in support of patient care and medical research.

As Davidoff and Florance remark in the provocative editorial that gave birth to these discussions of a new health information profession, ''We believe that it's time to face up to the fact that physicians can't, and shouldn't try to do all or even most medical information retrieval themselves.'' The activity they call ''medical information retrieval'' should, in fact, be done by trained and experienced health information professionals, who may actually come to be known as informationists. These informationists will be trained in the traditions and skills of both medicine and librarianship. Informationists may be first educated as physicians or as librarians, but their special qualifications will come from a new kind of interdisciplinary education.

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