CHAPTER: 1
THE INTRODUCTION
INTRODUCTION

The pattern of health care is changing. The new organization of the health services is largely at integration of general or special practice, health and welfare services and the hospital services. It is not difficult to imagine how network of health sciences libraries be employed since such networks will provide means of controlling more effectively what goes on in the provision of health information.

The priority of health care professionals has been and continues to be taking care of their patients utilizing the most recent and relevant therapeutic and diagnostic procedures. The successful delivery of health care therefore, demands equally efficient and qualitative educational programs in biomedical and health sciences. The single most important feature of quality assurance in medical and health care mechanisms is "Education". The libraries are the foundations of educational processes and these form a nucleus. These information banks are the sources of providing health related information suitable to the individual needs of health professionals for education, continuing medical education, self advancement teaching, research and most importantly for providing qualitative and improved patient care.
Because of voluminous amount of health literature becoming available now, no single library can satisfy the diversified information needs from health professionals. The cost of reading materials is rising every single day and the libraries do not have sufficient funds to acquire most of the required materials. There is therefore a dire need for library networks, which have of late, become the essence of today's libraries, information centers and their existence. In India, scientific, technological and economic developments have not yet reached a point, wherein such a facility has become a necessity and a reality.

One can not make a mention of libraries devoted to a speciality such as biomedicine and health care without taking a full and critical account of medical and health education in India and Karnataka. Because imparting of professional education is extremely critical where no importance is given to the maintenance of a library or information service, its organization and management. Therefore it becomes imperative to provide a detailed account on biomedical and health educations.

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Medicine is one of the most privileged and respected professions of all. "To help a patient get well, to make him more comfortable if he cannot be cured, to help him approach death with dignity if he must die, is the true essence of
medicine, the vital spark of mankind" [357]. The ultimate goal in medical education is learning with a modification of behavior [180].

Ideas about medicine are not based simply on patterns of disease, scientific knowledge, and medical technology. As the history of preventive medicine illustrates, ideas and socialites also reflect the influence of political, social and economic forces.

Medicine is a learned profession deeply rooted in a number of sciences and is charged with the obligation to apply it for the benefit of human being [240]. It is defined as a human activity undertaken for the benefits of others in the care of individual patients. It is an immutable body of language, skills and tradition applicable to the preservation of health, cure of disease and amelioration of sufferings. The boundaries of medicine blend into psychology, sociology, economics and even to cultural heritage. The medical profession is "disease oriented". The attention of the practice is changing from "problem-oriented" to "problem and or risk factor assessment-oriented" [345].

Medicine is continuously changing. Its practice is far more than the application of scientific principles to particular biological aberration [355]. Its focus is on the patient whose welfare is its continuous purpose. It is a
serving profession— one that exists not for its own sake, but for the benefits of others.

Three major responsibilities of medicine have been noted [407]:

[a] To generate scientific knowledge and to teach it to others;
[b] To use knowledge for the health of individual or a whole community; and
[c] To judge the moral and ethical propriety of each medical act that directly affects another human being.

In the art of medicine, a physician must be an advocate of patient as well as the adversary of disease. The knowledge of scientific underpinning of medicine is necessary in order to marshal the basic information required to understand a patient’s illness and to be able to reason logically about the problem of diagnosis and therapy. Beyond assimilation of scientific and biomedical and health information, there is even more important consideration that the changes in biomedical science and technology are enormous and largely unpredictable.

Keeping up with biomedical, health, technological, diagnostic and therapeutic advances, has become an almost insuperable challenge for health professionals. The scientific
knowledge is not static, it continues to undergo remolding as new discoveries are made.

Since medicine is derived from a number of sciences relevant to the health of individuals or of groups, physicians must be trained as scientists to utilize these complex disciplines effectively. The physicians must be conversant with the process of scientific enquiry—how data are obtained and evaluated; how hypotheses are framed, modified, or discarded. Therefore quality of care depends upon the ability and wisdom of physicians; adequacy of facilities and equipment; access to safe and effective therapeutic agents; the quality of professional education and training and regular and proper use of clinical literature and libraries among other things.

The prevention is the key to health and its significant lack in today’s educational programs is seen in the attitude and knowledge of majority of health professionals [199]. The preventive programs will have to be based on community networks in order to identify population at risk [298]. The preventive measures must be rooted in customs. These are still largely inadequate and therefore must be integrated into medico-social strategies at all levels—governmental, communal, public and private.
The hospitals are particularly concerned with the tertiary preventions. These could as well play a very important role in primary and secondary prevention. Therefore the preventive programs must find their ways into the general or special hospital environments. The advancement of science is a social and public process [303] and every medical practice is a part of social system [274]. Mr. Rajiv Gandhi, the then Prime Minister of India stressed that the most critical need in the nation today is for human well being [373].

The practice of medicine has become increasingly academic pursuit because of the changing needs of the medical and health professionals. Judgement is central to the practice of medicine.

The major influence on physician’s philosophy and mode of their work is the matter of how well they are trained and informed of the latest advances in biomedical and health sciences, in diagnostic and therapeutic modalities. Creativeness in clinical medicine lies in adapting knowledge to practice which comes from qualitative educational programs of which libraries form a firm foundation.

Importance of a health sciences library network and its establishment for the State of Karnataka must be realized based on the requirements and observation of actual facts.
01. 1 History of Communication:

The prime purpose of literature is communication from scientists to scientists. In the biomedical and health care environment, it is from scientists to practitioners and from practitioners to scientists [170]. The relevance by physicians on information communications is often associated by the fact that information intended for formal publication takes several months to reach readers. In order to overcome these delays in publications, the physicians use informal channel of communications [399].

The important function of scientific communication is to give each scientist or researcher the information that is required. Its function is to direct the attention of scientists and researchers to the new topics other than those which they have kept a tract of. Inviting criticisms and suggestions from fellows is also an important functions of communication. There are two types of scientific communication: [a] Formal; and [b] Informal. Formal communication is one which is transferred and transmitted through published books, periodicals, reports or through the conventional channels. Informal communication on the other hand is private and is either oral or via telephone.

The scientific research is potentially open to a much more wasteful duplication of efforts because of lack of
communication among scientists. The availability of indexing periodicals and on-line databases have resolved the problems and avoiding duplications.

A handwritten book was a major source of formal communication in the past before Guttenberg developed printing in 1455 A.D and streamlines dissemination process of scientific and educated world. The books became a major sources of transmitting information to scientific community. They lacked however, speed necessary for rapid diffusion needed for priority claims many researchers sought by the 17th century.

Scientists in Europe were working and communicating through personal letters- as formal communication. Those letters were addressed to peers or leaders in particular areas and verbal exchanges transmitted the news still further. Those handwritten letters in length were read by Henry Oldenberg, the secretary of the Royal Society at the annual meetings. Oldernberg later published all letters in 1665 and called the publication as the "Philosophical Transactions" which is the first recorded journal that disseminated society’s current information.

In medical sciences, the first journal appeared in 1731. The six volumes of Medical Observations and Enquiries published between 1757 to 1784 communicated more useful
knowledge to the world than the Royal Society of Physicians of London and the Royal College of Physicians combined.

Some published their findings in book format since the publication of *Piscipia* by Newton on Optics. William Harvey’s classic work on the Circulation of Blood appeared as a 72-page booklet in 1628. The later period saw monographs being replaced by almost complete use of papers in society journals to transmit information. By 1850, the "Transactions" accepted techniques of cross reference to previous works because of paramount importance, even though only 15% of papers submitted carried any references.

By this time, the growth of subject matter forced in specialization and formed specialized journals as seen today. The use of journals as a method of dissemination has been stimulated by improved postal service. Because of multiplicity of journals as books in the 17th century, in 19th century, the same happened about the books. This growth in journals resulted in the emergence of abstracting journals and chemistry produced its first abstracting journal by the end of the 19th century. The later years of 19th and the first decade of the 20th century were associated with the development of journals which reflected new discoveries in physiology and medicine.
Up to the 2nd World War, societies and institutions published journals which grew in size and number. The research was growing faster than the number of journals available. Therefore some pure research was published in the 20th century in the non-academic journals. Up until 20th century, the journal was still an individual dissemination tool. The scientists received their own copies of journals by virtue of their membership to societies.

After the end of 2nd World War, the professional society’s journal competed with commercially published journals. Individuals belonging to more than one society had access to journals, and no one could practically afford abstracting service. The efforts to provide bibliographic control of the literature led to an increase in the number of indexes, abstracts and other guides to the literature in the nineteenth century. The 20th century brought the introduction to highly specialized abstracting services—noteworthy, Chemical Abstracts in 1907; Biological Abstract in 1928; and "Excerpta Medica" Series after the 2nd World War; and the beginning of Index Catalog in 1879 [82].

Thus the post-war era saw the rapid growth of libraries to provide information to individual users. The sheer growth of the published information and its attendant cost ensured that information dissemination is institutionalized to a very
large extent. The growth of journals led to delays in publications and in turn led in many fields to new forms of letters and short note bulletins which resulted in alternatives to journals—microfiche, microfilms, supplements, etc.

Books ceased to be the major disseminating tools in science in 19th century as speed and convenience of the published papers became apparent but remained important part of communication by distilling works of journals into a more usable monograph format. In recent years an extension of monographs have been research reports which are the results of involvements of governments, societies, and the industrial research, etc. that needs to be disseminated.

It is a major worry of scientists that referring is most crucial to the quality control of science and thus the publication system that escapes quality control constrains are to be spurned. The publish or perish attitude in many research formats and the long time lag existing in journal publishing seems to stimulate the growth of the report format.

Informal communication has affected scientists and scientific members considerably as they communicate verbally or personal contacts in workshops, seminars, continuing education courses and conferences. The present day communications favors such informal channels in addition to
published communication. The foundation of Information Exchange Groups [IGEs] was favored because of this uniqueness.

Information Exchange Group [IGE] was set up between 1961-1967 and was financed by the National Institute of Health of the United States of America. There were a number of IGEs working in the United States to utilize the concept of an invisible college by streamlining communications and dissemination between a small group of scientists in a tightly defined subject group or area.

This program was ceased in 1967 due to lack of resources and criticism from traditional publishing channel, even though the concept was working with its drawbacks [154]. Such informal communications accounted for over 22% scientists obtaining information crucial to their research [146]. It is estimated that 48% of papers presented at conferences have never been published and that the information has been lost [230]. It is very important that scientists communicate with each other either formally, informally or face to face to share the important information.

It is an information-dependent society. The business sector is prompting use of new communication technologies to close the gap between an existentially expanded information base and its efficient management.
It is well known that an era has been reached called
"Little Science Big Science" [98] with the scientific
community becoming one of the major groups which is recognized
both by the librarians and the scientists. DeSolla Price's
[96, 97] theory of information suggests doubling of the amount
of published information every fifteen years, but some see
slowing down in the "big science" growth [11, 370].
Information is vital for rapidly changing and highly cost-
oriented society, and no techniques to obtain or exploit
information is regarded as too specific or extravagant [325].
Adaptation of technology to manage world's biomedical
knowledge and information base should be a national concern.
The most important function of scientific communication is to
give each researcher and scientist what they need [136]. The
scientific communication bound to science so that the
production and dissemination go hand in hand [264].

Irrespective of whatever mode between the scientists and
researchers, it is worthy to note that communication has and
will effect every aspect of research and advances in the
science and technology.

01. 2 Impact of New Technology:

The technology adaptation follows a pattern; in the first
stage it replaces manual traditional methods; activities are
performed faster and more efficiently. In the second stage, it
fosters new applications—things are done that were never done before; and in the third and final stage, the technology transforms or changes life style. For example:

*Telephones used to transfer voice only.*

*Today these carry digital text as well as voice and image messages.*

The newest technology that has influenced the libraries all around the world is Compact Disks—Read Only Memory [CD-ROM] which carries over 550 Mega Byte of information in one single disk or up to 275,000 to 300,000 of printed pages [71]. Browsing through this intensive data is made more pleasant by virtue of the fact that no long distance telephone calls charges or main frame computer access charges are involved. The health sciences library are fortunate to have this technology at their disposal at extremely reduced cost.

The MEDLINE [MEDLARS ON-LINE] index 6681 journals [124], and over 51.2% articles are in English [399]. It was not possible for an average health sciences library to utilize this extremely important database in health sciences because of huge cost involved for its instillation and access.

For e.g: The MEDLINE hooked directly with the US National Library of Medicine via Telephone was costing, in addition to the local, trunk and International calls, heavy sums for its access through local terminals. A thirty minutes of on-line
searching would cost about US $50 during non prime time excluding telephone calls. Besides this, the library has to spend resources for training of the professionals in MEDLINE strategies for searching and formulation of search strategies.

Since 1988, when MEDLINE files have became available on CD-ROM disks, a one time subscription fee of US $3000 per year will put all MEDLINE data from 1966 to date at the finger tips of the health sciences librarians. Some agencies such as SilverPlatter offer a 50% discount on second subscription to Medline on CD-ROM. There is no time limit for its use and no expenses are involved. In a survey 83% of the users of a library found MEDLINE on CD-ROM useful to learn and use [147]; Other surveys indicate that 88% of users recorded use of MEDLINE on CD-ROM between satisfactory to very satisfactory [51, 53, 310]. Major vendors in CD-ROM information technology have designed simplified versions of their systems at reduced rates with wide spread use of personal computers- the PCs [36]. A detailed report in its use in health sciences libraries in WHO Mediterranean Region has been presented highlighting the requirements and benefits of this technology [158]. Its effect on users is impressive [178]. The CD-ROM technology has created a new environment for end-users searching in health sciences libraries. Over 85% of libraries
with CD-ROM installation conduct end-users training in the US [320] and searches using this technology has significantly increased. Brahmi and Tyler [51, 53] concludes that there is a decline in mediated searches and increase in the CD-ROM uses of MEDLINE.

The role of information technology concerns contents, but even more importantly, it concerns the method of education [256]. Without information, countries neither can develop, nor can stay developed [231].

01. 3 Information as a Resource and Commodity:

Information is a data of value to the decision making process [391, 412]. Information has now become a commodity to be bought and sold. During the last five years over 600 information files have become publicly accessible on-line through computer terminals.

Two traditional concepts are being reshaped by the new information market place:

[a] The acceptance of information as an overhead expense that should be freely available without fees to all sectors of society, is giving way to the concept of information as a basic commodity- an essential power source much like gas or electricity; and

[b] One-time purchase of information for subsequent reuse. For example. a Book. The television did not do away
with movies, but did eliminate news reels; electricity did not do away with candles, but did eliminate the gas lamp.

The value of information is changing rapidly and will be exclusively available in future through on-line access. The economic and social impact of this trend has been increasing continuously. The information system serves an individual with a certain cognitive style faced with a particular decision problem in some organizational setting [255].

The academic centers as knowledge industries, have literally contributed very little to the technologies of information management and its use. These have now begun to respond to the challenge of information management for teaching, learning and research. How deeply the new technologies will affect the academic community is a subject of growing concern. There are some barriers in achieving the desired goals such as: pressing financial limitations and the aging physical plants, obsolete laboratories, equipments, increased operation costs and soaring cost of information resources.

These hamper the academic community's ability to respond to the challenge of narrowing the gap between technology and its application. The actions needed to overcome the above barriers are: introduction to newer technologies and automating information transfer etc. Without doubt information
is an organizational resource that is vital to the development of effective, efficient development and manufacturing of products and services. For example:

The treatment of choice for the
Kidney Stone was Surgery in the
past; presently, Shock Wave
Treatment or Lithotripsy has
revolutionized the treatment.

The academic institutions—schools and universities have added responsibilities. The faculty and staff need the best and most advanced information technology to carry out their research and teaching. The development and stewardship of knowledge, is the intellectual foundation of scientific endeavor and cultural advancement.

The organizational information resource supports the provision of patient care, records, medical information, and laboratory etc. The academic information base on the other hand, includes an array of information files that faculty and staff use. For example: Libraries, Personal Information Records and Instructional Materials, etc.

The explosion of biomedical and health information will continue to confront faculty and students and the selection of information for storage and retrieval will be a challenge so will be understanding of information.
The following equation will give some idea as to the development and generation of new knowledge [57] [Fig.1]

\[ \Delta I + [S] \rightarrow [S+ \Delta S] \]

[Fig. 1]

Where "S" is knowledge structure which is modified by the Information Input \( \Delta I \) to give a totally new knowledge structure \([S + \Delta S]\).

The vast information now available has prompted the information industry to find ways and means of retrieval and dissemination of required subsets in the specialized fields. As a result of this trends the information industry is competing in bringing out the State-of-the-Art technology that is applicable to the information. Several information vendors have researched and have successfully transformed the information data on on-line databases. In 1979-80, there were 221 database producers with nearly four hundred databases of which 59 were On-Line. In 1988 this number has jumped to about 1700 producers with 3699 databases and 555 being on On-line.

It is always true that not all the databases may be applicable to the biomedical and health sciences and as such the number of On-line databases is much less. This is because schemes appropriate for some users are not relevant for
others. Therefore it becomes essential that only those databases with valid, relevant and information of quality be searched and access sought.

01. 4  Essence of New Knowledge:

The field of biomedicine with its new developments in the therapeutic and technological approaches is moving rapidly. This great outpouring of new information requires that the studies of the very highest quality be disseminated into medical practice as rapidly as possible.

The printed biomedical commendation has several purposes: [a] placing on the record the original research of hypothesis; [b] review of progress in various fields; and [c] continuing presentation of views from physicians, researchers and medical educators about their research and experience which they feel will benefit others by sharing.

The rapid increase in information has forced a change in medical education. Many biomedical facts are too quickly outdated to be of long term use. Every researcher has two sources of published knowledge: [i] His own background knowledge and readings; and [ii] What he or she looks up specifically for the work in hand. Background knowledge has limitations because of sudden changes and future needs which are unpredictable [389]. The biomedical literature is expanding at a compound rate of 6-7% and it doubles between
every 5-15 years [96-98, 378] and ten folds every 35 years. It has been documented that the total number of medical journals almost doubled between 1960 and 1975 and the climb looked very much like an "information explosion" [190]. It will continue to confront faculty, students, practitioners and the health sciences librarians in the selection of methods of information storage and retrieval and will be a challenge and so will be the understanding of information. The information explosion has crippled the entire health care industry. The health professionals, health educators, the libraries and the librarians are very much concerned about the explosion. Many journals carry 20-30 articles per issue, which present problems to physicians. This is because of the scattered information in a much larger range of journals and books. Porter [307] estimates that there were 750,000 articles published averaging 85 articles per hour. He also estimates that by the end of this century, according to the publishing speed of 1964, there would be over 3 million biological science articles or 320 articles per hour published. All are aware that the speed of information explosion has increased in geometrical progression and the total number of articles as estimated by Porter looks extremely meager. It would not be exaggeration to predict that it would be between seven to
eight million articles or average 600-700 articles per hour by the end of twentieth century. Porter beautifully warns:

"We have reached a period in science somewhat similar to that encountered by our colleagues of 300 years ago. Creative and inventive minds must now discover new methods for coping with the scientific literature. If this is not done, science will face real crisis within a generation and may suffocate from its own immense production".

This means that more time and efforts are needed to comfortably ensure that valuable information is not being overlooked by clinicians and researchers in the health sciences. Huth [190] concludes that new methods for storing, seeking and delivering information should be designed so as to deliver only the needed information and no more – information highly specific to the needs. which is valid. The information requirements of the medical research worker are unsatisfied by the current information resources [82].

Huth [191] has given an equation that would help understand the importance of specific information of high value [Fig. 2]:

```markdown
// Equation for specific information importance
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\[
\text{VALUE} = \frac{\text{UTILITY}}{\text{COST}}
\]

[Fig. 2]

The utility of information system can be judged by the answers to specific questions and how efficiently it delivers the answers. How relevant are these answers; Has the system delivered all answers - none overlooked ?; does the system deliver answers with efficiency- with speed ?; are these answers in right and easy to use format ?

The above equation is further expanded [Fig. 3]:

\[
\text{VALUE} = \frac{\text{Relevance + Thoroughness + Efficiency}}{\text{Cost}}
\]

[Fig. 3]

The cost is made up of "Purchase Cost" Plus "Access Cost" which is nothing but processing cost, obtaining cost, utilization cost and time involved.

Both the Retrieval and Utilization Time are also cost.

If a lot of time of value is required to search and produce information required by user on a simple or a complicated topic, it is high cost. It is therefore necessary
to reduce both purchase and access cost in the above equation. The searching method should be as cheap as possible; i.e. less time in searching and providing information. This will happen only when the library staff is trained to entertain the varied nature of requests for searched on clinical topics and are aware of the search strategy. It is also important to train the library staff in the proper usage of library resources. The utility of information is the need.

The practice of medicine is dominated by how health professionals process, record, retrieve and communicate information. Masys [256] estimates that there are over six lakh articles published in one year in biomedical literature and if a conscientious health professional regularly read two articles per day, in a year he/she will be 800 years behind in assimilating knowledge. Yet another study indicates that if physicians were to attempt to keep up with the literature by reading 2 articles per day, in one year they would fall behind 55 centuries, as there will be 2 million articles published annually; if they were to read every thing of possible biomedical relevance, they would required to read 5500 articles per day [24]. In 1964 it was estimated that 750,000 articles published or 85 articles per hour [307]. Any useful approach to reading the biomedical literature must be built on, and be compatible with, the clinical training. The
standards for selecting and summarizing article from periodicals of clinical importance to practitioners have been suggested [287].

The physicians use information to stay informed of the latest developments in biomedicine [24, 75, 86, 87, 363, 368]. The health professionals handle differently their patients in absence of information provided by libraries and that due to this information they performed better-informed clinical decisions [207]. Conclusive studies in favor of proper use of libraries, and periodical literature are available [172-177, 282, 402].

The medical information is a developed body of knowledge and a set of techniques concerning organization and management in support of medical research, education and patient care. It is recommended that the medical information should be an integral part of medical curriculum [12]. Knowing where to obtain information is as important and beneficial as actually committing information to the memory.

The health sciences libraries have accepted the continuing challenges to provide health care community with all information relevant to the advancement of teaching, research, for ensuring better and qualitative patient care in the communities. The information explosion has continued to dominate and baffle the libraries, and information centers on
one hand, and the librarians, and the health care professionals on the other.

The sophistication of biomedical, health literature and knowledge will increase tremendously in the years ahead and will become an integral part of the way people live in the communities. The information is generating with great speed. There is a risk that the information system available currently is best suited to yesterday’s needs [360].

The health professionals have difficulties in applying more than a fraction of new knowledge [171]. The physicians learn about the latest medical advances from journals, CME and their colleagues [246-248].

A survey indicates that 40% of physicians were aware of the latest advances in medicine within two months period, and majority learned these from periodicals; over 60% of physicians became aware within six months of the discovery; and 40% were informed through the CME courses [368]. In another survey the results of a demonstrated benefits of Photocoagulation in treating diabetic Retinopathy were not used by physicians whose 50% practice involved diabetic patients for over 18 months [114]. There are studies to show the impact of new knowledge on physicians’ behavior and mode of treatment which changed to considerable extent after reading recent articles [23, 88, 150].
The surveys have indicated that physicians who work in small hospitals and those who do not interact with medical students are more likely to read unsolicited literature and less likely to use libraries [87]. It has also been revealed that physicians claim to spend three hours per week in reading periodical literature. Another study reports that physician spent 5.5 hours per month reading journal articles [75].

A low cost alternative for physicians to supplement to journal subscription and a personal library with minimum collection of possible relevance is to set aside time each week at the least to visit the nearest health sciences library. It is advisable for busy clinicians to spare at least 2-3 hours per week in one stretch in the library that will keep medical knowledge in fine fettle.

The patient management of physicians depends largely on the relevance and validity of biomedical information used in clinical decision making. Adequacy of current information management is a controversial issue in the CME of physicians. It is noted that practitioners have serious problems in keeping with knowledge advances in assessing information for use, due to lack of time and at times questionable quality of medical literature [394]. The medical educators' main concern is to determine the existing gaps in clinical skills and knowledge of physicians.
The three basic functions of information management are:

01. Identifying biomedical information needs;
02. Obtaining the needed information; and
03. Determining the scientific value of the information obtained.

Williamson's surveys [394-395] expose that over 66% of physicians claimed their inability to manage the flow of literature, and he concludes:

"...It is clear from this data that physicians face a serious problem in their effort to keep current with recent medical advances. Science information is a critical professional skill that is not adequately taught in undergraduate medical education".

The average adaptation time of new drugs ranged from 29.8 weeks in group practice of 5-6 doctors to 76.62 weeks in solo practice [395]. These studies will help dissemination of innovations in medical practice and help physicians understand the communication of new biomedical findings and improve quality of medical care.

The US NLM received during 1987 a total of 22071 periodicals and serial of which only 12.6% or 2788 were included in the Index Medicus as against 14.3% in 1978. A total sum of $945,288 out of PL 480 is spent and of this
India's share was 60%. Only 20% of these funds supported the secondary literature tools such as bibliographies, handbooks, and biomedical guides, etc [187].

Because of the information explosion and its impact on the health care professionals, the US NLM increased 20% periodicals and serial titles from 18169 in 1978 to 22071 in 1987. The investigators have documented lack of awareness to several recommended procedures by physicians in clinical settings because newly generated critical information are not applied to patient care [368-369, 394]. One of the most important problems in the dissemination of biomedical literature is that the peer-viewed clinical journals try to serve a variety of audience [170]. While it is fact that many important advances in medical care are first reported in the biomedical periodicals, clinicians find the literature overwhelming and therefore, are often unaware of the advances.

It has been documented that most clinicians lack the time [76, 394] and skills [21] to appraise the studies of clinical importance published in journals.

01. 5 The Statement of the Problem:

The scope of medicine has no discrete boundaries. The practice of medicine is one of the most respected professions of all and the authorities right from Sir William Osler on to the present day, have advocated and spelled the true essence
of medicine, the purpose of this divine profession and the role a physician must play in communities. The excellent practice of medicine entails the transfer of medical knowledge to the care of patients, and is dependent on the sum total of medical knowledge. Advances in medicine depends on the acquisition of new information and the medical practice requires the transmission of this information on to the patients. Medicine is "reliable knowledge" and a science with a purpose— the Improvements in Patient Care [355, 407]. When reliable recent knowledge has been used to improve patient care, the records show that scientific medicine has been a resounding success.

The physicians must develop skills to communicate with communities. Since the physicians come into direct contact with large masses of people, they are in a better position to communicate messages that can help prevent diseases and other serious conditions. Being able to diagnose correctly is a good test of medical competence; and being able to tell the patient what he or she should know about the disease, is a good test of medical artistry [340]. A combination of medical knowledge, intuition and judgement is termed as the "Art of Medicine" [355]. The therapeutic maneuvers are a major part of medical practice. The physicians must be primarily concerned with the unique individuality of the patient whose welfare can not be
defined as the simple integral of formidable disciplines into which medical science has been conveniently but arbitrarily segregated.

As the advancements in medical information have exploded, remarkable changes have taken place in diagnostic and therapeutic fields including innovation of newer equipments, data collection and classification of disease [314].

It is necessary to formulate a National Medical and Health Education Policy in India which will set out the changes required in curriculum and training programs of health professionals [358]. There is a need to relate medical education to the needs of communities [349] and to achieve this, there should be an effective and intelligent curriculum contents of health education [383].

The hospitals are the backbones of an organized society and health care system. These are mushrooming year after year in the state. What do the people and communities expect from these hospitals? The answer and expectations are self evident—high quality treatment and patient care. This means that the latest technology and methodology are needed for use which are economical. Every one feels that they need expert physicians to help them and back the health care with improved skills, current knowledge and its application in the treatment of the sick.
New diseases, treatments, drugs, technologies and different expectations on the part of users and providers of health services are forcing health professionals, planners, managers and the governments to rethink the traditional health care model. Presently the diffusion of information is greater than ever thus giving rise to more awareness and expectations. The traditional hospitals are rapidly evolving towards a broader concept, namely the totally integrated health centers. The regulation of health service provision, with the objective of protecting health standards and the right of consumers have a long history.

Biomedical sciences have spawned an astonishing array of genuine advances and health care that can prevent disease, save lives, reduce disability and relieve sufferings [171].

01. 6 The Objectives of the Study:

06. 6. 1 Indian Scenario:

The scenario in the nation as regards to the development of libraries and information centers is different than that in the developed countries. The situation in academic libraries—especially of the university libraries is much better than some special libraries due to the timely and regular financial assistance from the University Grants Commission [UGC]. Some special libraries with the exception of biomedical or health sciences libraries are also categorized as academic libraries—
such as faculties of science, technology and engineering libraries. These libraries have also been granted huge financial grants by the UGC on an annual basis. It is only the health sciences libraries that have been neglected while granting financial assistance. There are occasions when the medical school libraries have been granted sums up to ten thousand rupees off and on which have helped very little either in collection development or in upgrading or purchasing equipment or furniture.

The University Grants Commission has proposed for an establishment of INFLIBNET in the nation during the eighth Five Year Plan- 1990-1995. This proposed network covering all the university libraries and five hundred colleges including selected R & D institutions will cost approximately an expenditure of 157 million rupees for the first four years [193].

It is gratifying, however to note that the Working Group [WG] of the Seventh Planning Commission [319] has recommended to modernize the entire library and information science field- public libraries, academic libraries, science libraries and special libraries during the Seventh Five Year Plan: 1985-1990. The WG recommended a sum of 9,960 million rupees for modernization of library services and for the development of informatics which are essential for the overall socio-economic
development of nation; lack of sufficient funds; that there are insufficient resources in libraries to meet needs of users. There as lack of facilities- furniture and equipments; lack of library services in many parts of the nation; there are problems in attracting the right professionals for the job in the field; there is a need for the development of cooperative endeavors and resource sharing; and need for the diversified educational training programs for the professionals in the field of library and information sciences.

A sum of two thousand million rupees has been recommended out of the total Rs.9,960 million or 20.08% for the exclusive use of special libraries and information centers in science and technology. The WG has recommended 500 million rupees for the exclusively for the National Libraries including the National Medical Library New Delhi.

It has also made a provision of 1,500 million rupees for libraries of universities and higher education; and for technical libraries a further 800 million rupees.

It is worth noting that the WG made provision of 600 million rupees for the National Networking of Libraries besides 750 million rupees for acquiring computers for libraries. The Library Associations in India are provided ten million rupees in grants under this recommendations.
To discharge the responsibilities effectively and efficiently, the WG recommended that special libraries must have strong document collection; must have qualified staff and various physical facilities. The need for larger budgets have become essential in view of the escalating cost of books and periodicals. It considers 10-15% of total institutional budget for libraries as essential.

The WG also recommended resource sharing and a national network on the following basis:

[a] Common objectives;
[b] Shared knowledge;
[c] Compatibility among the operations;
[d] Practical working arrangements for collaborative efforts to increase and accelerate information flow; and
[e] Each participant should have access to several sources in the network and thus facilitating better information service to users.

Important aspects of cooperation remains in the adaptation of compatible standards and methods of information handling, techniques, and tools, etc.

According to the WG, the objectives for a national network are:
** Cost effective information storage and maintenance;
** Optimum utilization of existing library information system;
** Provision of Current Awareness Services with minimum delay;
** Maintenance of an Union Catalog;
** Interlibrary Loans;
** Cooperation among member libraries;
** Access to information sources both within and outside the country;
** Evolution of a National Standard for information handling;
** Promotion, Research and Development, innovation in information technology;
** Provision for document transmission facilities;
** Translation facilities;
** Maintenance and governance of Network;
** Development of proper CE courses for professional staff in the faculty of library and information sciences; and
** Adaptation of new techno-economical solutions.
The WG maintains that there are two major tasks for the national network: [a] Identify present information requirements of users at all levels and forecast future requirements in the light of National Development Plans and Policies; and [b] Develop existing libraries and information systems, their information resources and services and provide new ones where necessary, according to present and future requirements of users through effective cooperative acquisition, processing, storing and retrieval programs.

In Karnataka with little tradition of libraries and library users, it is difficult for government or the managements to approve of years of outlays of money without much visible returns for the investment.

It is beyond one's imagination that the health professionals in the state with a very strong and impressive network of health care institutions should have any problems concerning the storage, retrieval and dissemination of current biomedical and health information critical to the needs of professionals engaged in preventive and curative aspects of health care.

As embarrassing, as discouraging, as painful, and as pathetic it might be, the working of libraries in the institutions of the is slow, poor and awkward. Instead of bridging a suitable gap between the physicians, clinicians,
health educators, researchers and the right, timely and current information, the libraries and the readers are drifting apart.

Therefore the objectives of this study are:

[a] To survey comprehensively the state of art in health sciences libraries;

[b] To point out the existing draw backs and problems in:
   ** Collection Development;
   ** Service Patterns;
   ** Personnel;
   ** Cooperation and Resource Sharing;
   ** CE for Library Staff; and
   ** User education programs;

[c] To find practical solutions;

[d] To propose suitable strategies and a model;

[e] To draft a Blue print of the network structure for consideration for the implementation by the concerned authorities.

01. 7 The Material and Methods:

Survey method is used to collect the relevant data for this study. A combination of both written questionnaire
supplemented by reminders and personal visits to the libraries
is used to gather information and data required to evaluate
the working and the state of art of health sciences libraries
in the state.

The surveys are the diagnostic procedures to pin point
the existing problems to know the existing status in an
environment. When these are supplemented with personal visits,
interviews and discussions, the responses that are obtained
will convince the researcher that the information that he/she
is seeking and has obtained will indicative of the true state
of art of the health sciences libraries. The surveys can gauge
the use made of library services and possibly even the
attitude of the community it serves, but these will never be
able to measure the "value" of a library.

In planning a survey, it is wise to enlist expert
opinions. One must define:

01. What do we want to know;
02. Is the survey necessary;
03. Is the survey most appropriate ?;
04. Will questions or interviews yield most
information ? etc. etc.

01. 7.1 Questionnaire:

The purpose of questionnaire is "measurement" [285]. The

critical dimensions of the problems were carefully thought and
it was possible to determine the kind of data needed [194, 382].

The most critical aspect of data collection is the way questions are formulated and asked. The studies have shown that a slight change in the wording of a question will produce substantial change in character of data collected or generated [137, 277, 299, 356]. A question that strikes the respondent as rude or inconsiderate may affect not only his/her reply to that particular question, but also the attitude to the next few questions and to the survey as a whole.

Therefore the survey contained a series of 82 questions in a carefully designed questionnaire. These were free-open, closed-type and short. Due consideration was also given to the layout, printing, choice of paper and spacing in the questionnaire. A rapport was maintained both by telephone, letters and personal visits.

The questionnaire was mailed to 74 health sciences libraries of the health care institutions- teaching colleges- in the state- both government owned and privately managed. These were addressed to the Principal or the Dean of the medical or health schools. Two copies of the questionnaire were sent.

The personal interviews are considered in such surveys, essential to know and to gather first hand appropriate
information about libraries, their services, the users and the librarians in these institutions.

01. 7. 2 Interviews:

A comprehensive regional plan, assessing the biomedical and health information needs of the professionals of Karnataka was an essential part of the proposal including interviews with both librarians and user community.

The personal visits revealed hesitation on the part of librarians in responding to the questionnaire in writing. Some librarians, who at first, refused to share information on their libraries. On frank, open, careful and friendly discussions with them, it was possible to obtain direct or indirect answers to questions on the working of libraries, services offered, working conditions and users. Even with several personal visits and appeals it was only possible to obtain responses from 44 libraries out of a total of 74, making the responses of about 62%. The usable data was available from 41 libraries.

Since the user community dictate the way a library and its services must be planned and organized, it was essential to interview personally the user community consisting of:

01. The Principals/Deans of Medical Colleges;
02. The Chiefs/Administrators of the Major Hospitals;
03. The Heads of the Clinical Departments;
04. The Postgraduate students in medicine; and
05. The Clinicians—Physicians, Surgeons, etc.

For the health professionals, their colleagues are the information sources and the libraries to them are a place of the last recourse rather than first.

Active information service is the province of any special library [325]. The responsibilities of librarians have grown. The scope of services to be rendered has widened and at the same time funds are stagnating or being reduced. In such times, new schemes for cooperative efforts and implementation will enable the librarians to meet the challenges. A new role for health sciences librarians in the nation is required.

Rapid progress of knowledge and technology in all fields of medicine and the recognized need for an inter sectoral approach to problem solving and decision making in matters concerning health involving other disciplines require an acceptance of libraries of the above role. New communication and information technologies have brought changes specially to health sciences libraries altering fixed concept of library organization.

The information authorities have urged the health sciences librarians to carry on the localized operation by
means of cooperation among libraries in various regions of the world [380].

The health sciences libraries are presently facing twofold challenge to:

01. Adapt to new services that are required to provide using all available technical resources; and

02. Do so without requiring additional resources.

This rapidly developing microcosm, bringing together a magnitude of interests has begun to realize the problems and the new roles being expected to assume. This has created a number of technical and financial problems, the solution to which often needs a wider context, if the responses are to be optimum and rational. In other words, what is needed is a greater cooperation, both from one library to another and with the other constituent elements in the libraries.

01. 8 Limitation of the Study:

It is extremely difficult to carry on a research study such as the present one without adequate literature on the subject that is applicable to the problems in a field. During this project the research was hampered first and foremost because of the non availability of adequate information both published and unpublished on Karnataka health sciences.
libraries in particular. Generally there are hardly a few article that have been published on the development of a library network in the country. It was therefore imperative that efforts were made to gather literature on Library Networks in the developed countries, mainly the United States. Though the problems in the profession are quite different and have different stages in India and the US, it was possible to gather information on the silent features through the literature and the applicability of variant forms of solutions in the development of a State-wide Network of Health Sciences Libraries.

The other problems or limitations imposed on the study were the non-cooperation by professionals working in the libraries of the State. The simple mailing and waiting for response method did not prove fruitful and therefore, several personal visits were conducted to these libraries. Even the Librarians of several institutions hesitated to provide written information that would be useful in the research.

Therefore a face-to-face interview was conducted with all these librarians. These interviews were arranged after approaching the Deans and Principals of colleges. The principals and the deans were briefed about the problems the college libraries and the health professionals were facing and their inability to obtain the required health information from
the libraries. It was explained to them the inability of their libraries to provide information to them in view of non availability of resources—funds and reading materials. Then they were briefed about the project that a network of health sciences libraries is helpful and will resolve the problems. These authorities were convinced and their librarians were directed for an interview.

A study such as the present one can not accomplish anything unless there is cooperation among the researcher and those providing information on the status of the problems. Thus the present study lacked adequate cooperation and required information from libraries that would have further depicted the states of affairs in libraries.

01. 9 Chapterization:

The dissertation contains nine chapters. Chapter 1 includes the Introduction, which highlights the importance of biomedical and health education and the requirements for a library dedicated to the speciality. History of Communication, Impact of New Technology, and Essence of new Knowledge is also covered in this chapter. Chapter 2 gives accounts of the biomedical and health education in general, and its state in India and Karnataka. The physiomorphology of is also presented in this chapter. Chapter 3 reviews the available limited literature.
Chapter 4 is the highlighted section in the dissertation. It includes material on the Health Sciences Libraries, their scope and functions, Users, their needs and education. The collection development in these libraries comprising of books, periodicals, and audiovisual materials is covered. The personnel and services that are essentially in the domain of these libraries are highlighted. The resource sharing, cooperation and Interlibrary Loan that have now become an essential ingredient of these libraries is discussed. The job descriptions for a variety of library professionals is given.

Chapter 5 contains the Survey and its Analysis. It gives introductory remarks on the survey, and its analysis. The methodology used in the survey, tools and techniques applied are given. The chapter contains the findings of the survey which helped propose on an urgency the requirement for a health sciences library network for the state if improvements both in the medical and health education, patient care, research, continuing education, the libraries, services and the professionals are to be seen in a near future.

Chapter 6 explains the Library Network structures and the types of networks. It also explains the need for a health sciences library network for Karnataka. The financial resources required, management mechanisms and, manpower
requirements are explained. The benefits of such a facility are highlighted.

An evaluation mechanism for the network is given and its importance on the overall effect of the library network in Karnataka is discussed. The chapter also proposes "Circuit Librarians" for small hospitals and primary care centers without any library and services.

Chapter 7 contains the specific proposal for the state of Karnataka for the development and management of a Health Sciences Library Network. It is suggested that the model proposed will be compatible with the National Health Sciences Library Network when established. It will be absorbed as a region and the libraries will continue to function as before, with the approval of the Regional Network Authority and the State Government.

Chapter 8 concludes the dissertation highlighting the project. Chapter 9 forms the bibliographical section with alphabetical listing of references cited in the dissertation.

The appendix contains a Glossary of the Terms used; Questionnaires used for libraries and the Users during the research. Sample Job Descriptions developed for Professionals, Semi-Professionals and Supportive Staff are appended. An organizational chart is given for a typical health sciences library.