ELECTRONIC INFORMATION SOURCES : BASIC CONCEPTS AND HISTORICAL OVERVIEW WITH SPECIAL REFERENCE TO MEDICAL SCIENCE

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ABSTRACT

Electronic Information Sources(EIS) constitute a major component in disseminating information and knowledge in modern world. EIS offer a variety of opportunities than their printed counterparts. This article discusses the concept of EIS and provides a historical overview of various EIS in medical sciences. The EIS are grouped into five catagories, viz. offline batch processing systems, online information source, CD-ROM sources, Internet and web sources and Personal Digital Assistants.

1. Introduction

In a wide variety of acadamic disciplines including the medical sciences, Electronic Information sources (EIS) are generally presumed to represent the leading edge of innovation in the presentation and dissemination of scholorship. They can reach potentially enormous professionals and lay audiences in a fraction of the time. They are capable of supplementing traditional text with images, sound and video, opening up entirely new vistas of inquiry and analysis. Medical science is always in the forefront of making use of the potentials of computer based electronic information sources and services since the inception of these resources. Today multitudes of electronic medical information source are available in various formats. The integration of electronic resources in the health care system provides enormous potential to increase the efficiency of medical education, research and patient care.

2. Defining Electronic Information Sources

Library of Congress in its draft interim guidelines for cataloguing electronic resources' define electronic Information Source as "manifestation of a work encoded for manipulation by computer. The manifestation resides in a carrier accessed either directly or remotely". The Library of Congress goes on to further define a "directly accessed electronic resource" as an "electronic resource whose carrier is 'touchable' e.g.a CD-ROM" and a "remotely accessed electronic resource as an electronic resource whose carrier does not embody a direct 'touchable' physicality, [e.g. an electronic journal, or a database accessed through the Internet, or a web-site]"

AACR2[2], define an electronic resource as "Material (data and / or program(s) encoded for manipulation by a computerized device. This material may require the use of a peripheral directly connected to a computerized

government engineering colleges and technical institutions identified by the AICTE are also the members[3].

6. Health Science Library & Information Network [HELINET]

HELINET, the first medical library consortium in India, was launched by the Rajiv Gandhi Univerisity of Health Sciences (RGUHS), Karnataka[9]. The member colleges can get access to around 650 International biomedical journals from 24 publisheers at about one third the price of their print subscription. HELINET sources-E-Journals from the following aggregators such as Elsevier's Science Direct [http://www.sciencedirect.com/], Ovid Biomedical Collec-tion [http://gateway.ovid.com/], Annual Reviews Biomedical Suite [http://arjournals.annual reviews.org/biomeidcalsearch.dt1] and J-Gate [http://j-gate.informindia.co.in/]

7. CSIR Consortia

A consortium for about 40 CSIR Laboratories to access more than 1300 E-Journals through Elsevier's Science Direct. NISCAIR is the nodal organisation of this consortium.

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device (e.g., CD-ROM drive) or a connection to a computer network (e.g., the Internet)."

Armstrong and others[3] defined EIS as "Collections of information tools/products delivered to requesting users electronically - usually computer mediated."

Ridi[4] defined EIS as "a wide range of products going from electric periodicals to CD-ROMs, from e-books to websites, from mailing list to databanks, all of them having a common feature of being used-and sometimes modified - by a computer".

From the above definitions, the following inferences can be drawn.

- EIS are computer-based information Sources.

- EIS appear mainly in two forms:(a) Internet. (b) CD-ROM

- EIS cover a wide range of products such as E-Journals, E-Books, Web resources and databases.

- Delivary of information in EIS is through computers.

3. EIS in Medical Sciences : Historical Overview

Computers were first applied for the information processing and disseminating activities in early 1960's. Since then various types of electronic sources of information started appearing in medical sciences. Based upon the chronological order of appearance, the EIS in medicine can be broadly catrgorised as :

I) Offine batch processing systems

II) Online information sources

III) CD-ROM sources

IV) Internet and Web sources

V) Personal Digital Assistants

I. Offline Batch Processing Systems

National Library of medicine (NLM), USA the largest health science library in the world, is one of the pioneers who made use of the computers in information processing and dissemination activities. In 1964, NLM began using computerised system for producing its printed publication, Index Medicus. Soon after, early searches were run in offline batch processing mode against the computer data base[5]. The complete system became known as Medical literature Analysis and Retrieval System (MEDLARS) and it provided mechanised access to the growing volume of biomedical literature to the medical community. MEDLARS represents the first EIS produced in medical field.

II. Online Information Sources

Online information services started in medicine with the establishment of MEDLARS ONLINE, (MEDLINE) IN 1971. The establishment of MEDLINE paved way for an online information revolution in libraries. The potential of commercial development of online search systems and services became apparent and the rapid development of computer and communication technologies made this a reality. Intially MEDLINE was available only in the regional medical libraries in USA. Later, by the end of the decade, it became available all over the wrold through different vendors. The decade of 1970 was one of rapid growth in online medical information sources and services. New vendors emerged and databases other than MEDLINE were developed like EMBASE and BIOSIS. Time-sharing and new communication system reduced access costs. Also search and retrieval system of electronic resources were improved. Commercial vendors such as DIALOG Information Services, Bibliographic Retrieval Services(BRS) offered hundreds of databases in various branches of science and technology. This has resulted in

the widespread use of online commercial databases and online information service became part of the reference departments in libraries. Based upon the requests received from the medical professionals the referance librarians or search specialists searched the online databases. Virtually the initial users of online information sources were trained intermediaries or the referance librarians.

This situation changed considerably in the 1980's when a critical mass of personal computers became available. Personal computer-based user friendly search interfaces aiming at the end-user medical community were developed. Paper Chase, Grateful Med, DIALOG Knowledge Index and BRS Colleague are examples of such user-interfaces developed by the commercial vendors for searching the online databases by the end-user medical community. Of these Paper Chase and Grateful Med were search interfaces developed exclusively for searching MEDLINE.

The development of user friendly interfaces enhanced the popularity of online medical information sources among the medical professionals. This has resulted in the proliferation of databases and same databases became available through increasing number of vendors.

Another notable development is the emergence of locally mounted bibliographic databases. As the libraries became more automated internally and as the librarians became more sophisticatd in the use of computers to deliver electronic information sources and services, the idea of locally mounting bibliographic databases emerged. In 1984 NLM announced the availability of MEDLINE subsets, which could be licensed for local use with either commercial or locally developed retrieval software. Mini-MEDLINE at the Georgetown University and Mary-MED at the University of Maryland, USA were examples of two such locally mounted bibliographic databases.[6]

III. CD-ROM Sources

The arrival of CD-ROM (Compact Disc Read Only Memory) as a powerful information storage medium in 1985 was another milestone in the history of electronic medical information sources. The CD-ROM technology promised to bring database searching closer to the end-user medical professionals. In 1987 NLM licensed MEDLINE to commercial vendors for distribution on CD-ROMs. MEDLINE on CD-ROM was one of the first electronic information sources to get widespread distribution in medical libraries. Following MEDLINE other databases like BIOSIS, PSYCLIT, EMBASE etc. also became available in CD-ROM format. Medical libraries all over the world quickly embraced the technology as a cost-effective alternative to online information sources. By the end of 1980's there were 8 CD-ROM versions of MEDLINE making it clear that CD-ROM as an electronic medical information source was finding a niche in libraries.[7] Another notable development in the 1980's was the design of hardware and software for linking multiple personal computers through networks. The networking of medical institutions at local regional and nationl and international levels permitted the medical professionals to exchange information with distant colleagues.

The improvements in optical storage devices made it possible to store large Bibliographic, full-text medical information on Digital Video Discs (DVD) with gigabyte storage capacity and multimedia features. The introduction of Compact Disc-Recordable (C R) and compact Disc Re-writable (CD-RW) allowed medical professional to store information on CD-ROMs by themselves. Corresponding to the developments in the CD-ROM technology 'Silver Platter' released DVD version of MEDLINE as 'MEDLINE Advanced'.

IV. Internet and Web

The real breakthrough in the growth of EIS was the emergence of the Internet. Though developed in USA in the 1960s the Internet became prominent in libraries only by the 1990s. In its early years of development Internet offered services like Email, FTP, Telnet, Gopher, and WAIS.

The emergance of World Wide Web (Web) in 1991 was a turning point in the history of electronic medical information sources. Hyper-text and multimedia capabilities coupled with user friendliness made the web a viable medium of information storage and retrieval. Today millions of web resources of various kinds on different branches of medical sciences are available. Web became an alternative platform for the traditional online medical information sources and services. The traditional online vendors in the field of medicine and allied health like NLM, Silver platter, and Dialog are now providing their service over the web. In addition many new vendors have come up to make use of the capabilities of Web in providing database services.

V. Personal Digital Assistants

Personal Digital Assistant (PDA) is the latest product of modern information technology, which gives many possibilities for managing medical information by individual medical professionals.[7] PDA is a hand-held computer device, with Information storage and retrieval capabilities. Palm Computing Incorporation developed the first truely functional PDA in 1996. Since then information pertaining to various branches of medicine are being produced in PDA format (E.g. EPocrates) by different vendors. PDA is gaining popularity among the medical professionals as an EIS which can be used conveniently.

4. Conclusion

While the prevailing EIS several years ago was the dial-up online information sources

and services, today it is the CD-ROM and the Internet. On the Internet, World Wide Web is playing the central role, pushing aside traditional resources like Telnet and FTP. There are many different specific electronic medical information sources available as CD_ROM and web documents. These include : Clinical trials, electronic journals, text books and reference books, medical records, medical graphiqs, systematic reviews, Evidence-Based Medicine (EBM) practice resources, Continuing medical Educatiion (CME) course resources, Decision support tools, drugs information sources, bibliographic databases, medical gateways and search tools.

The developments information Technology will continue to provide the medical community with new possibilities of information access. We can only guess what EIS of tomorrow will look and perform like and what utilization it might have. But whichever be its form, the purpose will stay the same: Timely access to information.

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