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Electronic Information Sources

Pervaiz Iqbal
Department of Orthopaedics and Trauma Surgery, Shaikh Zayed Hospital, Lahore - 54600

SUMMARY

This article briefly describes the evolution of electronic data bases, provides introduction to Online Service and gives more detail about CD-ROM MEDLINE Service.

Medical literature has grown rapidly since the publication of the first annual volume of Index Medicus, which recorded 20,000 articles in 1879. After hundred years, this total has increased more than ten folds to around 250,000 annually[1]. The Medline database, which offers access to Index Medicus by computer, extends its coverage of literature back to 1966. Between 1971 and 1984, its size increased from 147,000 to more than 4.5 million references, while the full set of 21 database produced by US National Library of Medicine (NLM) at the end of 1984 contained over 8.5 million references[2]. The current annual growth rate of MEDLINE database is over 300,000 references.

ELECTRONIC INFORMATION SOURCES

Online databases

The easy access to massive quantities of world's medical literature in electronic format originated over 30 years ago when, to enable faster processing of increasing volume of published literature, the US NLM undertook the development of a computerized system for the production of the printed Index Medicus. The system was called MEDLARS (Medical Literature Analysis and Retrieval System) and the first issue of Index Medicus to be produced by it appeared in August 1964. The versatility of the system was rapidly appreciated since it could be used to generate listings of information on specific topics to meet individual needs. The ability to search for complex combination of terms, gave it a major advantage over any printed index. As a result, the MEDLARS demand search service was initiated to meet requests from health professionals for bibliographies. This service proved popular and demand reached a peak in 1970 when 24,000 searches of the database were processed on 21 computers at centers based in the USA and eight other countries[2]. In 1970, the turn-round time for MEDLARS search requests in the USA was estimated at 40-60 days. It was inadequate to meet urgent needs. To enable faster access from a wider range of organizations the database renamed MEDLINE, was made available 'ONLINE' in the USA over a national telecommunication network, on 29 October, 1971. Access from outside the USA was developed subsequently. The number of MEDLINE searches processed in October 1972 alone was 10,605, giving an estimated annual rate of 140,000. The figure rose by 1980 to 1.5 million searches of NLM's 19 databases from more then 1000 organizations world-wide.

At this time, development in communications networks and the entry of a diversity of companies into database industry, led to establishment of online access to 400 databases in a wider range of subject areas[3]. Today, there are more than 5000 databases. Medicine is prominently represented with more than 200 databases listed in the Directory of Online Health-care Databases. The compilers of this directory estimates that these databases in 1989 contained 50 million references from 100,000 international source publications. Although MEDLINE, which indexes more than 3000 journals, remains the best known online database, there are many other important sources which offer varied routs of access to medical information. Most are categorized as bibliographic databases, characterized by provision of full citation to the literature, usually with abstracts, but not the full text of original publications.

Online searching is a fast and powerful alternative to CD-ROM searching[4]. One has to connect personal computer with telephone line using a Modem. Formal training is necessary for quick and cheap reference finding. Other benefits such as direct transfer from online searching to your own computer and bibliography database make online searching of biomedical databases essential to consider.

The use of online database is expensive and complicated, restricting its use. Charges are according to the length of time of connection and number of references. The average total expenditure for database use is at US $ 100 per hour[5].

Technically, the process of accessing and searching online database can be complicated. Connection to a host computer over a telecommunication network, is a multistage operation, involving special protocols and command languages that vary from one system to another. Effective searching of database requires a thorough knowledge of their individual searching system.

CD-ROM databases

Medline, the bibliographic database of the National Library of Medicine (NLM), is the primary source in the U.S. for information from biomedical literature. It is the single most important research tool for physicians, nurses, and health personnel[6]. It is international in scope with approximately 75% of citation published in the English language. It contains all the references that appear in Index Medicus, an index to periodical articles in medical sciences, as well as citations that appear in the Index to Dental Literature and International Nursing Index. Medline contains complete references to articles from more than 3,200 journals with abstracts. In short, it is a better citation system[7].

The most significant development in making electronic information retrieval facilities easily accessible in a cost effective way to a wider user group has been the advent of the compact disc a medium for data distribution.

CD-ROM (Compact Disc Read Only Memory) is read only in the sense that user can only read data from it, never add to it. The compact disc was introduced by Philips and Sony in 1980, offering a medium, capable of mass storage of recorded data despite its small size (12 cm X 1.2 mm). The data is recorded in digital form using a laser beam. The information on one disc is 600 megabytes which is equivalent to 250,000 pages, or 100 copies of Harrison's Principles of Internal Medicine[8]. The first CD-ROM databases were marketed in 1985. Their popularity has increased to the extent that 2212 titles are listed in the 1992 edition of the CD-ROM directory.

Medical literature is a vast and growing area of human knowledge. The only way to master it is to learn how to use library resources effectively to gain access to the precise information needed[9]. Medline is a result of recent development in information technology[10]. Medical information is increasingly stored in electronic format, enabling faster and more flexible access to the literature[11]. The hard work of finding relevant references is performed by the computer very efficiently. The required data can be printed on paper, stored on floppy disk or hard disk. It can be imported in any word processing package and utilized at leisure. The system is easy to learn and to use, even for those who are not familiar with a Personal Computer[12].

The equipment for searching a CD-ROM is a microcomputer and a special player or a drive to read the data. The information from CD-ROM disc is displayed on the computer screen. There is no need to use telecommunication network. The time taken to perform a search is immaterial because the discs are the property of the institution allowing unlimited use without further cost.

Searches on Medline or CD-ROM can be highly specific, since a number of different concepts can be searched and linked, with provision for easy retrieval by author, subject, keyword, journal, year of publication, or any combination of these. This provides more powerful, comprehensive, and flexible retrieval capabilities than the printed Index Medicus. Furthermore, once a reference is located, an abstract will usually be available and may contain all the information required.

MEDLINE is a powerful tool to monitor world health problem. From 1983 through mid-1991, more than 200,000 MEDLINE entries were AIDS-related. Close to 60% of the journals indexed in MEDLINE published at least one article on AIDS during the past ten years. As reflected by a subset of 29,077 MEDLINE records, the literature of AIDS has grown to encompass 29 languages and 65 countries. A bibliometric study of the medical literature helps to demonstrate the progression of AIDS as a world health problem and the concomitant expansion of the research effort underway to control it[13].

Medline is most informative, user friendly, and economical method to keep ourselves informed. Retrieving information from CD-ROM databases is an easy and popular way to keep updated in a particular field. It can be of tremendous help in initiating research activity in any institute. A core electronic medical library can easily be established in a rural setting using Medline[14].

MEDLINE is used to satisfy a diversity of medical needs concerning patient care, the progress of biomedical research, the quality of education received by health professionals in training, the safety and effectiveness of health care institutions, the operation of the system of third-party reimbursement, for legal decisions, and for the knowledge of the public[15].

Recent Developments

A recent development combining the useful features of Online and CD-ROM is provision of access via the UK Joint Academic Network (JANET) to number of major databases produced by the Institute for Scientific Information, including the Science Citation Index[16]. Searching is free of charge for registered individuals at UK academic institutions which pay a fixed annual subscription charge to the service. The databases are online in the sense, that the use connets to them directly through JANET. Their storage is on a Mainframe computer at Bath University and allows faster processing of searches than on CD-ROM workstations. They offer one of the main advantage of CD-ROM databases, namely the ability to conduct a search in the user's own time, without the need to consider the cost. In addition, they are updated at a weekly interval.

It is possible to focus medical education by using a model that integrates the skills of end-user searching of the medical literature into the traditional course content. Since 1988, 313 first-year medical students were studied as they accessed MEDLINE to retrieve information about biochemical genetic disorders[17]. Their search behavior was studied by analyzing data from the National Library of Medicine's traffic files. The skills that they initially learned were reinforced as they searched clinical genetics problem cases in the second-year pathology course, and these skills were consolidated in the third year when the students addressed specific patient-care questions in pediatrics. The students' perception of the value of this model was studied by analyzing questionnaires completed during the exercise. It was demonstrated that when students were taught the skills of accessing MEDLINE by computer, they could formulate a question, retrieve current information, critically review relevant articles, communicate effectively, and use these skills to contribute to patient care. Hence, the student use of Medline, searching knowledge and skills on retrieval in clinical situation is increasing recommended[18]. When clinicians were compared with librarians for retrieval of clinical data, clinicians, tended to capture larger overall retrievals resulting in higher numbers of relevant and irrelevant citations than librarians[19].

Baylor College of Medicine has developed the MEDLINE Retriever[20], a tool to query MEDLINE, the data-base of medical literature at the National Library of Medicine. The MEDLINE Retriever communicates via the Internet to achieve excellent response time for MEDLINE queries. It uses the X Window System and the Motif toolkit, and employs the Knowbot Operating Environment developed by the Corporation for National Research Initiatives. The MEDLINE Retriever is an extension of Baylor's IAIMS design concept that brought forth the Virtual Notebook System, and fits well with Baylor's aims with regard to the High Performance Computing Initiative.

The Health Science Library at University of Tennessee (UT), Memphis has taken advantage of a campus-wide network for the purpose of providing enhanced access to library services. With a terminal or microcomputer, members of the UT Memphis community can use an electronic menu system to complete photocopy, interlibrary loan, and computer literature search request forms; leave messages or sign up for library workshops; use electronic mail to receive citations and abstracts from computer literature searches; use an electronic bulletin board to scan the library's new acquisitions lists, library hours, services, and policies; and use bibliographic retrieval software to search the library's locally mounted databases. Remote access to library services and electronic resources, which is available twenty-four hours a day, could potentially save users time and the institution money. Remote access, however, is intended to supplement, not to supplant or discourage, in-house library use[21].

A powerful method of processing MEDLINE source data uploaded to the IBM 3090 Mainframe computer through an IBM/PC has recently been described[22]. Data are first downloaded from the CD-

ROM's PC devices to floppy disks. These disks then are uploaded to the Mainframe computer through an IBM/PC equipped with WordPerfect text editor and computer network connection (SONNGATE). Before downloading, keywords specifying the information to be accessed are typed at the FIND prompt of the CD-ROM station. The resulting abstracts are downloaded into a file called DOWNLOAD.DOC. The floppy disks containing the information are simply carried to an IBM/PC which has a terminal emulation (TELNET) connection to the university-wide computer network (SONNET) at the Ohio State University Academic Computing Services (OSU ACS). The WordPerfect (5.1) processes and saves the text into DOS format. Using the File Transfer Protocol (FTP, 130,000 bytes/s) of SONNET, the entire text containing the information obtained through the MEDLINE and CINAHL search is transferred to the remote Mainframe computer for further processing. At this point, abstracts in the specified area are ready for immediate access and multiple retrieval by any PC having network switch or dial-in connection after the USER ID, PASSWORD and ACCOUNT NUMBER are specified by the user. The system provides the user an on-line, very powerful and quick method of searching for words specifying: diseases, agents, experimental methods, animals, authors, and journals in the research area downloaded. The user can also copy the Titles, Authors and Source with optional parts of abstracts into papers under edition. This arrangement serves the special demands of a research laboratory by handling MEDLINE and CINAHL source data resulting after a search is performed with keywords specified for ongoing projects. Since the Ohio State University has a centrally founded Mainframe system, the data upload, storage and Mainframe operations are free.

CD-ROM MEDLINE in Pakistan

The facility of Medline on SilverPlatter is being introduced in this country by College of Physicians and Surgeons Pakistan. Initially it was started at C.P.S.P. office, Karachi, five years ago. Gradually this service is being extended at all regional offices and postgraduate medical institutes of country. In the city of Lahore, this service is available at CPSP office, Patiala Block, King Edward Medical College; Punjab Postgraduate Medical Institute; Punjab Institute of Cardiology; British Council library and Shaikh Zayed Postgraduate Medical Institute. At S.Z.P.G.M.I., this facility is free of cost, for all postgraduate students and faculty members of the institute. We agree with Haynes et al[23] that imposing user charges for searching in clinical settings adversely affects searching quantity, and undermines its benefits.

The Computer Section of the College of Physicians and Surgeons Pakistan has planned to start full text service on CD-ROM, in near future. Complete articles from 390 leading journals of medicine, with monthly update, would be available on request. We applaud this move and look forward to start same service at Shaikh Zayed Postgraduate Medical the Institute Lahore.

Learning how to use Medline

There is a user a friendly and powerful tutorial for MEDLINE. The tutorial is divided into the following sections.

a. **Keyboard:** It is about the functions of the system and how to access them; how to display and print search results.
b. **Basic search:** It is about basic instructions on formulating search strategies; takes you through some searches.
c. **Further search:** This section deals with advanced search strategies; gives further information about constructing searches.
d. **Thesaurus:** It teaches how to use the MeSH (Medical Subject Headings) to conduct a search.
e. **Review:** It provides summary of the tutorial lessons.

Each tutorial is presented in a series of small windows. Each window has a set of instructions to follow. If a wrong key is pressed, one is alerted by a bleep.

The tutorial has been installed on a Network at the Computer Center, SZPGMI. The are four terminals, four doctors can learn how to use MEDLINE at one time.

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The Authors:

Pervaiz Iqbal
Senior Registrar
Department of Orthopaedics and Trauma Surgery
Shaikh Zayed Hospital
Lahore - 54600.

Address for Correspondence:

Pervaiz Iqbal
Senior Registrar
Department of Orthopaedics and Trauma Surgery
Shaikh Zayed Hospital
Lahore - 54600.