

# Computerized Bibliographic Information Service in a Family Practice Clinic

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Access to current medical information is important for good-quality patient care. Computerized bibliographic information services (CBIS) have been evaluated in a family practice clinic as an aid to clinical decision making. Results suggest that CBIS is a relatively inexpensive, fast, easily accessible tool for clinicians, medical educators, and researchers.

Technological advances have radically changed access to medical information. More than 100 years ago, John Shaw Billings began a project that led to formation of *Index Medicus*.<sup>1</sup> A congressional act in the 1960s enabled the National Library of Medicine (NLM) to begin organizing medical information from worldwide published references into comprehensive storage and retrieval systems. This collection of information culminated in the formation of Medical Literature Analysis and Retrieval Systems (MEDLARS), which includes a detailed listing of *Index Medicus*, *Indexed Dental Literature*, and *International Nursing Literature Index*. In 1971 the computerization of bibliographic information, coupled with the technological advances for remote on-line interactive computer networks, allowed for the development of MEDLARS on-line—MEDLINE.

The availability of computerized bibliographic information services (CBIS) has improved dramatically during the past decade, but it is still not common in clinical practice. In 1979 only 35 percent of MEDLINE systems in institutions were in

hospitals or hospital libraries. Although this institutional index is relatively high, those hospitals with MEDLINE service represent only 5 percent of the total number of hospitals in the United States.<sup>2</sup> The use of CBIS in outpatient clinical settings is not well documented. The solo practicing physician seldom uses CBIS for urgent patient management problems because of lack of access, time constraints, and expense.

All systems for on-line data retrieval require a telephone, a modem coupling device, a computer terminal, access to a telecommunications network, and, for best efficiency, a printer. In on-line searches the user has direct access to the data base. The search strategy is entered through the terminal, and an immediate response is received from the computer. The response is given as the number of referenced articles relative to the topic. These preliminary results may then be used to modify and improve the search strategy. When satisfied with the number of bibliographic sources, the user can print out results immediately at the terminal. If a large number of references is retrieved, a sample list can be printed on-line at the terminal and the rest printed off-line inexpensively by a high-speed printer and then mailed to the searcher.

This paper describes the initial experience with

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CBIS in an ambulatory care clinic at the University of Louisville School of Medicine, Department of Family Practice, including faculty and resident assessment of the value of this service for patient management.

### CBIS in the Family Practice Clinic

The Department of Family Practice at the University of Louisville has recently gained access to a computerized bibliographic retrieval system. Utilizing existing computer hardware, the department invested \$500 in start-up and training fees with Bibliographic Retrieval Services (BRS). This vendor was chosen over other competitors primarily because a contractual agreement had already been reached between the University of Louisville Health Sciences School Library and BRS. For this reason, the Department of Family Practice was able to obtain a reduced user fee based on the high volume already present at the library. As a result, the Department of Family Practice, within the confines of the clinic, has ready access to a vast amount of medical information, including MEDLINE and approximately 40 other data bases.

The major advantage of on-site computer service is the nearly immediate results. The clinician is asked to provide a brief explanation of the topic to be searched. This background enables the computer searcher to use free text terms or to locate standard indexed terminology to prepare an appropriate search statement with minimal clinician involvement. Refinement of the initial search strategy occurs on-line, based on feedback from the preliminary search results. The usual procedure at the Department of Family Practice involves scanning the titles of various documents listed and selecting the most relevant references for bibliographic printout. If the resulting number of documents is large, the list can be reduced by limiting the search to review articles or by requesting only the most recent references. In addition to standard bibliographic information, selected abstracts can be printed when available. The provision of abstracts seems particularly valuable in the clinical setting, since the requester receives some information on the topic immediately and, thus, is aided in clinical decision making.

In expectation of a high number of search re-

quests, the Department of Family Practice elected to train several staff members in CBIS. Five secretaries, one research facilitator, and one faculty member took part in a two-day BRS training program. Three secretaries did not complete the training program, stating that the program was technically too difficult. Training sessions were attended by members of other medical school departments, mainly from the basic science sector. BRS training sessions were free of charge to those with contractual agreements. Travel expenses for the BRS trainer were shared by those departments attending.

In the first three months of operation, 115 searches were performed at an average cost of \$6.25 per search (range, \$0.28 to \$16.49). A search was defined as one computer run per data base per question. Thus, if the same request was searched in two data bases, two searches were counted. The stated cost per search is taken from items on the vendor's bill, which include computer search time, communication line cost, and off-line printing. Other cost items not included in the cost per search are recurring operating expenses, terminal supplies, maintenance for the computer and telephone, local telephone costs, subscription costs, terminal rental fees, and cost for personnel time. If personnel time for the department research facilitator were included, using the salary rate of \$6.64 per hour and an average time expenditure of 18 minutes per search for preparation plus 12 minutes of computer connect time, an additional \$3.32 might be added to the above cost per search; however, including CBIS functions within an existing job description may remove the need to consider personnel time as an extra cost item.

Most of the searches used the MEDLINE data base accessed through the Medical Subject Heading (MeSH).<sup>3</sup> All searches for patient management went through MeSH. The premed data base of current clinical medicine and the Educational Resources Information Center (ERIC) data base were also used. Psychological abstracts were used only occasionally because of the higher cost per search and the lack of key-word indexing manuals in the department. University of Louisville medical librarians have noted that family practice uses more data bases than other clinical departments.

One third of the requests were related to patient management and the remaining two thirds involved research or scholarly activities. Eighty percent of the faculty (12/15) and 42 percent of the

residents (11/26) used the on-site unit during the first three months. Ten of the 11 residents were second- and third-year residents, who spend more time than first-year residents in the Family Practice Clinic.

The user survey indicated that 40 percent of those who had used the on-site service had never requested a library-assisted search. Thirty-five percent stated that they had used the on-site service with greater frequency than they had used library-assisted searches. Moreover, 100 percent indicated that they would probably or definitely use the more accessible departmental system in the future. The reported level of satisfaction for users in the sample ranked 4.7 on a 5.0 scale, and 80 percent of those surveyed indicated that the retrieved information was very useful or interesting.

## Discussion

The computerized information service, as used in the Department of Family Practice clinic, is relatively inexpensive, fast, and easily accessible to clinicians for issues relevant to patient management as well as to medical educators for teaching and research purposes.

In keeping with national trends showing more educational institutions charging for bibliographic searches,<sup>4</sup> the University of Louisville Health Sciences Library has started to charge university faculty for these services. At the Department of Family Practice, bibliographic information services are provided free of charge to all Family Practice Clinic personnel in the hope that the additional costs for the service will be offset by better patient care and enhanced quality of education. The departmental cost per search is comparable to the US national average of \$7.48 (range, \$2.00 to \$50.00) for MEDLINE.<sup>5</sup> The departmental cost per search figures are also comparable to those searches performed at the University of Louisville Health Sciences Library, which average about \$7.00 per search. Variable estimates are reported in the literature because there are several methods for determining search costs. The use of CBIS in the Family Practice Clinic represents a small financial risk compared with the potential for improved patient management and academic performance.

The economic considerations of CBIS are of

importance to practitioners and administrators alike. Werner<sup>4</sup> reported that computerized searching initiated in one library resulted in a 36 percent reduction in full-time equivalent employee time compared with manual searching. This figure may be difficult to realize, since search utilization has been shown to rise dramatically with implementation. Initial projections for a high volume of search requests have not been realized in the Department of Family Practice. The departmental daily average of two searches per working day does not require training several staff members for back-up purposes. Inclusion of about one hour per day for CBIS processing into an existing personnel job description should pose no problem for most outpatient clinics. Frequent use of technical computer skills is essential for best efficiency until self-directed computer programs become more available. For this reason, the department recommends initial CBIS training for only one or two select individuals. As clinicians become better able to formulate questions in the context of key words for search strategies, and as the research facilitator gains more experience, preparation time for search strategies and costs for on-line searches should decrease. A summary of expenses relative to CBIS has been reported by McGee<sup>2</sup> to total \$3,400 to \$3,700 maximum for the first year and \$1,675 to \$2,725 maximum for the second year of operation.

Even when health libraries are accessible, a major factor discouraging the use of printed literature for patient care is demand on the clinician's time. Horowitz and Bleich<sup>6</sup> noted that the 24-hour period required for librarian-assisted searches renders the information retrieved useless for immediate patient management decisions. Mosley<sup>7</sup> concludes that there is a considerable amount of uninformed decision making in patient care, with more than one third of the physicians proceeding without consulting some pertinent literature source. The most frequently cited reason in her study for not referring to the literature was lack of time. Menzel<sup>8</sup> reported that clinicians used the literature much less frequently than do researchers and suggests that the precomputer information services from libraries do not meet the needs of clinicians.

The on-site system at the Family Practice Clinic demonstrated its advantage by providing information about patient management in a matter of

minutes. Although only one third of the requests from this department directly involved patient management, it seems safe to assume that some of these decisions would have been made without consulting the literature had the on-site unit not been available. The availability of a trained research facilitator, who is able to give priority to retrieving patient management data, has resulted in a very fast turnaround time in this department. A fast turnaround time is essential for physician use of clinically relevant data from the printed literature. Thus, although precise information about the impact of CBIS on patient management is not available, it appears that CBIS has helped a significant proportion of physicians to be more aware of current issues in clinical management.

The purposes of literature searches reported at the Family Practice Clinic are similar to those reported in systems offering easy access for questions of clinical management<sup>6</sup> and dissimilar to purposes reported in systems stressing academic research.<sup>9,10</sup> In one report from regional hospitals,<sup>2</sup> items relating to patient care accounted for 39 percent of searches, research for 31 percent, education for 17 percent, publication for 18 percent, and miscellaneous for 8 percent. At the University of Louisville Department of Family Practice, faculty members have observed that a large number of search requests have been generated by past patient management questions arising from differences of opinion that frequently emerge from weekly case conferences. The use of CBIS in an academic department has additional benefits in that the searches may be used for preparation of lectures and publications and for refining and referencing research questions. The use of such a system in private practice might be better for improving patient management, keeping current on topics of interest, and updating clinic procedures.

User satisfaction with the computerized systems in general has been quite high. Frequently cited reasons for dissatisfaction were unrealistic expectations from new users and errors in communication.<sup>2</sup> It has been suggested that satisfaction increases when the requester is present during the search.<sup>11</sup> The increased satisfaction is due not to personal contact in initial search formulation, but rather to the requester's opportunity to revise and redirect the search while it is in progress. The positive results from this survey within the Department of Family Practice may reflect a favor-

able bias inherent in the survey instrument. The survey was presented as an opportunity to offer suggestions for improvement, but formal assessment scales were not used. Moreover, as this survey represents the initial three months of the computerized service, the short-term evaluation may merely represent infatuation with new technological "gadgets." Nevertheless, the consistently high marks and positive comments cannot be overlooked. That 20 percent of the users noted the search results were useful or interesting, but not exactly what they were looking for, may reflect an indirect benefit of computerized searches in that searches often retrieve citations with an orientation slightly different from the original focus. Curiosity about these items often leads to an expanded use of CBIS.

The advantages of computerized searching over manual techniques are evident to anyone who has pursued searches through *Index Medicus* or other referenced compendia. Utilization of *Index Medicus*, with its year-by-year volumes and monthly supplements, is time-consuming, and cross-referencing by manual means is nearly impossible. Computerized searches are less time-consuming and, thus, more cost effective.<sup>12</sup> Additional benefits include a printed bibliography and access to multiple data bases that are larger than the collection of subscription journals at any particular library. CBIS is complementary to family practice medical literature filing systems.<sup>13</sup>

Computerized searching provides information not available from other sources.<sup>14</sup> For example, the Cancerline data base provides up-to-date information on ongoing cancer research and chemotherapy protocols. A prototype hepatitis data base has been completed by a consensus of experts supported by data with bibliographic references. The hepatitis data base is updated by ongoing review of select literature by these experts. Often pertinent journal information from abstracts is available with on-line computers when the original journal article is not available at library sources. Also, the National Library of Medicine has indexed the computerized MEDLINE version in more detail compared with the printed versions. In *Index Medicus* each reference has an average of three subject headings, whereas there can be up to 12 subject headings in MEDLINE references.<sup>15</sup>

Computer files are often updated more frequently than printed information systems in the

library. Information in the printed *Index Medicus* is at least three months behind publication date of the journal, whereas MEDLINE is only one to two months behind. The premed data base is current for publications only one to two weeks old.

In summary, the on-site computer access service has provided family practice clinicians with a valuable tool for retrieving medical information rapidly. The enthusiasm and satisfaction expressed by its users lead to expectations of increased utilization. Initial reports suggest that the potential educational and patient management benefits of this relatively inexpensive system are great. Its use in other family practice residency programs is highly recommended.

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