Use of information sources by family physicians: a literature survey*

By Anita A. H. Verhoeven, M.D.
Reference Librarian/Information Specialist

University Library Groningen
P.O. Box 559
9700 AN Groningen
The Netherlands

Edzard J. Boerma, M.A.
Assistant Professor of Education

Institute of Education
University of Groningen
Grote Rozenstraat 38
9712 TJ Groningen
The Netherlands

Betty Meyboom-de Jong, M.D., Ph.D.
Professor

Department of Family Medicine
University of Groningen
Ant. Deusinglaan 4
9713 AW Groningen
The Netherlands

Analysis of the use of information sources by family physicians is important for both practical and theoretical reasons. First, analysis of the ways in which family physicians handle information may point to opportunities for improvement. Second, such efforts may lead to improvements in the methodology of literature research in general. This article reports on a survey of the literature on information use by family physicians. Eleven relevant research publications could be found. The data showed that family physicians used colleagues most often as information sources, followed by journals and books. This outcome corresponded with results in other professions. Several factors influenced the use of information sources by family physicians, including the physical, functional, and intellectual accessibility of the source; the physician's age; participation by the physician in research or education; the social context of the physician; practice characteristics; and the stage of the information-gathering process. The publications studied suggested ways to improve information gathering in the areas of computerization, education, library organization, and journal articles.

INTRODUCTION

Analysis of the use of information sources by family physicians is important for both practical and theoretical reasons. First, family medicine is a young academic discipline with a growing scientific output. Due to the interdisciplinary nature of this field, effective use of information sources can be a complex challenge, particularly because bibliographic education is not yet common. Analysis of family physicians' use of information sources could point to opportunities for improvement, including more effective service by librarians and information specialists.

* This study was supported in part through a grant from the Jan Kornelis de Cock Foundation, Groningen, the Netherlands, project number 93-16.

Second, analysis of the use of information sources by family physicians could help enhance the methodology for literature research in general. Objectivity, precision, reliability, and validity are essential criteria of research methodology. These criteria are, however, not yet accepted as fundamental aspects of literature research [1]. It is important to develop this methodological rigor for literature research in general and to make such methods concrete in a specific field such as family medicine. If the published results of literature research do not include the description of and justification for the process used, the research cannot be repeated and verified. Hence, the methodological reliability and validity of the research can be called into question [2].

Library and information sciences supply information search models; a methodology for literature research could be based upon these models. However, these models do not reflect fully the working habits of scientists. Analysis of the information-gathering habits of family physicians could help fill gaps and shortcomings in these models and thus contribute to development of a sound methodological basis for the literature research process.

For these reasons, the authors undertook a literature survey to determine what sources and methods for information gathering are used by family doctors and what factors influence this process.

METHODS AND MATERIALS

The literature search was carried out using numerous information sources (Appendix A) spanning the years 1975 to 1992, and an extensive list of keywords (Appendix B). Publications were selected according to the following criteria:

- they had to describe original research findings;
- they had to describe how family physicians gather information in general;
- they had to describe and compare the frequency of use of information sources;
- they had to be books, dissertations, or articles from journals indexed in one of three large bibliographies (*Index Medicus, Excerpta Medica* or *Library Literature*) or on the journal list of the Medical Division of the Dutch Academy of Science;
- they had to be in English or Dutch; and
- they had to have been published in the period 1975–1992.

RESULTS

Eleven publications were found that addressed information seeking by family physicians (Table 1, documents A–K). All but three publications (E, H, J) describe American studies. The motivations for information seeking in the studies were patient care decision making (A, B, C, D, F, J) and continuing medical education (K). No publications were found on information gathering for research. Four studies did not describe the motivation for the literature search.

Physician sample and research methods

In most studies, the physician sample was selected from specialized groups, such as physicians affiliated with a specific hospital or university (A, D, G, I), members of professional medical associations (K), workers in a medical center, or members of a society for medical information science (J). In four other studies, the investigators selected subjects at random from the population of family physicians in a specific geographical area (C, E, F, H). Dee (B) selected interview candidates through personal networks.

The sample sizes ranged from 12 (B) to 425 (H). The responses varied from 45% to 100%. Two studies investigated nonrespondents (F, H). The habits of these physicians did not significantly differ from those of respondents.

Methods used in the eleven studies included written questionnaires (A, D, E, F, G, H, I, J), telephone interviews (F, K), face-to-face interviews (B), observations (B, C), diary sheets (E), the critical incident technique (J), and patient chart reviews (B).

Information sources

All studies but one (E) showed that family physicians used information sources in the following order of frequency: colleagues, books and journals, libraries, and printed or online bibliographies. Means (F) considered textbooks and journals as one (printed) source. When books and journals were combined, they were the most frequently used source. However, most studies divided these printed sources into two categories, making colleagues the most important source of information. In Heal's survey (E), books and journals from personal libraries preceded colleagues.

Physician characteristics related to information-seeking behavior

Younger physicians used libraries (E, I, K) and printed sources (F) more frequently than did older physicians. Ely and Means (C, F) could not relate age or professional experience to the use of information sources. Family physicians who engaged in research or educational activities used journals, conferences, libraries (I), and online databases (I, K) more than did physicians who handled only patient care. Stichele (H) found that oral and informal communication was an important information channel.

Physicians in practices in which disciplines other than family medicine also were represented used in-

formation sources less than did single-specialty practices (A). Whereas physicians in solo practices used journals the most (F), physicians in health centers usually consulted colleagues (C). In rural areas, conferences were an important information source, as were sales representatives from the pharmaceutical industry (I). In contrast to urban family physicians, rural physicians performed very few online searches (I). An office library, if available, was an important information source (D, E).

Nature of information needed and accessibility

Physicians needed various kinds of information: general medical information (J); information on drugs (C, K); information on therapy (B, E, F, J); and information on diagnosis (J). Means (F) stated that the stage of the information-gathering process influenced the choice of the information source. In calling attention to new information, printed material was the most important source; in the analysis stage, personal contacts were most important; and in the decision stage, refresher courses were the most important information source.

Cost factors, such as time and energy needed to search for information, were more important than quality of the information source (A, J). The most frequently used sources were those with good physical, functional, and intellectual accessibility (A, B, D, E, F, K); those that were clinically relevant (A, F); and those that were familiar to physicians (A, B, E, F, H). Connelly (A) defined *physical accessibility* as "availability" (how close the resource is to the site of clinical practice), *functional accessibility* as "searchability" (how easy it is to find the knowledge needed in the source at hand), and *intellectual accessibility* as "understandability" (how easy it is to read and understand the information).

Physicians faced a number of problems when seeking information: irrelevant information (F, K), inappropriate descriptors (K), incorrect and incomplete indexing of books and journals (B, D, F), inadequate organization of journals in the medical practice (B, D), and a large time investment (B, E, F, J, K).

Suggestions for improvement

All authors but one (C) recommended ways to improve information retrieval for family physicians. These recommendations can be divided into four categories:

Computerization. There were recommendations for improved online retrieval systems, full-text databases, hypertext systems, and expert systems (A, B, D, F, G, J, K). Two studies warned against massive databases with much irrelevant material (D, K).

Table 1
Eleven documents published in 1975 to 1992, focusing on the use of information sources by family physicians

A. Connelly DP, Rich EC, Curley SP, Kelly JT. Knowledge resource preferences of family physicians. J Fam Pract 1990 Mar;30(3):353–9.
B. Dee CR. Information needs of the rural physician: a descriptive study [Dissertation]. Florida State University, 1990.
C. Ely JW, Burch RJ, Vinson DC. The information needs of family physicians: case-specific clinical questions. J Fam Pract 1992 Sep;35(3):265–9.
D. Gruppen LD, Wolf FM, Van Voorhees C, Stross JK. Information seeking strategies and differences among primary care physicians. Möbius, 1987;7: 18–26.
E. Heal PE. The information needs of general practitioners: to what extent they are satisfied by the Postgraduate Medical Centre Library? [Master's thesis]. Loughborough University of Technology, 1978.
F. Means RP. Information seeking behaviors of Michigan family physicians [Dissertation]. University of Illinois, 1979.
G. Renford BL, Eagleson BK. Profiling family physicians and their use of information sources. Med Ref Serv Q 1982 summer;1(2):39–52.
H. Vander Stichele R, Heyvaert J, van Royen P, De Smet E. De informatiekanalen van de Vlaamse huisarts. Huisarts Nu 1985;14(5):188–95. (The information channels of the Flemish family physician.)
I. Strasser TC. The information needs of practicing physicians in northeastern New York State. Bull Med Libr Assoc 1978 Apr;66(2):200–9.
J. Timpka T, Ekström M, Bjurulf P. Information needs and information seeking behaviour in primary health care. Scand J Prim Health Care 1989 Jun;7(2): 105–9.
K. Williamson JW, German PS, Weiss R, Skinner EA et al. Health science information management and continuing education of physicians: a survey of U.S. primary care practitioners and their opinion leaders. Ann Intern Med 1989 Jan 15;110(2):151–60.

Education. There is a need for effective instruction in the use of information sources through programs such as the medical documentation and bibliography course for family physicians in Belgium [3] as well as in medical curricula and continuing medical education (A, G, H, K).

Libraries. Library facilities should be made more accessible to family physicians than they are now (B, E, I).

Journal articles. Journal articles should be tailored more than they are now to the family physician's daily work (A), and article structure should be improved (K).

DISCUSSION

Family physicians used colleagues most frequently, followed by books and journals, as information sources for patient care and continuing medical education. Family physicians involved in research or education relied more on formal information sources, such as printed and electronic sources, than did their colleagues focusing only on patient care. Obviously, there are differences in the qualitative and quantitative information needs of medical researchers and medical practitioners. Research requires more use of formal

(printed or computer) information than of informal sources, such as colleagues. Clinical work requires precisely the opposite [4–6].

Studies of other professions confirmed the results of the literature survey. Physicists [7], engineers [8], social scientists [9], research and development professionals [10], and scientists [11] also rely on individuals and journals more than other information sources. In contrast to family physicians, internists prefer journals to colleagues. Gruppen (D) explained this discrepancy as the result of differences in the nature of the two professions, and their training, working conditions, and tools.

Family physicians rarely used online bibliographic databases (B, E, F, G, H, I). However, for physicians in rural areas, online connections were important [12].

In addition to familiarity with information sources, physical and functional accessibility are clearly important factors in the process of information gathering. Family physicians placed more importance on accessibility than on factors related to the quality such as reliability and completeness of an information source. This finding also was reported by studies of other professionals, such as physicians and medical students [13], engineers [14], and industrial personnel [15]. A possible explanation could be that quality is not immediately apparent whereas cost factors have a more direct impact [16]. Improving the quality of a source, in contrast to improving its accessibility, will not always result in increased use (A).

A number of suggestions were made for improving the organization and supply of information through initiatives involving computers, education, library use, and journal articles. The suggestions were rather technical, without much analysis of why the computer was used so little. Research could help identify possibilities for stimulating use of the computer.

Although family physicians used other individuals as their primary source of information, none of the studies reviewed offered suggestions with regard to stimulating adequate personal contacts. In this regard, the literature of family medicine is comparable to that of other sciences.

The existence of an office library increased the availability and use of information (A, D). Improving the clinical applicability and structure of journal articles was recommended as a way of making information more accessible. However, the present authors feel that improving the indexes of books and journals probably would have more impact than would structural changes on the user. This proposition is strengthened by research showing that, even when they are available, books and journals with inadequate indexes hardly ever are used [17].

To increase familiarity with information resources, education is necessary. In workshops for continuing medical education courses, it is important to provide advice on use of not only formal sources, such as journals, but also informal sources, such as colleagues.

CONCLUSIONS

When constructing an explicit methodology for information gathering by family physicians, it should be noted that these physicians use colleagues frequently, and that accessibility is an important factor influencing the use of information sources.

In addition to instruction in use of traditional, formal sources such as journals, family doctors must be taught to exploit personal information sources, which evidently are the most popular. Attending conferences can enlarge personal networks, for example. Librarians and information specialists can help improve communication among family physicians. They could create new document files, such as international directories of family practitioners, which could include up-to-date names, addresses, and research fields of family physicians. Librarians also could provide analyses of citations of leading research studies related to family medicine.

Library and bibliographic instruction would enlarge physicians' familiarity with information sources, and familiarity would enhance perceptions of an information source as being accessible [18]. A specific bibliographic database for family medicine, including "grey" and national literature, would improve the physical accessibility of the family medicine knowledge base. Functional accessibility could be improved with appropriate descriptors in printed or computerized bibliographies of family medicine and extended indexes in books and journals with, for example, cross-references to synonyms and related terms. Professional organizations and libraries should advise family physicians on organizing their professional libraries and on development of computer and manual filing systems.

Clearly structured journal articles and abstracts improve intellectual accessibility. Abbreviations should be minimized, because they decrease the readability of the text.

In summary, this literature survey uncovered many ways to improve traditional library science models to provide methodologically sound research tools, for family doctors as well as others.

REFERENCES

1. Vorst HCM. Methodische aspecten van literatuuronderzoek. In: Kallenberg A, Kalle P, eds. Automatiseringsaspecten van onderwijsdocumentatie: verslag van een informatiemarkt. Den Haag: SVO, 1984:59–75. (Methodological aspects of literature research. In: Kallenberg A, Kalle P, eds. Aspects of computerization of educational literature: report of an information market. The Hague: SVO 1984:59–75).

2. BOERMA EJ, ARNOLD CA. The library, information services and user education and the aims of the university: the contribution of the methodology of (literature) research. Iatul Q 1990;4(2):56–64.
3. PEETERS C, VANOLER STICHELE R. A training course in medical documentation for family physicians. In: Deschamps C, Walckiers M, eds. Medical libraries: cooperation and new technologies. Amsterdam: Elsevier, 1987:235–41.
4. OSIOBE SA. Sources of information for biomedical decision-making. Methods Inf Med 1985 Oct;24(4):225–9.
5. WOOLF SH, BENSON DA. The medical information needs of internists and pediatricians at an academic medical center. Bull Med Libr Assoc 1989 Oct;77(4):372–80.
6. HUTH EJ. The information explosion. Bull NY Acad Med 1989 Jul/Aug;65(6):647–61.
7. CHEN C. How do scientists meet their information needs? Spec Libr 1974 Jul;65:272–80.
8. GERSTBERGER PG, ALLEN TJ. Criteria used by research and development engineers in the selection of an information source. J Appl Psychol 1968;52(4):272–9.
9. LINE MB. The information uses and needs of social scientists: an overview of INFROSS. Aslib Proc 1971;23(8):412–34.
10. RODENBURG P. R&D-professionals als informatiegebruikers. Een inventarisatieonderzoek naar het benutten van informatiebronnen. Open 1992;24(1):2–6. (Research & development professionals as information users. An inventory investigation in the utilization of information sources).
11. ROWLAND JFB. The scientist's view of his information system. J Documentation 1982 Mar;38(1):38–42.
12. HARRIS DL, PEAY WJ, LUTZ LJ. Using microcomputers in rural preceptorships. Fam Med 1989 Jan/Feb;21(1):35–7.
13. NORTHUP DE, MOORE-WEST M, SKIPPER B, TEAF SR. Characteristics of clinical information searching: investigation using critical incident technique. J Med Educ 1983 Nov; 58(11):873–81.
14. GERSTBERGER, op. cit.
15. ROSENBERG V. Factors affecting the preferences of industrial personnel for information gathering methods. Inf Storage Retrieval 1967;3:119–27.
16. CURLEY SP, CONNELLY DP, RICH EC. Physicians' use of medical knowledge resources: preliminary theoretical framework and findings. Med Decis Making 1990 Oct/Dec; 10(4):231–41.
17. COVELL DG, UMAN GC, MANNING PR. Information needs in office practice: are they being met? Ann Intern Med 1985 Oct;103(4):596–9.
18. GERSTBERGER, op. cit.

Received August 1993; accepted July 1994

APPENDIX A

Information sources used for the literature search

- Medical literature guides [1–5], which contain medical literature sources
- Indexes of journals: the volumes 1990–1992 of *Annals of Internal Medicine*, the *Bulletin of the Medical Library Association*, and *Huisarts & Wetenschap* (*Family Physician & Science*)
- Printed bibliographies: *FAMLI* [6] 1990–1991, *Medical and Health Care Books and Serials in Print* [7] 1990–1992, *ARIST* [8] 1990, and *Library Literature* [9] 1990–1992
- Dutch University Catalogues
- Online bibliographic databases from 1975 to 1992: MEDLINE, EMBASE, CATLINE, DHSS, Health Periodicals Database, Science Citation Index, and LISA; the bibliographic book databases: LC MARC-Books, British Books in Print, Books in Print, and Dissertation Abstracts Online
- Institutes and conferences: Netherlands Institute for Primary Health Care in Utrecht, the Netherlands; Information and Documentation Centre for Social Science in Amsterdam, the Netherlands; the Royal College of General Practitioners in London, Great Britain; and a Boerhaave course, "Future Trends in Biomedical Documentary Information"
- Citation analysis: with the citing document at hand, tracing literature references by means of referred publications

References

1. MORTON LT, GODBOLT S, EDS. Information sources in the medical sciences. 4th ed. London: Bowker-Saur, 1992.
2. CHEN C. Health sciences information sources. Cambridge, MA: MIT Press, 1981.
3. JUNG C. Wie finde ich medizinische und pharmazeutische Literatur? Zweite Aufl. Berlin: Berlin Verlag, 1981.
4. STRICKLAND-HODGE B, ALLAN BC. Medical information: a profile. London: Mansell, 1986.
5. WELCH J, KING TA, HANDS DE. Searching the medical literature: a guide to printed and online sources. London: Chapman and Hall, 1985.
6. FAMLI: family medicine literature index. London, Ontario: World Organization of National Colleges, Academics and Academic Associations of General Practitioners/Family Physicians (WONCA); Bethesda, MD: National Library of Medicine, 1980–.
7. Medical and health care books and serials in print. New York: Bowker, 1985–.
8. Annual review of information science and technology. Medford, NJ: Learned Information, 1966–.
9. Library literature. New York: Wilson, 1921–.

APPENDIX B

Keywords used for the literature search*

Information descriptors:

bibliography
information
information gathering
information need
information seeking
information source
information service
information storage and retrieval
information system
knowledge

* Plural forms were used also.

library
literature
literature research
literature search
medical bibliography
medical information
medical literature
methodology
research
research design
resource
retrieval system
source

Family physician descriptors:

family doctor
family medicine
family physician
family practice
family practitioner
general physician
general practice
general practitioner
health care
physician
practitioner
primary health care