

---

# The information behaviors of life and health scientists and health care providers: characteristics of the research literature\*

By Ellen Gay Detlefsen, D.L.S.  
Associate Professor

School of Information Sciences and  
Center for Biomedical Informatics  
University of Pittsburgh  
135 N. Bellefield Avenue  
651 SIS Building  
Pittsburgh, Pennsylvania 15260

---

**Background:** In a literature-based discussion of research on the information behaviors of life and health scientists and health care practitioners, the problem of characterizing this complex literature is discussed. The issue of terminology for this interdisciplinary area is raised. The paucity of models for information seeking behavior that have been tested in a health care population is discussed, as are the frequently used methods of investigation and data collection methods. **Methods:** By analyzing a large number of information behavior research studies, the questions of who does the research and where the research is published are answered. The characteristics of this research are discussed. Studies are cited that investigate the information behavior of physicians, multidisciplinary groups of health professionals, medical students and faculty, nurses and other allied health personnel, life scientists, and basic science researchers. Two short case studies—on the diffusion of medical knowledge and on drug information and physician behavior—are used as examples of information behavior research. **Conclusions:** The importance of studying the information behavior of health and life scientists and health care providers is underscored by a discussion of the implications for further study.

---

This paper characterizes the research, as it appears in the published library and information science and medical literature, on information seeking by health care professionals, and life and health scientists.†

## TERMINOLOGY

Researchers in this field have labeled their work with many different terms. To hear of studies described as research on information seeking behavior or information channel studies is not uncommon. Other research-

ers label their work as communications research or discuss knowledge or knowledge-based information. There is also a body of relevant research that is generally called diffusion of knowledge studies and some researchers have described their work in this field as the study of the dissemination of knowledge. Most important, however, is that all of this research deals in some way with behavior change and that some of these studies actually become outcomes research, in that the research seeks to show how the patient care and research outcomes are affected by the use of information. Perhaps the term information behavior is actually the most accurate, because that term encompasses the wide range of activities, including information seeking, information retrieval, information storage, information management, and information use.

## MODELS FOR INFORMATION SEEKING STUDIES

The tradition of research on information seeking, rather than research on information retrieval or manage-

---

\* This paper, revised in 1997, is based on a presentation given at the Life Sciences Research and Reference Institute on April 30, 1996 University of Pittsburgh School of Information Sciences, Department of Library and Information Science, Pittsburgh, Pennsylvania.

† For a copy of the extensive classified bibliography of information behavior studies handed out at the Life Sciences Research and Reference Institute, please send e-mail to the author at ellen@sis.pitt.edu.

ment, is the most robust. Investigators have proposed a number of models for studies such as these, but they are not necessarily models drawn from information behavior specifically in medicine. There are actually a number of theorists from both the social sciences and library and information science who have proposed models for information seeking behavior, but none of them have yet been tested on a medical or life sciences population. A useful recent paper by Leckie, Pettigrew, and Sylvain [1] does include health care providers among the professionals whose information behavior is being modeled.

There are also a few excellent review papers that look at the big picture of medical and health sciences information behavior research, but most are dated. The early work of Osiobe [2], Elayyan [3] and Gruppen [4], and more recent pieces by Thompson [5] and Verhoeven et al. [6], as well as an annotated bibliography by a team from the Agency for Health Care Policy and Research [7] stand out from other studies.

#### FREQUENTLY-USED METHODS OF INVESTIGATION AND DATA COLLECTION METHODS

Researchers working in the field of information behavior use a variety of methods of investigation and a greater variety of means of data collection. Each has both positive and negative impacts on the usefulness of the research. These research studies depend upon a variety of data collection methods, and this reliance on specific means of data collection can directly affect the usefulness of the research.

The various methods of data collection include those that study library use or library users; those that study documents or logs; those that survey subjects from afar by mail or by telephone; those that interview subjects individually or collectively after the fact; those that are observational in formal and informal ways; those that are prospective in nature; and those that combine several methods in one investigation.

Examples from each of these methods, representing both investigations by health professionals and research by library or information science professionals and coming from both professional literatures, reveal there is much to be learned not only about the reported behaviors but also about the ways in which the forms of inquiry themselves define and limit the investigation. Notwithstanding these limitations, the field is rich with methods that offer future researchers excellent opportunities to conduct scientific inquiries into the information behaviors of health professionals.

The most common form of investigation in library and information science is the library use or user study. However, these studies are limited to those who actually use a library or are limited to an understanding of the library materials that are actually used. In-

formation can be gathered about how people use libraries, but nothing can be learned about the people who do not use libraries.

Document or log studies are investigations of materials cited in bibliographies; published in the literature, or the popular press, or captured from computer searching; and are limited to published materials or unobtrusive data-gathering about searches or strategies only, so not much is discovered about what lies behind the search or query. What materials were available to answer the query can be determined, but not much about what was discarded or needed that was not found.

Mail and telephone surveys are very popular with social scientists, but they are limited because the answers are generally confined by the choices on the questionnaire or the subjects are liable to be led to make choices by the structure of the question. The response rate for mail and telephone surveys may also be unacceptably low because some subjects may not want to answer questionnaires.

Interviews are a method of choice because they can elicit in-depth information. However, they can be limited by the individuals or groups chosen to be interviewed, by the nature of the discussion and skills of the interviewer, or by the post hoc memory of the subjects.

Observational methods or ethnographic methods are those used by anthropologists, in which the investigator blends into the environment, watches and takes notes of what is happening without interfering with the ongoing activity, but they can be severely limited by the willingness of those being observed. They are also very labor and time-intensive, and thus very expensive; typically special training for observers is required.

Experimental methods are preferred by scientists, but they can also be limited by the willingness of the population to participate. As with observer studies, they are time and labor intensive, and few such studies have been done to date.

Combined methods may be the most practical, for while they are often labor-intensive and still post hoc in nature, they do offer a way by which information-seeking behavior can be caught in the manner of a snapshot by an investigator.

An examination of the literature showed that there are a large number of surveys, using both paper-and-pencil and telephone techniques. A few researchers have used the clinical vignette or critical incident technique, while a larger number have employed interviews and focus groups. Covell et al. [8], in a widely cited study, used interviews with physicians in California, while Schwartz [9] used focus groups for her study of information behaviors among physicians and medical school faculty in India. Mullaly-Quijas et al. [10] also used focus groups in their study of health

care providers. Several investigators have done formal ethnographic observations, most notably Forsythe [11, 12], while others have used more informal environmental audits. There have been some good examples of documentary analysis, including literature reviews, citation studies, chart reviews, and transaction logs.

For instance, there is the frequent appearance of library use or user studies from the library and information science research community. Library user studies, while very useful for those who manage medical libraries and other specialized information centers, can only show the information behavior of those who actually use libraries, and there is a considerable body of research that suggests medical libraries are not among the top choices of health care personnel faced with an information need. This limitation notwithstanding, the work of researchers such as Marshall [13] and Klein [14] does show that medical library information can in fact be demonstrated to save lives, shorten length of hospital stay, and reduce medical care costs.

Other researchers prefer methods by which they study documents or logs, rather than individual practitioners. Library use studies are good indicators of the materials that health care practitioners do find helpful, and chart review studies, such as the work of Giuse and Huber on AIDS information [15], can be used to identify areas in which health professionals need additional information. Phillips' study documenting the importance of medical information that appeared in the *New York Times* serves as an excellent example of a documentary study of information behavior [16].

Some library and information science researchers, and many of the social science community, have preferred to survey subjects from afar or to interview subjects after the fact. The work of Bowden [17], Dee and Blazek [18], and Lundeen and Tenopir [19] each used classical paper-and-pencil mailed survey methods with rural physicians and providers, while the studies done by Williamson et al. [20, 21] used professionally-managed telephone surveys of opinion-leaders and practicing internists.

There are a handful of well-done studies that are observational in method. Forsythe, a classically-trained anthropologist and ethnographer, has done the most formal of these observational studies. Her work with Osherhoff and Buchanan is noteworthy both for the use of ethnographic method and for the insight that information needs of physicians include general and specific patient-focused information such as that found in the chart, knowledge-based information such as that found in medical libraries, as well as information that integrates or synthesizes both kinds of information [22]. Informal observational work, such as the environmental scans of Frisse [23] and Plutchak [24], is more common. These studies are among the most useful in describing real-life information behaviors.

Only a few information behavior studies have been truly experimental, and almost all of these have been controlled clinical trials of an information intervention. The work of Tierney [24] and Frazier [26] in particular demonstrates that physician behavior in ordering tests and prescribing drugs can be changed by the simple intervention of information about the costs of particular tests or pharmaceuticals.

Some researchers have preferred to combine several methods in a single study, hoping thereby to produce a more robust study. Gorman and colleagues in Oregon [27–29] and Wildemuth et al. [30] from the University of North Carolina at Chapel Hill, have been particularly successful in the extended use of combined methods.

### WHO DOES THE RESEARCH?

This kind of research is often done by a team, working in a collaborative approach to the problem. There are as well several solo studies that have focused on the information behavior of a specific type of health professional. The researchers themselves usually are health sciences librarians, library and information science educators and most often, library and information science doctoral students doing dissertation research. The growing community of medical informaticists includes some who work specifically on information behaviors and there are groups of physicians, most notably in internal medicine, who have researched the problem. There is clear evidence that social scientists and colleagues from the field of communications perform this kind of research as well. In addition, there is interest and some published work emerging from nurse researchers and pharmacists interested in drug information seeking.

### WHERE IS THIS RESEARCH PUBLISHED?

Those looking for the research literature must take a broad interdisciplinary approach to the search, as these studies are published in the library and information science, medical, and social science journals and proceedings. Table 1 lists the key journals in which information behavior studies will likely appear.

### WHO IS STUDIED?

The populations whose information behavior have been studied include a great many physicians; internists and family practitioners are particularly likely to be studied, as are medical students, residents, and house staff, and a few pediatricians, dentists, and psychiatrists. Almost no surgeons or surgical subspecialists have been studied. Nurses have been extensively studied, as Grand's review of the literature indicates [31], as well as some pharmacists, physical therapists,

**Table 1**  
Journals which regularly publish life and health sciences information behavior studies

---

<i>Academic Medicine</i>
<i>Annals of Internal Medicine</i>
<i>Bulletin of the Medical Library Association</i>
<i>JAMA: the Journal of the American Medical Association</i>
<i>JAMIA: Journal of the American Medical Informatics Association</i>
<i>JASIS: Journal of the American Society for Information Science</i>
<i>Journal of Information Science</i>
<i>New England Journal of Medicine</i>
<i>SCAMC Proceedings</i> [Symposium on Computer Applications in Medical Care, now a supplement to <i>JAMIA</i> ]
<i>Social Science and Medicine</i>

---

and dental hygienists, but very few other allied health professionals. The information behaviors of basic life scientists and researchers have been studied, but not to the extent that similar studies have been completed for physicists and engineers.

Several researchers, notably Bird and Heekin with gerontologists [32] and Giuse and Huber with AIDS practitioners [33], studied multidisciplinary groups of health professionals. Cunningham and Grefsheim [34, 35] examined a multidisciplinary group of biotechnology faculty, using a variety of data gathering techniques.

#### OVERALL CHARACTERISTICS OF THE LITERATURE

The authors of these research studies are generally health providers themselves, most often physicians. Those who are librarians are most often health sciences librarians or library and information science educators who specialize in health sciences.

MEDLINE is the most heavily discussed information system in this body of research. The work of Lindberg and his National Library of Medicine colleagues [36, 37] and the work of Haynes and McKibbin and the Health Information Research Unit at McMaster University [38, 39] are among the most cited. Qualitative and survey methods are the most popular methods employed by these researchers, and the research articles are most likely to be in the medical literature and the *Bulletin of the Medical Library Association*. Thus, the single best index to use to locate these studies is MEDLINE, although keyword and text word approaches work better than Medical Subject Headings (MeSH) to locate these items. Those who would search exhaustively for this literature should also use a library and information science index and a citation index as well, using all the candidate terms discussed in order to ferret out these studies. Finally, most of the literature is descriptive rather than prescriptive. Few of these researchers have attempted theory-building.

Two special cases are illustrative of the range of research on information behavior of health professionals:

diffusion of knowledge studies and drug information studies. These two areas show how information behavior studies can go well beyond the classical survey of health practitioners or library users. Both case studies involve a variety of approaches and data collection methods, thereby demonstrating the characteristics of this kind of research.

Diffusion of knowledge studies typically report of how health care providers find out about a particular medical phenomenon, a new pharmaceutical product, or a new treatment method. Many are studies of the effectiveness of a particular strategy for the continuing medical education of health professionals. A handful of these studies have been directed towards improving physicians' practice habits and the development of clinical practice guidelines. This body of research is almost exclusively done by physician researchers and involves the extensive use of interviewing and telephone survey methodologies. Several general findings stand out. For instance, the length of time required to get new knowledge into the useful practice of health providers may be several years. Also, while physicians report that they read the medical literature, they prefer to retrieve this new knowledge from the popular press and from continuing medical education conferences. Finally, experimental studies do show that information provided at the point of practice—at the bedside or the prescription pad—can directly and immediately change practice behavior.

The studies of drug information and physician behavior are similarly illustrative of how the research on information behavior has been carried out. Again, these are primarily studies done by physicians and pharmacists who specialize in drug information. They are especially rich in the sociology of information transfer and there are a number of studies that attempt directly to measure the impact of drug and pharmaceutical company representatives (the process of academic detailing) on physician practice and hospital formulary approvals. General studies of physician information seeking have suggested that pharmaceutical company sales personnel are common sources for new drug information and that drug information is a major area of need for physicians. One brief observational study, for instance, has shown a direct correlation between a pizza party for house staff and increased use of an expensive antibiotic produced by the company whose representative procured the pizza for the metabolic rounds [40, 41].

#### IMPLICATIONS FOR FURTHER STUDY

Of note, however, is that none of these information behavior studies—whether of diffusion of knowledge, drug information, and physician behavior, and even those on general information-seeking behavior—has really been attempted in the new age of managed care

and that some of the behaviors previously reported may change as physicians have less time to attend conferences, read journals, or peruse the popular press. Similarly, few of these studies have been attempted in the high technology workplace envisioned by medical informatics researchers. The transition to a paperless work environment may drastically affect the pacing and delivery of new medical knowledge to practitioners. A third issue that has yet to be studied is that of the impact of newer problem-based medical curricula on younger, newly-trained, physicians. Their information seeking is by definition and formal training different than that of their predecessors, and thus their information behaviors will be different. Those in the library and information science and medical informatics community, as well as health professionals who work in this field, clearly will have much to study in the coming decade.

## REFERENCES

- LECKIE GJ, PETTIGREW KE, SYLVAIN C. Modelling the information seeking of professionals: a general model derived from research of engineers, health care professionals, and lawyers. *Libr Q* 1996;16(2):161-93.
- OSIOBE SA. Use of information resources by health professionals: a review of the literature. *Soc Sci Med* 1985;21(9):965-73.
- ELAYYAN RM. The use of information by physicians. *Int Lib Rev* 1988 Apr;20:247-65.
- GRUPPEN LD. Physician information seeking: improving relevance through research. *Bull Med Libr Assoc* 1990 Apr;78(2):165-72.
- THOMPSON ML. Characteristics of information resources preferred by primary care physicians. *Bull Med Libr Assoc* 1997 Apr;85(2):187-92.
- VERHOEVEN AAH, BOERMA EJ, MEYBOOM-DE JONG B. Use of information sources by family physicians: a literature survey. *Bull Med Libr Assoc* 1995 Jan;83(1):85-90.
- UNITED STATES AGENCY FOR HEALTH CARE POLICY AND RESEARCH. Annotated bibliography: information dissemination to health care practitioners and policy makers. (AHCPR Publication no. 92-0030). Rockville MD: The Agency, 1992.
- COVELL DG, UMAN GC, MANNING PR. Information needs in office practice: are they being met? *Ann Intern Med* 1985 Oct;103(4):596-99.
- SCHWARTZ DG. How physicians and biomedical scientists in India learn information-seeking skills. *Bull Med Libr Assoc* 1995 July;83(3):360-62.
- MULLALY-QUIJAS P, WARD DH, WOELFL N. Using focus groups to discover health professionals' information needs: a regional marketing survey. *Bull Med Libr Assoc* 1994 July;82(3):305-11.
- FORSYTHE DE, BUCHANAN BG, BANKOWITZ RA ET AL. Expanding the concept of medical information: an observational study of physicians' information needs. *Comp Biomed Res* 1992 Apr;25(2):181-200.
- OSHEROFF JA, FORSYTHE DE, BUCHANAN BG, BANKOWITZ RA ET AL. Physicians' information needs: analysis of questions posed during clinical teaching. *Ann Intern Med* 1991 Apr 2;114(7):576-81.
- MARSHALL JG. The impact of the hospital library on clinical decision making: the Rochester study. *Bull Med Libr Assoc* 1992 Apr;80(2):169-78.
- KLEIN MS, ROSS FV, ADAMS DL, GILBERT C. Effect of on-line searching on length of stay and patient care costs. *Acad Med* 1994 Jun;69(6):489-95.
- GIUSE NB, HUBER JT, GIUSE DA, BROWN CW JR ET AL. Information needs of health care professionals in an AIDS outpatient clinic as determined by chart review. *J Am Med Inform Assoc* 1994 Sept-Oct;1(5):395-403.
- PHILLIPS DP, KANTER EJ, BEDNARCZYK B, TASTAD PL ET AL. Importance of the lay press in the transmission of medical knowledge to the scientific community. *N Engl J Med* 1991;5(16):1180-83.
- BOWDEN VM, KROMER KE, TOBIA RC. Assessment of physicians' information needs in five Texas counties. *Bull Med Libr Assoc* 1994 Apr;82(2):189-95.
- DEE CR, BLAZEK R. Information needs of the rural physician: a descriptive study. *Bull Med Libr Assoc* 1993 Jul;81(3):259-64.
- LUNDEEN GW, TENOPIR C, WERMAGER P. Information needs of rural health care practitioners in Hawaii. *Bull Med Libr Assoc* 1994 Apr;82(2):197-205.
- WILLIAMSON JW, GERMAN PS, WEISS R, SKINER EA ET AL. Health science information management and continuing education of physicians: a survey of US primary care practitioners and their opinion leaders. *Ann Intern Med* 1989 Jan 15;110(2):151-60.
- WILLIAMSON J. Education in science information management: the foundation for quality assurance in the 1990s. *Qual Assur Util Rev* 1990 Nov;(85):121-28.
- OSHEROFF ET AL., op cit.
- FRISSE ME. Searching for information in a hypertext medical handbook. *Comm ACM* 1988 Jul;31(7):880-86.
- PLUTCHAK TS. On the satisfied and inept end user. *Med Ref Serv Q* 1989 Spr;8(1):45-8.
- TIERNEY WM, MILLER ME, McDONALD CJ. The effect on test ordering of informing physicians of the charges for outpatient diagnostic tests. *N Engl J Med* 1990 May 24;322(21):1499-1504.
- FRAZIER LM ET AL. Can physician education lower the cost of prescription drugs? A prospective controlled trial. *Ann Intern Med* 1991 Jul 15;115(2):116-21.
- GORMAN PN, ASH J, WYKOFF L. Can primary care physicians' questions be answered using the medical journal literature? *Bull Med Libr Assoc* 1994 Apr;82(2):140-46.
- GORMAN PN. Information needs of physicians. *J Am Soc Inf Sci* 1995 Dec;46(10):729-36.
- GORMAN PN, HELFAND M. Information seeking in primary care: how physicians choose which clinical questions to pursue and which to leave unanswered. *Med Decis Making* 1995 Apr-Jun;15(2):113-19.
- WILDEMUTH BM, DEBLIEK R, FRIEDMAN CP, MIYA TS ET AL. Information-seeking behaviors of medical students: a classification of questions asked of librarians and physicians. *Bull Med Libr Assoc* 1994 Jul;82(3):295-304.
- GRAND B. Review of the literature, in Information seeking behavior of nurses in Botswana. Ph.D. dissertation, University of Pittsburgh, 1997: Chapter 2.
- BIRD G, HEEKIN JM. Survey on the use of information sources in the field of aging. *Bull Med Libr Assoc* 1994 Jan;82(1):30-35.

33. GIUSE, op cit.
34. GREFSHEIM S, FRANKLIN J, CUNNINGHAM D. Biotechnology awareness study, part 1: where scientists get their information. *Bull Med Libr Assoc* 1991 Jan;79(1):36-44.
35. CUNNINGHAM D, GREFSHEIM S, SIMON M, LANSING PS. Biotechnology awareness study, part 2: meeting the information needs of biotechnologists. *Bull Med Libr Assoc* 1991 Jan;79(1):45-52.
36. LINDBERG DAB, SIEGEL ER, RAPP BA, WALLINGFORD KT ET AL. Use of MEDLINE by physicians for clinical problem solving. *JAMA* 1993 Jun 23-30;269(24):3124-29.
37. LINDBERG DAB, SIEGAL ER. On assessing the impact of medical information: does MEDLINE make a difference? *Methods Inf Med* 1991 Oct;30(4):239-40.
38. HAYNES RB. Loose connections between peer-reviewed clinical journals and clinical practice. *Ann Intern Med* 1990 Nov 1;113(9):724-28.
39. MCKIBBON KA ET AL. How good are clinical MEDLINE searches? A comparative study of clinical end-users and librarian searches. *Comput Biomed Res* 1990 Nov 1;(23):583-93.
40. HAYNES RB ET AL. Online access to MEDLINE in clinical settings: a study of use and usefulness. *Ann Intern Med* 1990 Jan 1;112(1):78-84.
41. SHORR RI, GREENE WL. A food-borne outbreak of expensive antibiotic use in a community teaching hospital [letter to the editor]. *JAMA* 1995 Jun 28;273(24):1908.

*Received July 1997; accepted September 1997*