Transitioning to the Internet: results of a National Library of Medicine user survey

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In late 1995, several months prior to the introduction of Internet Grateful Med, the National Library of Medicine (NLM) conducted a customer survey as part of its efforts to make a transition from Grateful Med to new forms of electronic information access and retrieval. A questionnaire survey was mailed to a sample of 2,500 online users randomly selected from domestic users (excluding fixed-fee users) who searched NLM databases during the second quarter of 1995. The final response rate was nearly 83% of eligible respondents. About 70% of NLM customers responding already had access to the Internet, and of those, more than 90% had access to the World Wide Web. However, only 26% of customers with Internet access were using the Internet to access NLM databases. Health care providers account for about 46% of NLM customers but, as a group, search NLM databases relatively infrequently even though they have higher-end equipment. Librarians and information professionals represent about one-fifth of NLM customers and are by far the most intensive users, but tend to have lower-end equipment. Overall, the survey results provide a strong basis for the transition to Internet-based delivery of NLM online database services, including Internet Grateful Med and the NLM family of World Wide Web sites. However, Internet access is uneven, especially in rural areas and at hospitals. This reinforces the need for continuing special outreach efforts directed at improving access for rural and hospital-based users and rural libraries, upgrading computer equipment for medical librarians, and training health care providers in more effective use of Internet-based biomedical information resources.

INTRODUCTION

The growth in Internet availability and use, and in particular the development of the user-friendly, graphically appealing technology of the World Wide Web, created an opportunity for database providers such as the National Library of Medicine (NLM) to develop new means of access to electronic database services [1].

Since the early 1970s, NLM has been providing online access to its databases and services [2]. At first, NLM's users were largely librarians and information specialists who provided clients (the end users of the information) with mediated search services. These early searchers used terminals with 300- and then 1,200-baud modems—very slow by today's standards—to connect to NLM's online system. During the last decade, personal computer technologies have advanced dramatically, and faster computers and modems have become more widespread. Coincident with the increasing availability of microcomputers was NLM's development of a personal computer–based search interface to make searching the databases easier for

health professionals who wanted to do their own searches. The software package, Grateful Med, was introduced in 1986. Since that time, NLM has enhanced the software, which currently is available for both IBM-compatible and Macintosh computers.

As part of its system reinvention efforts [3, 4], NLM began exploring ways to further improve user access to its services. The Internet and the World Wide Web provided the logical avenue. Using these new technologies, NLM developed an intelligent gateway system that not only incorporated design features of the existing Grateful Med, but also included new features and functions and access to additional search tools. However, before committing significant resources to what is now called Internet Grateful Med (http://igm.nlm.nih.gov), NLM used a customer survey to determine whether its current online users were equipped to take advantage of access to the databases via the Internet. This article summarizes the customer survey methodology and results, and then discusses the implications for NLM operations and outreach. The article draws in part from an NLM report on the survey [5], which includes additional detailed survey results along with statistical analyses and tabular and graphical presentations. Note that use of the term "significant" in this article means that there is a 1% or less probability ($p < 0.01$, using the chi-square statistical test) that the relationship between the variables noted occurred by chance. Statistical results are presented either in the text or in the relevant data tables.

METHODS

The survey questionnaire included thirty-four items covering Internet access and use, computer equipment platforms, and searching behaviors and patterns (see the appendix). Through pre-testing, the time required to complete the questionnaire was estimated to average fewer than ten minutes.

In the survey, 2,500 NLM users were randomly selected from a population of 15,372 U.S. users (excluding fixed-fee users) who conducted searches during the months of April to June 1995. NLM was primarily interested in learning about Internet connectivity among users. Therefore, users under fixed-fee program agreements, mainly at universities, were excluded from the sample because Internet connectivity is a requirement of the fixed-fee programs. Note that the survey did not, and was not intended to, include users who access NLM databases through third-party vendors.

The first mailing took place in late October 1995, with subsequent mailings to non-respondents in November and December. Follow-up phone calls were placed in January 1996, with data collection terminated at the end of January. Of the 2,500 users sampled, 2,361 users were determined to be eligible NLM users. Of these 2,361 users, 1,955 completed at least one questionnaire, for a response rate of 82.8%. To test for non-response bias, demographic data on the respondents were not available, and thus could not be compared. However, comparisons were made of the mailed-out and response distributions for each state, by NLM region, and across Census Bureau Metropolitan Statistical Area types (henceforward referred to as MSA types). There were no statistically significant differences in response rates across states, the District of Columbia, and Puerto Rico; known MSA types; or NLM regions. The response rates closely reflected the percentage distribution of the survey sample. The high response rate and the statistical results indicate that non-response bias is unlikely.

RESULTS

Internet access and use

Users were asked about Internet access from the computer most frequently used to search NLM databases. Of the 1,931 respondents, 25% reported no Internet access, and 4% did not know or were not sure whether they had access to the Internet. Thus, at least 70% of the respondents had access to the Internet at the time of the survey. Some respondents circled multiple responses to the question, indicating that they had more than one mode of access to the Internet from the computer most often used to search NLM databases.

Among those with Internet access, the most common means of access was a commercial service such as America Online, Prodigy, or CompuServe (35%). The next most common means was a dial-up modem connecting directly to NLM (28%), followed by an ethernet, Novell, or other local-area network (LAN) connection (22%).

The 1,339 users who reported Internet access were asked whether they also had access to the World Wide Web. Eight percent indicated that they either did not have access to the Web or did not know. Thus, at least 92% of the respondents who had access to the Internet also had Web access. Respondents with Internet access also were asked what Internet services they had used in the previous twelve months. Electronic mail was the service used by the largest percentage of respondents, regardless of the means by which the Internet was accessed, followed by the Web.

Users were asked about use of the Internet as a communications link to access NLM's online database. Only 26% of the respondents with Internet access (18% of all respondents) indicated that they used the Internet to connect to NLM's databases. The respondents who answered "no" to this question were asked to specify the reasons why they did not use the Internet this way. Among the 774 users who responded, the reasons most frequently cited were that they preferred Grateful Med direct access; could not figure out the

Internet; or were not aware that it was possible to use the Internet to access NLM. These results, while seemingly contradictory given the high overall level of Internet access among respondents, are reasonable because at the time when the survey was conducted NLM had not yet introduced Internet Grateful Med. In addition, while it was possible to use the Internet to communicate with NLM by using the Macintosh- or DOS-based version of Grateful Med or by searching the databases with the command language, there was no compelling reason to do so.

In order to gauge how the overall picture might change in the near future (specified as "within the next 12 months"), users were queried about their expectations for upgrades in Internet access. Only about 11% of respondents indicated that they did not have Internet access then and that no upgrade was expected.

Equipment profiles

Overall, 81% of the respondents indicated that they used IBM-compatible equipment; 18% used Macintosh equipment. The remaining 1% used either UNIX equipment or a dumb terminal, or did not know or were not sure.

The survey results also indicate that Internet access is related to the capabilities of the user's computer platform. As the user's computer platform moves from lower- to higher-end (meaning a faster processor and modem, larger memory, and more user-friendly operating system), the level of Internet access goes up. This relationship is statistically significant ($p < 0.001$, using chi-square tests) for IBM-compatible memory, processor, operating system, and modem, and Macintosh memory, operating system, and modem. As noted earlier, of the total group of respondents, 70% indicated that they had access to the Internet at the time of the survey, while 25% did not. However, in looking at Internet access by type of equipment, the survey results indicate that 68% of the users with IBM-compatible equipment had access to the Internet, compared with 80% of those with Macintosh equipment.

The majority of respondents indicated that they used what were considered at the time of the survey to be relatively high-end computer platforms, as defined by computer processor speed, size of memory, operating system, and modem. Of the IBM-compatible computer users, about three-quarters (74%) had a platform with a 486 or Pentium processor, 84% had at least 4 megabytes of memory (35% had more than 8 megabytes), most (87%) were using the Windows operating system, and about three-quarters (73%) had at least a 9.6 kilobaud modem. Of the Macintosh users, most had a platform with at least 4 megabytes of memory (93%) and the System 7 operating system (90%), and about three-quarters (77%) had at least a 9.6 kilobaud modem.

Respondents also were asked to predict upgrades to their computer platforms anticipated during the following twelve months. These predictions are inherently uncertain, since they are based on possible future actions, and because between 10% and 20% of the respondents indicated "don't know/not sure" about upgrading. Despite these uncertainties, the general picture that emerged is one of upgrading to higher-end equipment.

Ninety-two percent of all respondents indicated that they used a modem to access NLM databases. With respect to modem speed, at the time of the survey a higher percentage of Macintosh users had 28.8 kilobaud modems than IBM-compatible users (28% versus 15%). If expected upgrades in modem speed occurred as reported across all respondents, about 70% of the respondents who reported using a modem would soon have had either a 14.4 or 28.8 kilobaud modem. The percentage of 28.8 kilobaud modems would have increased from 15% to 34% among IBM-compatible computer users, and from 28% to 45% among Macintosh users.

Characteristics of the NLM customers

User groups. The survey results provided NLM with an updated picture of current customers. Health care providers constituted the largest respondent group at 46%. Librarians and information services professionals (20%) and scientists (19%) were the two additional large categories of respondents. Educators, members of the media, students, members of the legal profession, patients and health care consumers, and "other" made up the remaining 15% of the respondents. These data corroborate the shifting trends in user base that NLM began to note with the 1986 introduction of Grateful Med. Prior to that date, the majority of the users were librarians and information services professionals. With the advent of easier-to-use search interfaces, scientists and health care providers are more frequently conducting at least a portion of their own searches [6], and new types of users (e.g., patients, students, members of the news media) are gaining online access.

Search frequency. Nineteen percent of the respondents search NLM databases less than once a month; 39% one to three times each month; 23% search four to ten times each month; and 19% search more than ten times each month. Differences in the number of searches conducted per month among the various user groups are statistically significant. Health care providers tend to conduct fewer searches each month compared with librarians or other information services professionals and scientists. Nearly half of the health care providers indicated that they search NLM databases one to three times each month (Table 1). In com-

Table 1
Frequency of searching by user groups

	Less than once/ month (%)	1–3 times/ month (%)	4–10 times/ month (%)	>10 times/ month (%)
Health care provider	24.7	46.9	20.2	7.7
Librarian/information services professional	9.5	13.6	18.5	57.3
Scientist	14.3	40.7	33.2	11.6
Educator	20.2	45.2	26.2	8.3
Patient/health care consumer	51.6	41.9	3.2	3.2
Media	17.1	48.6	22.9	11.4
Student	22.2	51.9	18.5	7.4
Legal	13.6	50.0	27.3	9.1
Other	30.5	37.8	19.5	12.2

Chi-square = 710; df = 36; $p < 0.0001$.

Table 2
Use of Grateful Med and NLM command language for searching by user groups

	Using Grateful Med (%)	Using NLM command language (%)	Don't know/ not sure (%)	Did not respond (%)
Health care provider	90.2	6.5	1.7	1.7
Librarian/information services professional	28.5	64.5	0.8	6.2
Scientist	78.7	15.6	3.2	2.4
Educator	79.8	15.5	2.4	2.4
Patient/health care consumer	93.5	6.5	0.0	0.0
Media	82.9	14.3	2.9	0.0
Student	92.6	3.7	0.0	3.7
Legal	86.4	9.1	0.0	4.5
Other	75.6	20.7	3.7	0.0

Chi-square = 629; df = 16; $p < 0.0001$.

parison, more than half of librarians and other information services professionals indicated that they conduct ten or more searches per month, and about three-quarters search four or more times a month. This compares with the 28% of health care providers who search four or more times per month. Scientists fall in between with 45% searching four or more times per month.

Search method. Overall, about three-quarters (76%) of respondents use the Grateful Med software for searching NLM databases, and about one-fifth (22%) use the NLM command language (about 2% did not know or were not sure). With the notable exception of librarians and other information services professionals, NLM customers primarily use Grateful Med for searching. About four-fifths of scientists and educators use Grateful Med, and more than nine-tenths of health care providers use Grateful Med (Table 2). This contrasts with the 65% of librarians and other information services professionals who use the NLM command language (29% use Grateful Med), a statistically significant difference. Because of the dominant role of librarians and other information professionals in conducting the most intensive searching (more than ten times per month), the majority (58.8%) of the high-frequency searching is carried out with the command language. In comparison, most (86.3%) of the lower-frequency searching (zero to ten times per month) is done with Grateful Med, again a statistically significant difference (chi-square = 355, df = 6, $p < 0.0001$).

Search location. The office was listed as the primary search location by 47% of the entire respondent group. However, the survey also documents that a substantial amount of searching is being done from the home. Thirty-two percent of the respondents indicated that the home is the primary search location, and nearly half (46%) indicated that it is the second most frequently used search location. Health care providers search relatively more frequently from home. Almost half of health care providers indicated the home as the location from which they most frequently search, followed by the office (Table 3). Most scientists search most frequently from the office or home, and librarians from the library or office. These differences among user groups are statistically significant for both primary and secondary search locations.

Equipment. The survey results indicate significant differences in the type of computer used by various customer groups (chi-square = 89, df = 3, $p < 0.0001$). Nearly 94% of the librarians and other information services professionals indicated that they use IBM-compatible equipment, and 6% Macintosh. In comparison, about two-thirds (67.2%) of scientists use IBM-compatible computers and one-third use Macintosh computers, and four-fifths (82.4%) of health care providers use IBM-compatibles and one-fifth (17.6%) use Mac-

Table 3
Primary* and secondary† search locations of the four largest user groups

	Health care provider		Librarian/ information services professional		Scientist		Educator	
	Primary (%)	Secondary (%)	Primary (%)	Secondary (%)	Primary (%)	Secondary (%)	Primary (%)	Secondary (%)
Office	40.2	27.7	26.0	13.8	80.2	15.8	57.9	21.1
Home	49.5	42.1	5.8	46.8	17.0	57.9	27.6	52.6
Library	1.8	15.2	58.6	26.6	1.4	24.6	3.9	15.8
Hospital	8.5	14.9	9.6	12.8	1.4	1.8	10.5	10.5

* Chi-square = 977; df = 9; $p < 0.0001$.
† Chi-square = 47; df = 9; $p < 0.0001$.

Table 4
Modem speed* and Internet† access by four largest user groups

	≥ 14.4 kilobaud modem (%)	With Internet access (%)
Health care provider	63.4	73.3
Librarian/information services professional	45.6	71.0
Scientist	61.2	83.8
Educator	53.5	77.1

* Chi-square = 63, df = 15, $p < 0.0001$.
† Chi-square = 20, df = 3, $p < 0.0001$.

intosh. Likewise, the results show significant differences among customer groups in the levels of IBM-compatible equipment for memory (chi-square = 36, df = 9, $p < 0.0001$), processor (chi-square = 42, df = 12, $p < 0.0001$), and operating system (chi-square = 76, df = 15, $p < 0.0001$). Of those respondents using IBM-compatible computers, librarians and other information services professionals are more likely to have lower-end equipment than scientists or health care providers.

The survey results for all users—IBM-compatible and Macintosh users combined—also show significant differences for modem speed and Internet access. Almost half of librarians have computers with 14.4 or 28.8 kilobaud modems, compared to more than three-fifths of health care providers and scientists (Table 4). With regard to Internet access, excluding respondents who were not sure or did not know, 84% of scientists reported having Internet access, contrasted with 73% of health care providers and 71% of librarians and other information professionals. In sum, the survey results indicate that scientists as a group have greater Internet access and make heavier use of Macintosh and higher-end IBM-compatible computers. Physicians also make relatively greater use of higher-end IBM-compatibles, but have less access to the Internet. Librarians are more likely to use lower-end IBM-compatibles and have relatively less access to the Internet.

Geographic location. Zip code information provided by the respondents was used to characterize the locations from which NLM customers most often search. Almost half of the respondents (46%) were identified as searching from a location inside a city center. Twelve percent of the population indicated searching from a location outside of an MSA (considered to correspond to rural locations). The survey results were analyzed to identify any variables for which geographic location made a significant difference. The only variable so identified was Internet access, for which respondents from rural areas (as defined above) had statistically significantly lower levels of Internet access than respondents from urban areas ($p < 0.001$). Overall, 24% of urban customers did not have Internet access at their primary search location, compared with 36% of rural customers. These differences were most marked for customers using rural libraries as the primary search location. Almost half (48.6%) of these rural library search locations did not have Internet access—about double the overall average. In addition, the survey results indicate that customers searching from hospitals have uniformly lower levels of Internet access; about half lack Internet access whether searching from rural or urban hospitals (51.1% and 48.9% respectively).

Customer satisfaction. Respondents were asked to rate their satisfaction on a four-point scale ranging from "very satisfied" to "very dissatisfied." Respondents are for the most part satisfied with NLM online services: 58% were very satisfied; 33% moderately satisfied; 3% moderately dissatisfied; and 1% very dissatisfied (5% had no opinion or no response). Since there were so few dissatisfied customers, these data were insufficient to conduct statistical comparisons with the satisfied customers.

DISCUSSION

The survey results documented the already high level of Internet access among NLM customers and have implications for NLM's delivery of services. The survey indicated a higher than expected level of Internet access—about 70% of all respondents reported having Internet access. This considerably exceeds the U.S. national average estimated at about 40% of homes with computers, 10% to 15% of all homes, and 5% to 10% of the total U.S. population [7]. The survey results also indicate that, if the respondents without Internet access met their stated expectations to upgrade to the Internet during the subsequent twelve months, the percentage with Internet access would rise to the 85%-to-90% range. If the survey results are adjusted for the fact that fixed-fee users (about one-third of all users) by definition have Internet access but were excluded from the survey, the estimated percentages with Internet access are even higher.

NLM has identified the Internet as the source of one of its major opportunities to improve service delivery, especially for information dissemination. The survey results confirm the significance of this opportunity. Of the three-quarters of NLM customers with Internet access, 77% were already using Internet to access the World Wide Web, yet only 26% were using the Internet to access NLM databases. This suggests a large potential for future use of Internet-based services by NLM customers who are already Internet-capable, and whose numbers are likely to increase further as other NLM users upgrade to the Internet. In April 1996, NLM released Internet Grateful Med (IGM), an Internet-accessible version of NLM's Grateful Med search software for users of NLM databases.

However, the survey results also underscore that Internet access is uneven. For years, NLM has been concerned that certain geographic areas or user groups have less access than others to biomedical information resources, including the NLM online databases. This concern has underpinned NLM's special outreach programs aimed at users in rural and remote areas of the United States and to otherwise underserved populations. A recently completed five-year review of NLM outreach activities concluded that "[t]he RMLs [Regional Medical Libraries] should continue to reach out to rural and other underserved health professionals through further identification and targeting of those areas in which health professionals are still underserved" [8].

The survey results were analyzed to identify any variables associated with statistically significant differences in Internet access. The analysis confirmed that users from rural areas as a whole have significantly less access. The differences are even more dramatic for users at rural libraries. Among user locations, the survey results indicated that NLM customers at hospitals in all geographic areas (rural, suburban, urban) have significantly less Internet access.

These results underscore the continued need for NLM outreach programs (e.g., training, demonstrations, equipment upgrades) directed toward rural areas in general and rural libraries in particular, and toward hospitals regardless of location. If survey respondents carried out their stated intentions to upgrade to the Internet, access would improve significantly. The percentage of rural users without Internet access would drop from 36% to about 15% within twelve months of the survey, and the percentage of hospital-based users without Internet access would decline from about 48% to 22%. These are important areas for further monitoring and evaluation by NLM, the RMLs, and others.

The survey results also indicate that Internet access is correlated with the capabilities of the user's computer platform, as defined by the processor, size of memory, operating system, and modem speed. The overall positive relationship between equipment platform and Internet access seems plausible, given that users of higher-end computers typically are more sophisticated and more inclined to experiment with new applications. A key issue is what level of computer platform is sufficient to support reasonable Internet access? At the time of the survey, a platform with a 486 or Pentium processor, at least 4 megabytes of memory, the Windows operating system, and a 9.6 kilobaud or faster modem was judged to be adequate, based on the experience of NLM staff. About 52% of IBM-compatible users had platforms with all of these components. For Macintosh users, a platform with a System 7 operating system, at least 4 megabytes of memory, and a 9.6 kilobaud or faster modem was thought to be adequate. A reported 55% of Macintosh users had platforms with all of these components.

Since the survey, the volume and complexity of content on the Internet and World Wide Web continue to increase, and the requirements for an adequate computer platform continue to escalate.

The implication is that many NLM users would need to continue to upgrade their computer platforms in order to maintain satisfactory performance. Fortunately, users did indicate an intent to significantly upgrade. In addition, the price-performance of personal computers continues to fall. With continuation of current trends in the personal computer industry, it seems reasonably likely that most NLM users will continue to have adequate computer platforms, but this assumes regular upgrading and bears monitoring, especially in light of tightening hospital and library budgets.

The survey results provided NLM with an updated picture of current customers. The percentage of health care professionals using NLM databases continues to increase (now approaching one-half of all users), with librarians and scientists tied for second (at about one-fifth each). However, librarians are by far the most intensive users (57% search more than ten times per month, compared to just 12% of scientists and 8% of health care professionals). It is likely that librarians still account for the majority of searches of NLM databases, in absolute numbers of searches, even though a minority of total users. Overall, the results suggest that NLM must continue to support three major and different user groups—librarians who are highly trained in search techniques and are intensive users; health care professionals who generally have less training in informatics and conduct at most a few searches a month; and scientists who tend to be relatively sophisticated in using information technology but conduct fewer searches (compared to librarians, although more than health care providers).

Librarians search primarily from the library, and scientists from the office. The primary search location of health care providers, in comparison, is closely balanced between the home and the office (approximately a 50:40 split). Patients and students in this survey search primarily from home, but note that many students search at universities that have fixed-fee arrangements with NLM and thus were excluded from the survey. Given the large amount of home searching by health care professionals, NLM outreach can justifiably focus on facilitating home-based searching.

The survey results indicate that scientists as a group have greater Internet access and make heavier use of Macintosh computers and high-end IBM-compatibles. Given that most search from the office, scientists appear to be in the strongest position in terms of technology. Health care providers, on the other hand, have relatively lower Internet access but tend to have higher-end computer platforms—with more memory

and faster processors and modems. This suggests an opportunity to use training, demonstrations, enhanced Internet access, and the like to leverage the apparent availability of higher-end technical equipment to health care providers. In contrast, librarians overwhelmingly use IBM-compatibles that tend to be lower-end and also have relatively less Internet access (compared to scientists, but about the same as health care providers). In this sense, librarians as a group, the most intensive users of the NLM databases, are in the weakest position with regard to the availability of the technical resources (notably higher-end computer platforms with Internet access) needed to capitalize on electronic biomedical information. Closing this gap has been, and continues to be, a priority of NLM's outreach programs and the activities of the RMLs and the National Network of Libraries of Medicine (NN/LM), with more than 4,500 member institutions.

Efforts to ensure equity of access to electronic biomedical information resources must continue, especially for rural and other underserved populations and for user groups that do not yet consistently have all the ingredients needed for effective electronic access. NLM's goal continues to be to ensure that its customers—current and future—are able to derive maximum benefit from NLM's online databases and from other electronic biomedical information resources [9].

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APPENDIX A

National Library of Medicine Customer Survey*

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As part of a continuing effort to improve the quality and availability of its online services, the National Library of Medicine (NLM) would appreciate your taking a few minutes to tell us about the information technologies you currently use and those you anticipate using in the future. As a government agency, we would also like for you to tell us how you, our customer, feel you are presently being served.

For each question, circle the one best answer *unless* the instructions specifically ask you to circle all answers that apply. You may wish to confer with a technical person in your organization to answer some questions. If you have any questions about this questionnaire, you may call (800) 639-2030 between 9 A.M. and 9 P.M. eastern time. Thank you!

1. First, have you used MEDLINE and/or other NLM databases at any time in the past 12 months?
   a. Yes
   b. No

If you marked "No" to Question 1, stop here and return your questionnaire in the enclosed business reply envelope. If you marked "Yes," proceed to Question 2.

2. How often do you search the NLM databases?
   a. Less than once a month
   b. 1–3 times each month
   c. 4–10 times each month
   d. More than 10 times each month
3. From what location(s) do you conduct searches? Rank order by frequency. Use "1" for the most frequent, "2" for the second most frequent, etc.
   ___ Office
   ___ Hospital
   ___ Library
   ___ Home
   ___ Other (specify) _____

4. How do you most frequently search the NLM databases?
   a. Using Grateful Med
   b. Using the NLM command language
   c. Don't know or not sure
5. Do you have computer support personnel and/or a network/system administrator to help with hardware and software installations?
   a. Yes
   b. No
   c. Don't know or not sure
6. Please identify the one user group that **best** describes you:
   a. Practicing physician, nurse, or other health professional
   b. Scientist
   c. Educator
   d. Student
   e. Librarian or other information services professional
   f. Patient or other health care consumer
   g. Other (specify) _____
7. Please enter the zip code of the location from which you do most of your searching.

   □□□□□

8. What one type of **computer** do you *most often use* to search MEDLINE and other NLM databases?
   a. IBM-compatible ☞ **GO TO Q9**
   b. Macintosh ☞ **GO TO Q15**
   c. UNIX ☞ **GO TO Q22**
   d. Dumb terminal only; no computer ☞ **GO TO Q19**
   e. Don't know or not sure ☞ **GO TO Q22**

IBM-compatible PC users only Q9–14

9. What type of *processor* does this computer have now?
   a. Less than a 386 processor
   b. 386 processor
   c. 486 processor
   d. Pentium
   e. Don't know or not sure
10. How much *memory* does this computer have now?
    a. Under 4 megabytes (MB)
    b. 4 to 8 MB
    c. More than 8 MB
    d. Don't know or not sure
11. What *operating system* do you use on this computer now?
    a. I use Windows, Windows for Workgroups, or Windows NT
    b. I use Windows '95
    c. I use DOS, but the computer can run Windows
    d. I use DOS only, and the computer doesn't have Windows
    e. OS/2
    f. Don't know or not sure
12. Within the next 12 months, to what type of *processor* do you expect this computer or its replacement will be upgraded?
    a. Processor is not likely to be upgraded
    b. Will be upgraded to 386 processor
    c. Will be upgraded to 486 processor
    d. Will be upgraded to Pentium
    e. Don't know or not sure
13. Within the next 12 months, after upgrades, how much *memory* do you expect this computer or its replacement will have?
    a. Memory will not be upgraded
    b. 4 to 8 MB
    c. More than 8 MB
    d. Don't know or not sure
14. Within the next 12 months, to what type of *operating system* do you expect this computer or its replacement will be upgraded?
    a. Operating system will not be upgraded
    b. Windows, Windows for Workgroups, or Windows NT
    c. Windows '95
    d. OS/2
    e. Don't know or not sure
    ☞ **GO TO Q21**

Macintosh users only Q15–18

15. How much *memory* does this Macintosh computer have now?
    a. Under 4 megabytes (MB)
    b. 4 to 8 MB
    c. More than 8 MB
    d. Don't know or not sure
16. What *operating system* does this computer have now?
    a. Less than System 7
    b. System 7
    c. Don't know or not sure
17. Within the next 12 months, after upgrades, how much *memory* do you expect this computer or its replacement will have?
    a. Memory will not be upgraded
    b. 4 to 8 MB
    c. More than 8 MB
    d. Don't know or not sure
18. Within the next 12 months, to what type of *operating system* do you expect this computer or its replacement will be upgraded?
    a. Operating system will not be upgraded
    b. System 7
    c. Don't know or not sure
    ☞ **GO TO Q21**

Dumb terminal users only Q19–20

19. What type of dumb terminal do you use?
    a. Emulates VT-100
    b. Emulates VT-102
    c. Don't know or not sure
20. Within the next 12 months, to what type of computer do you expect this dumb terminal will be upgraded?
    a. Will not be upgraded
    b. Macintosh
    c. IBM-compatible
    d. Other: _____
    e. Don't know or not sure

All users can answer Q21–35

21. How confident are you that your predicted upgrades in type of processor, memory, or operating systems (if any) will actually occur in the next 12 months?
    a. No upgrades expected
    b. Virtually certain

c. Probable
d. Possible

22. Please circle any features your computer possesses.
CIRCLE ALL THAT APPLY.
a. Has a color monitor
b. Is a laptop

23. Do you use a modem to search MEDLINE and other NLM databases?
a. Yes
b. No ☞ **GO TO Q26**
c. Don't know or not sure ☞ **GO TO Q26**

24. What is the highest *speed* this modem can use now for data (not FAX) connections?
a. 1200 baud
b. 2400 baud
c. 9600 baud
d. 14400 baud
e. 28800 baud
f. Don't know or not sure

25. Within the next 12 months, to what speed do you expect this modem will be upgraded or replaced?
a. No upgrades to modem speed are expected
b. 2400 baud
c. 9600 baud
d. 14400 baud
e. 28800 baud
f. Don't know or not sure

26. What type of access to the Internet do you have through the computer you most often use to search NLM's databases?
CIRCLE ALL THAT APPLY.
a. I don't have Internet access ☞ **GO TO Q31**
b. Ethernet, Novell, or other local area network (LAN)
c. Dial-up with a modem (e.g., using SLIP or PPP)
d. Prodigy, American Online, CompuServe, or other gateways
e. Don't know or not sure ☞ **GO TO Q31**

27. Do you currently use the Internet as a communications link to access NLM's online databases?
a. Yes
b. No Please specify why not:

28. What services can you access on the Internet, *whether or not you are using them now?*
CIRCLE ALL THAT APPLY.
a. E-mail
b. FTP
c. TELNET
d. Gopher
e. World Wide Web
f. Other (please specify) _____
g. Don't know or not sure

29. Through what mechanisms do you have the capability to access the World Wide Web, even if you aren't using this computer capability now?
CIRCLE ALL THAT APPLY.
a. No capability to access the World Wide Web
b. Web browser, such as Mosaic, Netscape, Web Explorer
c. Dial-up with modem (e.g., using SLIP or PPP)
d. Prodigy, America Online, CompuServe, or other gateways
e. Don't know or not sure

30. What services on the Internet have you actually used in the past 12 months at any time?
CIRCLE ALL THAT APPLY.
a. E-mail
b. FTP
c. TELNET
d. Gopher
e. World Wide Web
f. Other: (please specify) _____
g. Don't know or not sure

31. Within the next 12 months, what upgrades in Internet access do you expect that the computer you use to search NLM's databases or its replacement will receive?
CIRCLE ALL THAT APPLY.
a. No upgrades in Internet access expected ☞ **GO TO Q33**
b. Ethernet, Novell, or other local area network (LAN)
c. Dial-up with a modem (e.g., using SLIP or PPP)
d. Prodigy, America Online, CompuServe, or other gateways
e. Don't know or not sure ☞ **GO TO Q33**

32. How confident are you that your predicted upgrades in Internet access will actually occur?
a. Virtually certain
b. Probable
c. Possible

33. So far, are you satisfied with the online services NLM offers?
a. Very satisfied
b. Moderately satisfied
c. Moderately dissatisfied
d. Very dissatisfied
e. No opinion

34. Please indicate the reasons you use NLM's online services.
CIRCLE ALL THAT APPLY.
a. Easy to use
b. Cost-effective
c. Convenient
d. Quality of customer support
e. Best option available
f. Other (specify) _____

Note: If you regularly search NLM's databases from a **second** location, please photocopy this questionnaire and respond to questions 7 through 32 for the second location using a different color ink. Please return both questionnaires together.

Thank you for completing this survey. Please use the enclosed business reply envelope to return the survey to National Library of Medicine Customer Survey, 126 College Street, Suite 2A, Burlington, VT 05401.

Please attach any additional comments or suggestions you think would be helpful in NLM's continuous efforts to improve customer service.

* Public reporting burden for this collection of information is estimated to average 7 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to DHHS Reports Clearance Officer; Paperwork Reduction Project (0937-0201); Room 531-H; Humphrey Building; 200 Independence Ave., SW; Washington, DC 20201. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control number for this project is 0937-0201.