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## A comparison of users and search subjects before and after the beginning of MEDLINE at the Iowa State Medical Library

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## A comparison of users and search subjects before and after the beginning of MEDLINE at the Iowa State Medical Library

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#### Abstract

The research in this paper is directed to the evaluation of changes brought about in the library search services of the Iowa State Medical Library by the addition of the use of the MEDLINE (MEDLARS on-line) computer. Nine hundred ninety-eight search requests were analyzed for two time periods of eight months each. The first time period included manual searches only and the second time period included both manual and MEDLINE searches. The information compiled for analysis included: the user's occupation; the subject request; whether a manual or computer search was requested; and the computer costs involved for each request.

The study revealed some increase in the number of user requests. The major findings included hospital personnel, state agencies, and attorneys were the three leading users of MEDLINE and Polk county and Linn county had more than a ten percent increase in search requests that might be attributed to the addition of the MEDLINE computer service. There was a decrease in the percent of requests in the "disease" medical subject category amounting to over ten percent. The paper includes two tables and two maps. The user's geographical location provided information on user distribution in the state of Iowa.

A COMPARISON OF USERS AND SEARCH SUBJECTS BEFORE  
AND AFTER THE BEGINNING OF MEDLINE AT THE  
IOWA STATE MEDICAL LIBRARY

A Research Paper  
Presented to the  
Faculty of the Library Science Department

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts

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Joy Averill  
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## ABSTRACT

The research in this paper is directed to the evaluation of changes brought about in the library search services of the Iowa State Medical Library by the addition of the use of the MEDLINE (MEDLARS on-line) computer. Nine hundred ninety-eight search requests were analyzed for two time periods of eight months each. The first time period included manual searches only and the second time period included both manual and MEDLINE searches. The information compiled for analysis included: the user's occupation; the subject request; whether a manual or computer search was requested; and the computer costs involved for each request.

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## Chapter 1

### INTRODUCTION

The State of Iowa has a unique small medical library that has been in existence since 1919. It is located on the second floor of the Historical Building in Des Moines, Iowa. At the present time it is a department of the State Library Commission of Iowa and is housed in the same building. Serving the entire state as a special health science library the medical library users include doctors, lawyers, nurses, other libraries, other state agencies, and students. The popularity of the medical library is steadily increasing.

There are increasing numbers of the elementary and secondary school nurses, teachers, and students who use the library facilities. Most often the school librarian telephones for needed information. As Iowa residents they borrow books and are interested in journals containing articles on current issues in health. The staff provides library orientation and group tours so they will become better acquainted with services of special libraries. Students frequently write letters requesting searches on topics for their reports and term papers.

The medical library is supported by public funding and is comparable in structure to other Iowa State Libraries.

Small in size with a book collection of over eighty thousand accessioned titles and subscriptions to over six hundred continuing serials and journals, the library was originally designed for preserving the medical history of Iowa and then to supplement the current materials of hospital and other special libraries. Most of the historical materials have been collected by donations from users through the years.

The medical library belongs to three important and functioning organizations that create a network for interlibrary loans, telecommunications, and literature searches. They are: The Midwest Health Science Library Network; the Iowa Library Association; and the Polk County Biomedical Consortium. The first is Region VII of the network supported by the National Library of Medicine (NLM) and has headquarters at the John Crerar Library in Chicago. The primary function is facilitation of interlibrary loan services and regional planning for medical libraries in the Midwestern states. This same area is also a division of the Medical Library Association which holds meetings for medical librarians once or twice a year. The second organization is concerned only with Iowa and has a "health sciences libraries" section that meets once in the fall and once in the spring. The group participation is excellent, and each meeting has an educational type program. Here again services discussed at the meetings are usually concerned with interlibrary loan processes and consultant services. Membership in the third organization, the consor-



tium, is limited to the health science libraries in Polk County and some agencies in surrounding counties. This group has a nonlegal structure and is supported by individuals rather than institutions. The functions are varied and represent federal, state, and privately supported libraries whose representatives have organized to form a cooperative interlibrary loan and research network. The group meets once a month in a rotating manner at a library for a brief one to two hour session of planning and an educational type program. One committee is currently working on a union list of serials. Most of the business takes place over the telephone.

The State Library Commission of Iowa is also a federal government depository library and the Medical Library receives as a result of this the National Library of Medicine's Index Medicus and other government publications free of charge.

In addition to the usual services provided by state libraries of loaning books and journals across the state, the Medical Library now makes MEDLINE computer searching available. The MEDLINE system (MEDLARS-on-line) is a speedy and convenient information system and a welcome addition to the library. In 1965, the National Library of Medicine in Bethesda, Maryland, established MEDLARS (Medical Literature Analysis Retrieval System). A data base taken from the Cumulated Index Medicus, it was computerized and successfully operated for several years. The data base was shipped

in tape form to the network centers that were responsible for a designated area. The data base was updated monthly. The tapes were used for retrospective searching. This was accomplished by trained analysts who prepared search strategies. The searches themselves were run at one of the MEDLINE centers.<sup>1</sup>

The conversion of the off-line MEDLARS to on-line MEDLINE occurred in 1971. At that time about twenty thousand searches a year were made nationally. The use of the data base increased to about twenty thousand searches a month after 1971. MEDLINE is designed to cope with the growth of biomedical publications and uses the Index Medicus and other indexes like the Nursing Literature Index as the base for searching on-line.<sup>2</sup>

The MEDLINE computerized system retrieves references and a complete search can be done in about fifteen minutes of on-line time. The amount of time will depend upon the search analyst, the subject headings, and terminal access. A search requires a highly trained person and is a time-consuming technology. In addition to using terminology from Medical Subject Headings (MESH) it is possible to search by author's name, words in the title, publication data, lan-

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<sup>1</sup>Lancaster, F. W., Toward Paperless Information Systems (New York: McGraw-Hill, 1978), p. 11.

<sup>2</sup>Ibid., p. 99.

guage, journal title, and various combinations of these.<sup>3</sup>

A printout of search results is available in just a few minutes for the patron. Patrons may request an off-line printout of results from the National Library of Medicine, but an off-line printout requires more time. These services are now available in countries all over the world.

The use of the MEDLINE computer system saves librarians and library users hours of manual searching time. The system provides to busy professionals and others comprehensive listings on most health sciences subjects at reasonable costs within a short time period.

The costs of the MEDLINE computer service varies. The Medical Library charges only for the connect time based on fifteen dollars per connect hour. The library is connected via a telecommunications linkage with the Bibliographic Retrieval Service (BRS) in Scotia, New York, where the National Library of Medicine has made MEDLINE available and open to searching by all kinds of libraries.

Since five of the Polk County Biomedical consortium members now have computer access to medical literature, the users of the Medical Library tend to be people from all around the state. For example, a doctor from Pleasantville may call into the library over the toll-free WATTS line and say, "the 'hell's angels' have just come into town and he

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<sup>3</sup>Harlem, Ole K., Communication in Medicine: A Challenge to the Profession (Basel, Switzerland: S. Karger, 1977), p. 35.

has an emergency patient with a knife-wound in the abdomen." He wants recent surgical repair information. Recent information is considered to be no more than three years old and the search analyst could use the following subjects for this request's search strategy: surgery, abdomen, techniques, wounds, emergency medicine, and any combinations of these. Manually the search could take two or three hours. Online the information is available in minutes. An attorney in Davenport needs medico-legal information on "leaving sponges in patients during surgery." Again the MEDLINE process furnishes the best and fastest answers for this malpractice case. All categories of users want materials for talks and students are always working on papers. One of the few complaints about MEDLINE has been in the nature of "is that all there is?"

Until now no attempt has been made to evaluate or compare the use of the library's search service either before or since the availability of the MEDLINE computer search system. There has been little statistical information upon which to base an evaluation to find out anything about the users or their requests.

#### Problem Statement

In reference to user requests for searches of the medical literature and the effect MEDLINE may have on library services three questions were examined.

1. Has the MEDLINE computer service implemented by the Iowa State Medical Library created changes in the number

and geographic distribution of users requesting searches?

2. Has the MEDLINE computer service implemented by the Iowa State Medical Library created changes in the subjects of medical literature search requests?

3. What is the average cost to the user of MEDLINE computer searches?

### Hypotheses

The first hypothesis is that attorneys, Iowa State agencies, and hospital personnel are requesting more MEDLINE computer searches than other user groups.

The second is that increasing numbers of MEDLINE requests are made from users who live outside of the Polk County area.

The third hypothesis is there are no changes larger than ten percent among the categories of subjects of MEDLINE medical literature searches requested by the user groups.

### Significance

Eight categories of library users for this study are doctors, attorneys, nurses, hospitals, State agencies, libraries, colleges and universities, and others. Constant changes in the medical field require new library services like MEDLINE in order to satisfy their demand for information. Results of this study may indicate where potential users are located, what subjects they are interested in, and costs of a new service to users. Changes in the demand for computer searches may require some departmental planning.

The staff may need additional training, which often requires a great deal of time. As more of the state agencies become acquainted with the service there could be an influx of requests that the search analysts will need to accommodate. Because no compilations of information about the MEDLINE service exists, there was a need to assemble data and record more information about MEDLINE in order to begin planning for a comprehensive evaluation of this computer service, its potential for expansion, and prospects for the future.

#### Assumption

One assumption could be made that MEDLINE computer searches are faster and more comprehensive than the manual searches and this will lead to an increase in demand for computer searches. Because information in medical literature is needed in the work of medical personnel and others, the library staff provides a valuable and useful service to these groups in the State of Iowa.

#### Limitations

The data gathered represent the search requests made eight months prior to the establishment of the MEDLINE computer service at the Iowa State Medical Library and the eight months following.

Limited information was recorded about each search requests, the name of the agency or person, occupation for persons, address, and the search subject.

No attempt was made to gather data from other

sources for MEDLINE searches in the state, for example the University of Iowa Health Sciences Library.

Definition

MEDLINE (MEDLARS on-line) service; an on-line computer-based information system to retrieve references to articles in over three-thousand of the world's biomedical journals. The printed counterpart is Index Medicus.

## Chapter 2

### LITERATURE REVIEW

The chronological development of MEDLINE was discussed by Miller.<sup>4</sup> Service began in October, 1971, with physicians leading as the most frequent user. The following procedure is typical of a search. The operator begins with a terminal code. This is called logging-in. Search statements are entered which usually consist of a subject heading formula. After term relationships are established then a term can be exploded. Search statements consist of the Medical Subject Headings (MESH) as used by the National Library of Medicine. An average number of ten subject headings are assigned to an article. In the printed counterpart, Index Medicus, article references are found under three or less subject headings. The subject headings may be combined with subheadings, geographical headings, time spans, and language designations. All authors of an article are listed. Foreign titles stand out, and the language designation includes most printed foreign materials. There is an entry date, publication date, and code for an accession number. After many refined actions take place on the

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<sup>4</sup>Miller, Dick R. and Robert A. Utterback, "The Physician and MEDLINE," Southern Medical Journal, LXVI (April, 1973), 474-6.



computer a "print" command produces an off-line bibliography for the user in just minutes. There is a limit to the number of search statements per search.

The users of MEDLINE are made up of professionals, students, and the lay public. A library analyst talks with the person directly, or through another librarian, or office staff. Often in order to reach a satisfactory search formula several telephone calls must be made. Miller,<sup>5</sup> Spiegel,<sup>6</sup> and Jensen<sup>7</sup> felt the physician is the most interested and frequent user of a medical library. Werner<sup>8</sup> placed the user as being from a professional school, a commercial field, a member of a society, foundation, research institute, or on a hospital team. Subcategories included the departments of a school or hospital such as anatomy, microbiology, surgery, etc. Hitchingham<sup>9</sup> and Greenberg<sup>10</sup>

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<sup>5</sup> Ibid., pp. 472-5.

<sup>6</sup> Spiegel, Isabel and Janet Cramer, "Comparison of SUNY and MEDLINE searches," Bulletin of the Medical Library Association, LXI (April, 1973), 205-9.

<sup>7</sup> Jensen, Joseph E., "Is There a Computer in Your Practice?" Maryland State Medical Journal, XXVII (September, 1978), 73-6.

<sup>8</sup> Werner, Gloria, "Use of On-Line Bibliographic Retrieval Services in Health Science Libraries in the United States and Canada," Bulletin of the Medical Library Association, LXVII (January, 1979), 1-14.

<sup>9</sup> Hitchingham, Eileen E., "MEDLINE Use in a University Without a School of Medicine," Special Libraries, LXVII (April, 1976), 188-94.

<sup>10</sup> Greenberg, Bette, "MEDLINE Demand Profiles," Bulletin of the Medical Library Association, LXV (January, 1977), 1.

further categorized the users as being faculty or students. Faculty included staff members. Students could be medical, nursing, or other. They are further categorized as graduate or undergraduate. Professional users tended to be more critical and used greater selectivity than most students. Medical subject headings are intended to be used primarily by people in the health sciences fields.

A study of users with regard to the manual search and the MEDLINE search revealed some variances between the two. Foreman's<sup>11</sup> article cited the use of a questionnaire to provide source information. Respondents were satisfied with manual searches and wanted more materials. Users of educational type materials felt the selection was good, and they liked the librarian's personal touch. They also felt that MEDLINE was an excellent addition to the manual search. Others felt the printouts were lengthy, limited in the time period covered, and the manual search had certain values computers could not provide. Katz in discussing the differences between the formats of searching said "a computerized search and a manual search normally complement one another."<sup>12</sup>

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<sup>11</sup>Foreman, Gertrude, et al., "A User Study of Manual and MEDLINE Literature Searches in the Hospital Library," Bulletin of the Medical Library Association, LXII (October, 1974), 385-7.

<sup>12</sup>Katz, William A., Introduction to Reference Work: Reference Services and Reference Processes (New York, McGraw-Hill, 1978), v.II, 3rd. ed., pp. 153-5.

Rajecki<sup>13</sup> talked about the user's responsibilities. Since an evaluation of how well the printout information fills his needs, it is the responsibility of the user to be an informed person. The user should be able to define terms, express ideas, and explain all particulars necessary for a search topic. This will enable the analyst to formulate an appropriate search strategy.

A search strategy was defined as "one bibliographical problem processed against one data base"<sup>14</sup> according to Werner. Three facets of the search process that involves the analyst's time are: interviewing the user, formulating the subject strategy, and applying the formula to the computer operations. These are referred to as the intellectual characteristics of the MEDLINE search. Most on-line requests are processed by the analysts alone. The time will vary with each procedure so that an average is difficult to establish. An important characteristic that makes MEDLINE a valuable service is the speed with which information is made available. The terminals transmit at the rate of about thirty characters per second. Most users have great confidence in the computer search retrieval. Due to a lack of standards pertaining to searches few comparisons can be made about the outcome.

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<sup>13</sup>Rajecki, Aldona A. and Margaret L. Muntz, "An Introduction to Medical/Nursing Libraries and Available Resource Tools, " Nursing Forum, XVII (January, 1978), 104.

<sup>14</sup>Werner, op. cit., p. 3.

Other characteristics of an online search include the number of minutes of terminal connect time and the number of terms or subject headings used in the search. Much value is placed on the relevance of subject headings to the topic requested and the search results as well as the precision quality of searches. The geographical location of the user is not a necessary consideration.

Another characteristic of MEDLINE searching is the capability of retrieving and using sub-categories that are applicable to a request in order to continue the search strategy. Important components are the author's name, title of book, or the name of the journal. Users often consider citations printed off-line to have better quality when additional subject headings are included.<sup>15</sup>

The precise values achieved for searches depends upon the ability of the analyst to formulate term combinations the computer will accept. Elman<sup>16</sup> stated that this requires highly trained and qualified people who have experience as literature searchers. When needed to operate MEDLINE, their time as a search component is not measurable. They evaluate the literature, establish the variables of a search, determine the pertinence of the information retrieved, comprehend uses for data, and judge variables of

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<sup>15</sup>Elman, Stanley A., "Cost Comparison of Manual and On-Line Computerized Literature Searching," Special Libraries LXVI (January, 1975), 12.

<sup>16</sup>Elman, op. cit., pp. 12-13.

the subject request.

Specific and detailed terms are essential for search questions according to Jensen.<sup>17</sup> His article discussed the varying forms of medical subject headings and how they could become transformed to denote an entirely different meaning if not properly used. The current three years of Index Medicus are readily available on-line. However, the years back to 1966 require a waiting period of twenty-four hours in order to produce a printout.

MEDLINE operated well in a medical or clinical setting according to Moll<sup>18</sup> and McCarthy's<sup>19</sup> studies. They indicated the demand for computer service is primarily research oriented. There are two types of requests made according to Greenberg.<sup>20</sup> They are broad and general searches versus the narrow and specific ones. A broad search is comprehensive. A narrow search provides for specific information pertinent to the user's needs.

Spiegel,<sup>21</sup> in his article, compared MEDLINE with an-

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<sup>17</sup>Jensen, op. cit., p. 73.

<sup>18</sup>Moll, Wilhelm, "MEDLINE Evaluation Study," Bulletin of the Medical Library Association, LXII (January, 1974), 1-5.

<sup>19</sup>McCarthy, Susan E., et al., "Evaluation of MEDLINE Service by User Survey," Bulletin of the Medical Library Association, LXII (October, 1974), 367-73.

<sup>20</sup>Greenberg, op. cit., p. 1.

<sup>21</sup>Spiegel, op. cit., p. 209.

other biomedical computer search service, SUNY, with these findings: in most subject areas the percentage of citations retrievable by MEDLINE was higher. This indicated the titles for the data base have been well selected.

Brown<sup>22</sup> discussed costs and user acceptance. The high cost of off-line printouts rather than on-line time was an important factor when determining value to the user. The costs may prevent full-scale participation by library users. The computer involves a lot of paper work and is time-consuming. The information in the material may be lengthy or not enough, thus creating disappointment. There is a continual need for up-dating computer information and the analysts knowledge of the operations. A new command language may have to be learned. There may be an occasional conflict with long-established habits, and promotion of the computer requires time for acceptance.

The cost comparisons of manual and on-line computerized literature searching are provided by Elman in his formula which contains all of the on-line cost factors:  $C_{total} = (T \times C_{sum}) + P$ .<sup>23</sup> Literature searching is expensive because: it has to be well done, it requires specialized training, and it takes time. The cost of a manual search

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<sup>22</sup>Brown, Carolyn P., "On-Line Bibliographic Retrieval Systems Use," Special Libraries LXVIII (April, 1977), 155-60.

<sup>23</sup> $COST\ total\ (per\ search) = T\ (on\text{-}line\ time\ in\ minutes) \times C_{sum}\ (sum\ of\ all\ costs\ per\ minute\ of\ operation) + P\ (cost\ of\ off\text{-}line\ printed\ citations).$

is represented by an employee's salary on an hourly basis plus the pro-rated cost of the index tools used and the proportionate assistance from other staff members. Computer search costs include: labor, telephone hookup, equipment, off-line printed citations, and time. The study indicated on-line searching is an efficient and cost-effective method for literature searching but comparisons are difficult to generalize because the costs involved are so varied.

## Chapter 3

### METHODOLOGY

The population for the study were those users of the medical library who request the staff to conduct searches which may be manual searches of Index Medicus or on-line searches via MEDLINE.

User and request information was recorded on slips of paper when the patron telephones the library or discusses the information wanted in person with a staff member. The information on the slips represents the name of the requestor and title, the address to which results are to be mailed, the date the request is made, the major subject and any sub-categories of the subject and any other particulars such as time period to be covered. There also may be recorded a cost limit for search results based upon the amount of photocopy charges.

The time period covered in this study was the first eight months of 1979, January to August, when the library staff was able to provide manual searches only and the next eight months period, September 1979 to April 1980, after the use of MEDLINE began and both manual and computer searches were performed.

Seven categories of users were established. They are: doctors, attorneys, nurses, hospitals and health re-



lated agencies, state agencies, colleges and universities, and others. Requests from doctors, attorneys, and nurses were placed in those respective categories when the information on the request slip indicated the request had come from the individual. The hospital and health related agencies, state agencies, and college and universities were represented by librarians and other staff members who did the communication for these requestors. The 'others' category included a miscellaneous grouping of students, lay people, and those who obviously did not fit in one of the specific categories.

The geographic distribution was made by identifying the county in Iowa which included the city or town the user lives in or where the institution is located. The Iowa Official State Transportation Map, 1979-1980, listing of towns and counties was used as much as possible.

The subjects of searches were placed into one of fifteen medical subject categories. The categories are to be found in Medical Subject Headings (MESH) published by the National Library of Medicine. MESH is recognized as the subject heading authority in the medical library field and contains the terms that could be used for representing the subjects of requested searches. This index is used in the medical library for both manual and on-line computer literature searches.

The fifteen MESH categories are: anatomy; organisms; diseases; chemicals and drugs; analytical, diagnostic

and therapeutic technics and equipment; psychiatry and psychology; biological sciences; physical sciences; anthropology, education, sociology, and social phenomena; technology, industry, agriculture, food; humanities; information science and communication; named groups; health care; and geographic names.

The researcher looked up the major subject, listed on the request slip, in the MESH index. The index gives after each subject a code (letter and number) for the major division of MESH in which the term fits.

The MEDLINE search costs are the amount recorded and charged to the user. That amount is the portion of an hour of terminal connect time the operator used to search the data base. The cost is based on fifteen dollars per hour of connect time. Some of the library patrons including most state agencies are given computer service free of charge. When no cost of a MEDLINE search was recorded, the user received the service free by a prearranged agreement. Most state agencies and a few other users receive the free service. For this study, only the charges actually paid by users was used to compute the average cost of MEDLINE searches.

## Chapter 4

### ANALYSIS OF THE DATA

Nine hundred ninety-eight requests, received by the Medical Library for searches of medical data bases, were analyzed for this study. User category and main subject group information was tabulated by two time periods: January-August, 1979 and September, 1979-April, 1980. Information tabulated for the second time period was divided into manual searches and MEDLINE searches. The county, or geographic location, of the requestor was also recorded by time periods. The data were recorded in fifteen subject groups.

Data in Table 1 show some change toward an overall increase in the number of searches from the first eight month period (A) when compared to the second eight month period (B and C) which includes the addition of MEDLINE services. Four hundred thirty-seven requests were made during the second period, an increase of one hundred twenty-four requests.

The first hypothesis was that attorneys, Iowa state agencies, and hospital personnel are requesting more MEDLINE computer searches than other user groups. Table 1 shows that the total number of searches for hospital personnel was twenty-two (28.9%), for state agencies seventeen

Table 1. Number of Search Requests by Time Periods, User Groups, and MESH Major Categories

MESH Categories	DOCTORS			ATTORNEYS			NURSES			HOSPITALS			STATE AGENCY			COLLEGES			OTHERS			TOTAL NO.			TOTAL PERCENT			
	A*	B*	C*	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
A-ANATOMY	4	2		1			1			3									3			9	2	3	2.0	.4	3.7	
B-ORGANISMS	1								1						1				1			2		2	.4		2.6	
C-DISEASE	107	95	8	13	33	7	11	29	20	18	8	27	27	3	1	1			39	55	3	218	258	29	49.8	53.1	38.1	
D-CHEMICALS & DRUGS	31	19	1	5	2	3	3	2	4	5	3	3	12	2	2				11	13	2	57	55	11	13.0	11.3	14.4	
E-ANALYTICAL, DIAGNOSTIC & THERAPEUTIC TECHNIQUES & EQUIPMENT	45	34	2	1	4	3	4	3	3	8	1	7	6						11	12	3	71	67	10	16.2	13.8	13.1	
F-PSYCHIATRY AND PSYCHOLOGY	8	10		1			2	1	5	2	3	2	1	7	2	1			5	8		23	24	11	5.2	4.9	14.4	
G-BIOLOGICAL SCIENCES	5	1					5	1	2			10	2						4	2		26	3	3	5.9	.6	3.0	
I-ANTHROPOLOGY, EDUCATION, SOCIOLOGY & SOCIAL PHENOMENA	4	3							2	4	1	3							1	1		7	13	1	1.6	2.6	1.3	
J-TECHNOLOGY, INDUSTRY, AGRICULTURE, FOOD	2	1										3							2	2		4	6		.9	1.2		
K-HUMANITIES	1	2							1													2	2		.4	.4		
L-INFORMATION SCIENCE & COMMUNICATION									1													1				.2		
M-NAMED GROUPS			4			1	4		1	5	1	2	7		2				13			3	36	1	.6	7.4	1.3	
N-HEALTH CARE	3	4	1	1			5		2	2	1	6	5	3					2	3		14	19	5	3.2	3.9	6.5	
TOTAL	211	175	12	22	40	13	26	46	41	44	22	57	64	17	1	7	3		79	109	8	437	485	76	99.2	99.6	99.3	
PERCENT OF GRAND TOTAL NUMBER	48.2	36.0	15.7	5.0	8.2	17.1	5.9	9.4	9.3	9.0	28.9	13.0	13.1	22.3	.2	1.4	3.9		18.0	22.4	10.5							

\* A = Manual Searches: January - August, 1979. B = Manual Searches: September, 1979 - April, 1980.  
C = MEDLINE Searches: September, 1979 - April, 1980.

(22.3%) and for attorneys thirteen (17.1%). These three user groups requested more computer searches than the other four and the hypothesis is accepted on the basis of the higher number and percentage figures. Doctors placed fourth with twelve (15.7%) requests. The "others" group was fifth with eight (10.5%), the colleges were sixth with three (3.9%), and the nurses had one (1.3%) of the total number of MEDLINE requests.

The second hypothesis was that increasing numbers of MEDLINE requests are made from users who live outside of the Polk County area. The data in Table 2 shows the number of requests by county in descending order. Seventy-five of the ninety-nine Iowa counties had users located in them during the eighteen month period. The other twenty-four counties were not included because no individual or institution requested a manual or MEDLINE search during either of the time periods.<sup>24</sup>

Polk county had the highest number of requestors for MEDLINE searches with forty-six (60.5%) of the total of seventy-six requests. The percent was 8.6% above Polk County's percentage of the manual searches of the A time period with two hundred twenty-seven (51.9%) and 18.9% above the manual search portion of the B time period with two hundred two (41.6%). Linn county was second highest

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<sup>24</sup>See the maps in the Appendix for additional information about the geographical distribution of requestors.

Table 2. Number and Percent of Search Requests by County

County	A*		B*		C*		TOTAL No.	TOTAL %	County	A		B		C		TOTAL	
	No.	%	No.	%	No.	%				No.	%	No.	%	No.	%	No.	%
POIK	227	51.9	202	41.6	46	60.5	475	48.0	PAGE	0	.0	3	.6	1	1.3	4	.4
STORY	15	3.4	16	3.3	2	2.6	33	3.3	UNION	2	.5	2	.4	0	.0	4	.4
SCOTT	10	2.3	18	3.7	2	2.6	30	3.0	WARREN	0	.0	4	.8	0	.0	4	.4
BLACK HAWK	15	3.4	13	2.7	1	1.3	29	2.9	BOONE	0	.0	2	.4	1	1.3	3	.3
WOODBURY	11	2.5	15	3.1	1	1.3	27	2.7	CLAYTON	0	.0	3	.6	0	.0	3	.3
WINNEBIEK	9	2.1	14	2.9	1	1.3	24	2.4	CLINTON	1	.2	1	.2	1	1.3	3	.3
DALLAS	6	1.4	19	2.1	4	5.3	20	2.0	HUMBOLDT	2	.5	0	.0	0	.0	3	.3
LENN	2	.5	10	2.1	8	10.5	20	2.0	IOWA	0	.0	3	.6	0	.0	3	.3
DES MOINES	7	1.6	12	2.5	0	.0	19	1.9	JOHNSON	2	.5	1	.2	0	.0	3	.3
WEBSTER	10	2.3	9	1.9	0	.0	19	1.9	MITCHELL	1	.2	2	.4	0	.0	3	.3
FAYETTE	3	.7	11	2.3	0	.0	14	1.4	ADAIR	1	.2	1	.2	0	.0	2	.2
CLAY	6	1.4	7	1.4	0	.0	13	1.3	BREMER	0	.0	2	.4	0	.0	2	.2
DUBUQUE	7	1.6	6	1.2	0	.0	13	1.3	BUENA VISTA	1	.2	1	.2	0	.0	2	.2
POWESHIEK	8	1.8	4	.8	0	.0	12	1.2	CHEROKEE	0	.0	1	.2	1	1.3	2	.2
WAPELLO	8	1.8	4	.8	0	.0	12	1.2	DELAWARE	1	.2	1	.2	0	.0	2	.2
APPANOOSE	8	1.8	3	.6	0	.0	11	1.1	MADISON	0	.0	2	.4	0	.0	2	.2
CARROLL	5	1.1	6	1.2	0	.0	11	1.1	MONONA	0	.0	2	.4	0	.0	2	.2
HENRY	4	.9	1	.2	4	5.3	11	1.1	MONROE	1	.2	1	.2	0	.0	2	.2
MARSHALL	4	.9	7	1.4	0	.0	11	1.1	MUSCATINE	1	.2	1	.2	0	.0	2	.2
BUCHANAN	5	1.1	3	.6	0	.0	8	.8	POCAHONTAS	1	.2	1	.2	0	.0	2	.2
HARDIN	3	.7	3	.6	1	1.3	8	.8	TAMA	1	.2	1	.2	0	.0	2	.2
PALO ALTO	3	.7	5	1.0	0	.0	8	.8	WRIGHT	2	.5	0	.0	0	.0	2	.2
CASS	0	.0	7	1.4	0	.0	7	.7	BENTON	0	.0	0	.0	0	.0	1	.1
CERRO GORDO	2	.5	4	.8	1	1.3	7	.7	CALHOUN	1	.2	0	.0	0	.0	1	.1
FLOYD	1	.2	6	1.2	0	.0	7	.7	CRAMFORD	1	.2	0	.0	0	.0	1	.1
ALLAMAKEE	0	.0	6	1.2	0	.0	6	.6	EMMET	0	.0	1	.2	0	.0	1	.1
POTTAWATTAMIE	1	.2	4	.8	1	1.3	6	.6	GREEN	0	.0	0	.0	0	.0	1	.1
SIoux	4	.9	2	.4	0	.0	6	.6	HANCOCK	1	.2	0	.0	0	.0	1	.1
BUTLER	1	.2	4	.8	0	.0	5	.5	JEFFERSON	0	.0	1	.2	0	.0	1	.1
FRANKLIN	0	.0	5	1.0	0	.0	5	.5	JONES	1	.2	0	.0	0	.0	1	.1
HAMILTON	3	.7	2	.4	0	.0	5	.5	MAHASKA	0	.0	1	.2	0	.0	1	.1
JACKSON	1	.2	4	.8	0	.0	5	.5	O'BRIEN	0	.0	0	.0	0	.0	1	.1
LEE	4	.9	1	.2	0	.0	5	.5	SAC	1	.2	0	.0	0	.0	1	.1
MARION	2	.5	3	.6	0	.0	5	.5	VAN BUREN	1	.2	0	.0	0	.0	1	.1
PLYMOUTH	3	.7	2	.4	0	.0	5	.5	WAYNE	0	.0	0	.0	0	.0	1	.1
AUDUBON	2	.5	2	.4	0	.0	4	.4	WORTH	0	.0	1	.2	0	.0	1	.1
CHICKASAW	2	.5	2	.4	0	.0	4	.4	OUT OF STATE	0	.0	0	.0	0	.0	1	.1
JASPER	0	.0	4	.8	0	.0	4	.4	TOTAL	6	1.4	3	.6	0	.0	9	.9
KEOKUK	2	.5	2	.4	0	.0	4	.4		437	99.7	185	99.2	76	88.8	99.8	99.4

\* A = Manual Searches: January - August, 1979. \* B = Manual Searches: September, 1979 - April, 1980.  
 \* C = MEDLINE Searches: September, 1979 - April, 1980.

with eight (10.5%) requests for MEDLINE searches. This percentage was ten percent above the manual searches for Linn County users during the A period with two (.5%) and eight and four-tenths percent above the B period with ten (2.1%) requests. Dallas and Henry counties users both had four searches or a 5.3% portion of the total MEDLINE searches. Neither of these counties had over a ten percent difference in MEDLINE searches as compared to manual searches. The apparent reason for the higher number of users in Polk county is the large number of students in the area and the location of state agency offices in Des Moines, the largest city in Iowa.

The second hypothesis was partially accepted on the basis that Linn county had more than a ten percent increase that might be attributed to the addition of computer service. With eight MEDLINE search requests that county placed second for computer usage. Dallas county was third with four MEDLINE requests providing for a substantial numerical increase. Counties that showed an increase in the number of requests for manual searches of four or more from the first eight months (A) to the second eight months (B) are: Scott (8 to 18), Woodbury (11 to 15), Winneshiek (9 to 14), Dallas (6 to 10), Linn (2 to 10), Des Moines (7 to 12), Fayette (3 to 11), Floyd (1 to 6), Cass (0 to 7), Allamakee (0 to 6), Franklin (0 to 5), Jasper (0 to 4), and Warren (0 to 4). Counties that showed a significant decrease in requests for manual searches from the first eight

months (A) to the second eight months (B) are: Polk (227 to 202), Poweshiek (8 to 4), Wapello (8 to 4), Appanoose (8 to 3), Henry (6 to 1).

Table 1 contains data for the third hypothesis, there are no changes larger than ten percent among the categories of subjects of MEDLINE medical literature searches requested by the user groups. Two MESH categories, "physical sciences" and "geographic names," are omitted from the table because there were no requests relevant to those categories. The subject heading category with the highest number of MEDLINE searches was "disease" with twenty-nine or 38.1% of the total. There was a noticeable increase in the number and percent of manual searches in the B time period over the A for this category, but a decrease of over ten percent in the percent of the total number of MEDLINE searches when compared with either A or B. There is one increase of 9.5% for the "psychiatry and psychology" category in the percent of the total requests for searches with MEDLINE when compared with manual searches. The other changes were minimal with the "anatomy" category showing a 3.7% increase in C over B. "Health care" increased from 3.9% (B) to 6.5% (C) making for a total B and C requests of 7.2% as an increase over the A period. The hypothesis is rejected based on the over ten percent decrease in the number of MEDLINE search requests in the "disease" category.

Some of the interesting points about the distribution of requests in MESH categories are concerned with the



maintenance of the high number of users from all groups and their requests in the "disease" category. There are a few changes of requests in "health care," and "named groups" categories. The patterns of requests by subject category remained similar for manual searches during the two time periods and acquired only a slightly different look when MEDLINE requests were added.

The total cost of MEDLINE search requests paid for by users was \$238.51. State agencies received free MEDLINE searches; therefore, only fifty-nine searches were paid for by users. The average cost per MEDLINE search for the first eight months of MEDLINE service at the medical library was \$4.04.

## Chapter 5

### SUMMARY, CONCLUSIONS, RECOMMENDATIONS

This was a study to find out if the addition of MEDLINE computer searches to the services of the Iowa State Medical Library had brought about any changes in the number and geographic distribution of users and changes in the subjects of literature search requests. Nine hundred ninety-eight search requests were analyzed for two time periods of eight months each. The first time period included manual searches only. The second included manual searches and MEDLINE computer requests. The information compiled and analyzed was: (a) user's occupation; (b) user's geographic location by county; (c) the subject of the request by MESH subject categories; (d) whether the request was done manually or by computer; and (e) the cost of the MEDLINE search.

The major findings of the study were: (a) hospital personnel, state agencies, and attorneys were the three leading users of MEDLINE; (b) that in addition to Polk county, Linn county had more than a ten percent increase in search requests that might be attributed to the addition of the MEDLINE computer service; and (c) there was an over ten percent decrease or change in the percent of requests in the "disease" medical subject category.

## Conclusions

Increased usage of MEDLINE service by attorneys and hospital personnel indicate that they have some knowledge of the potential of computer searching. Other groups may not be as aware of MEDLINE service or the computer searching possibilities. With MEDLINE there is a potential for new services and for faster delivery of library services in the future. While there always will be a need for manual searches, some users may prefer computer searches because of the faster completion of searches and because the print-outs provide a more permanent record of search results. Searching by a computer gives the searches the capabilities to broaden or narrow a subject, to combine search elements in a variety of ways, and to provide a more comprehensive current or retrospective literature search. These capabilities are beneficial to the user.

Since the study revealed certain areas of the State to have concentrations of medical library users, the future of MEDLINE search service is not limited in Iowa and could have an increased user population potential. Few MEDLINE searches were requested in several MESH categories; this indicates that users do not use or need to use, the whole range of medical literature. The subjects of the searches could expand to include more of the little-used MESH categories with new groups of users.

## Recommendations

The recording of more data and more specific information about MEDLINE searches is needed for program evaluation purposes. More detailed descriptions of subjects will help the analyst to formulate precise search strategies. Previous search strategies could be used for same-subject requests although each request has a tendency to be unique. Search results should be evaluated by the analyst and the user so that the value of the MEDLINE service could be judged more accurately. User judgement about search results will tend to be based on the number of references provided, if the specific subject request was met, and the length of time needed to provide the results. Careful record keeping is the best way to find out if users have some measure of satisfaction with search results and the MEDLINE service.

Public relations efforts by library personnel could be extended to include all county areas of non-users while increasing services to those already acquainted with the MEDLINE search service. Health personnel, hospitals, county medical societies, and health-related organizations are served by the medical library and should be contacted for user recruitment. This is possible via various medical organizations or networks.

A description of library services, information about library hours, and computer access time may be beneficial as a good promotional device where possible. User access to the terminal by walk-in patrons creates interest if

they are allowed to observe the analyst's procedures and the operation of the equipment.

MEDLINE services in the medical library should be maintained at the lowest cost level possible. Allowing for trial searches enables patrons to become familiar with the MEDLINE computer service.

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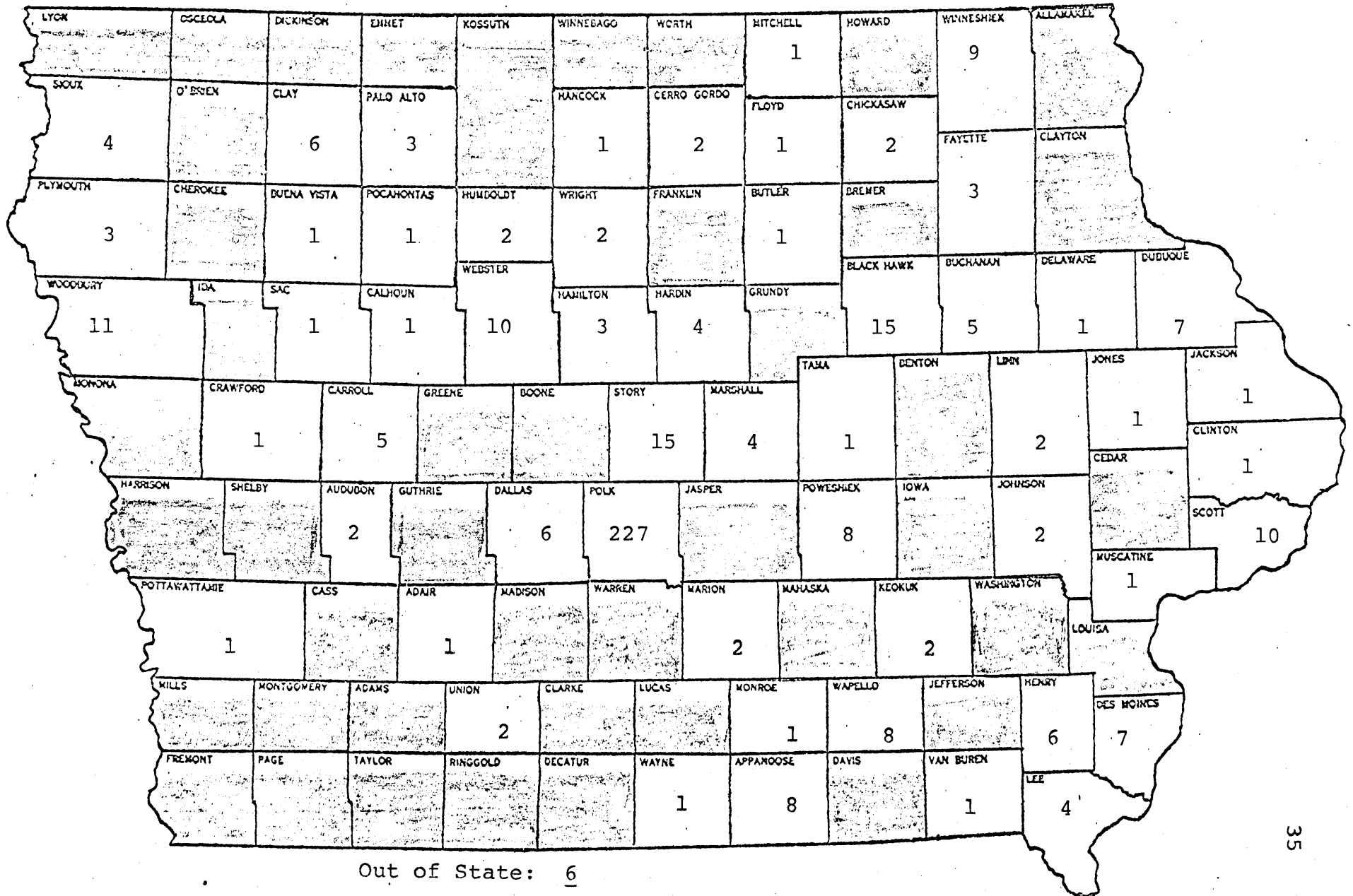
APPENDIX

STATE MAPS OF USER LOCATIONS BY COUNTY

1. Users Before MEDLINE, January, 1979 to August, 1979.
2. Users With the Addition of MEDLINE, September, 1979 to April, 1980.



Period I - USERS BEFORE MEDLINE, January, 1979 to August, 1979.



Period II - USERS WITH THE ADDITION OF MEDLINE, September, 1979 to April, 1980.

