Information retrieval patterns and needs among practicing general surgeons: a statewide experience

By Kirsten R. Shelstad, M.S., M.L.S., AHIP*
Lecturer

Department of Family and Community Medicine
University of New Mexico
Albuquerque, New Mexico 87131

Frederick W. Clevenger, M.D., F.A.C.S.
Associate Professor

Department of Surgery
University of Florida Health Science Center-Jacksonville
Jacksonville, Florida 32209

Information retrieval has progressed from a reliance on traditional print sources to the modern era of computer databases and online networks. Surgeons, many from remote areas not served by professional medical libraries, must develop and maintain skills in information retrieval and management in both electronic and standard formats. One hundred thirty-three New Mexico general surgeons were surveyed to identify their information-seeking patterns in five areas: retrieval purposes, retrieval sources, barriers to access, techniques used, and continuing education needs. Ninety-nine (74.4%) surgeons responded to the survey. Ninety-five percent utilize professional meetings, the medical literature, and physician colleagues as information sources. Only 17% utilize the outreach services of the state's only medical school library. Common retrieval barriers were practice demands (71%), isolation from medical schools (30%), computer illiteracy (28%), and rural environment (25%). Continuing education topics related to information management would be valuable to 61% of the surgeons. Sixty-nine percent believe their current ability to access biomedical information is adequate, despite most frequently accessing their personal libraries for information related to decision-making or patient management. These data suggest that, despite significant information needs, surgeons have not embraced newer forms of information retrieval. It is imperative that surgeons acquire and maintain modern information retrieval skills as a means of remaining up-to-date in their profession. Professional surgical organizations and medical librarians should collaborate on these continuing education ventures.

INTRODUCTION

Various studies have examined the information needs of health professionals, the skills with which those needs are met, and the sources utilized to satisfy those needs [1–6]. While information needs have changed little over the years, the means of accessing information have changed dramatically. Librarians and users have moved from a reliance on traditional print sources such as Index Medicus, books, and journals, to the use of audiotapes, videotapes, and computer applications, entering an era almost totally reliant on information accessibility via computer databases and online networks.
New Mexico, the fifth largest state geographically, is home to only 1.6 million people, 55% of them living in three urban clusters [7]. Twenty-eight percent of the state's population live in twenty-four rural counties, eight of which have no practicing general surgeon [8]. In some counties, surgery is performed by family or general practitioners who have a secondary practice in general surgery. Thus, New Mexico serves as a reliable model for the problems encountered in the rural delivery of surgical care.

Surgical practitioners in a rural state face many stresses, including professional isolation; the difficulty in securing competent vacation or leave coverage; the need to treat a wide range of disorders in patients who tend to be sicker; finding time for advanced clinical training; and adjusting to the small town environment [9-14]. Whether in an urban or rural practice environment, general surgeons face the increasing pressure of surgical subspecialization, which necessitates that they, like family practitioners, know something about everything. This has the potential for creating information overload in a world where the amount of information doubles every eight years [15-16].

This study exclusively examined a general surgery population, and set out to identify these surgeons' information-seeking patterns in five areas: purposes for seeking information, information sources utilized, barriers to information retrieval in a predominately rural state, retrieval techniques used, and continuing education needs. The authors felt it would be useful to compare the information retrieval patterns of urban and rural general surgeons, and, in the current environment of proliferating biomedical information, to see whether a rural state's general surgeons had embraced newer methods of computerized information access.

METHODS

Using standard physician directories [17-18], 133 physicians in New Mexico who had a primary or secondary practice in general surgery were identified. Each physician was assigned an identification number so that surveys were returned with only the unique number on them, and not the physician's name. This ensured anonymity of the responses but allowed for the codes to be checked against a master list so a second survey could be sent to the non-responders. The surgeons were asked to identify their practice type as solo, group, or institution-based. The survey consisted of specific questions about the purposes for which information was sought, the sources from which the information was obtained, the barriers encountered in retrieving information, previous training in information-retrieval techniques, use of technology, and continuing education needs. This study did not analyze the skill with which information was obtained or used, nor did it analyze the correlation between the surgeon's age and use of newer forms of technology. A personalized cover letter written by one of the authors was enclosed with each pre-stamped, one-page survey, which was mailed in February 1994. A month after the initial mailing, a second cover letter and a survey were mailed to the non-responders. Each survey was coded according to the master list, to indicate whether the respondent lived in an urban or rural county, was board certified in general surgery or another field, or was a member of the American College of Surgeons. The text of the survey is appended.

RESULTS

Return rate/demographics

One hundred thirty-three physicians who had indicated a primary or secondary practice in general surgery were surveyed in February and March of 1994. Ninety-nine surgeons (seventy-four urban and twenty-five rural) responded to the survey, for a response rate of 74.4%. Chi-square tests were used to compare survey responses of rural and urban surgeons. The majority of the rural surgeons (68%) were in solo practice, while the urban surgeons were almost evenly divided among solo practice (33%), group practice (36%), and institution-based practice (31%). Eighty percent of the respondents were board certified (all but one in general surgery), and 55% were fellows of the American College of Surgeons. Of the non-board-certified practitioners, 32% had a combined practice in primary care and general surgery. The average respondent had spent 16.77 years in practice (the range was one to forty-two years). Only Albuquerque and Santa Fe general surgeons were served by professional medical libraries.

Purposes for information

Table 1 outlines the purposes for which New Mexico general surgeons sought medical information. Patient care, continuing medical education, and casual curiosity were cited more than half the time. Urban surgeons used information for teaching and publication significantly more than rural surgeons. Rural surgeons, however, used information more frequently for continuing education, patient education, and medical-legal purposes. These findings are similar to those of other studies on health professional information usage [19-21] and specifically surgeons and their information needs and sources [22-25].

Information sources

Table 2 demonstrates the sources used by surgeons to obtain information. Professional meetings, the
medical literature, colleagues, and continuing education courses were the sources most frequently used by both urban and rural surgeons. Urban surgeons used hospital and medical libraries, mediated literature searches, end-user literature searches, medical schools, and community libraries far more than their rural counterparts. Rural surgeons utilized personal libraries more than professional medical libraries, but these collections were more handy and easily accessed. Fifty-eight percent of the urban surgeons did their own literature searches, even though the majority of them had access to libraries and librarians.

Information barriers

Barriers to information retrieval are illustrated in Table 3. Not surprisingly, rural practice and its resulting isolation from expert colleagues, medical schools, and library resources were seen as major barriers by the rural surgeons. Limited hospital budgets, which result in little or no financial support for the purchase of standard information sources such as books and journals, were another barrier faced by rural surgeons. Twenty percent of the urban surgeons felt that their lack of knowledge about appropriate information sources was a barrier, a feeling shared by only 8% of their rural colleagues. Practice demands were a major barrier experienced by both urban and rural surgeons. Close to one third of the respondents considered computer illiteracy a barrier to their information retrieval needs.

Retrieval techniques

Currently practicing New Mexico surgeons were exposed to *Index Medicus* use (75%), clinical medical librarians (36%), and end-user searching (27%) during medical school or residency. These surgeons, who average seventeen years of experience, were exposed to computers when their use was in its infancy. Although slightly more than one third of general sur-

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**Table 1**

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<tr>
<th>Source</th>
<th>Rural surgeons (n = 26)</th>
<th>Urban surgeons (n = 74)</th>
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of information. Information overload issues were important to less than half of the surgeons. Rural surgeons’ continuing education needs were almost identical to those of their urban counterparts in two areas dealing with information access: finding new library sources of information and using new techniques for accessing standard information sources.

Both rural and urban surgeons felt that their ability to access biomedical information was adequate more than half the time, although rural surgeons were less likely to feel adequate in this area.

DISCUSSION

These data demonstrate many similarities, as well as differences, between urban and rural general surgeons in their information needs, the information sources they used, and the barriers to information retrieval they encountered. New Mexico general surgeons used biomedical information most frequently for patient care and continuing medical education, which shows a commitment to remaining up-to-date in their field. Patient education received more attention from rural general surgeons, perhaps because they have more established relationships with patients in smaller practices. Urban surgeons, on the other hand, used information for teaching and publication more frequently. Medical-legal issues were of marginal interest to New Mexico surgeons, possibly to their detriment, since physicians are known to have been sued for not searching the medical literature, and rural physicians are now being held accountable to the same standard of care as their urban colleagues [26].

These data are similar to previous studies that document the use of information sources for health professionals. Rural surgeons used continuing education as a means of obtaining information slightly more than urban surgeons, but they have fewer sources, such as colleagues and libraries, near at hand. While New Mexico surgeons demonstrated a level of comfort with using familiar information sources such as colleagues and personal libraries, only a slight difference was noted in the use of colleagues as a resource by urban surgeons, which is somewhat surprising since the majority of rural surgeons are in solo practice. Seventy-one percent of surgeons ranked pharmaceutical representatives as an informational source, an alarming thought considering that their viewpoint is probably biased. More than half of the surgeons used audio- and videotapes as a way to gather biomedical information. Their low cost and easy accessibility no doubt contribute to their popularity. It is not surprising that a larger percentage of rural surgeons used the outreach services of the state’s medical school library, although, sadly, the plethora of resources available through its outreach programs was used by only 17% of New Mexico general surgeons. Having an established working relationship with a medical librarian knowledgeable in the field of surgery and its literature represents the most time-efficient use of current biomedical information by general surgeons. Medical libraries need to establish and maintain proactive outreach programs headed by professionals who can make information services available in the region. Many successful medical library outreach programs have been described in the literature [27–32].

Rural surgeons more frequently accessed the medical literature from personal libraries than from professional medical libraries or librarians. This may be a discouraging fact, since librarians are information professionals with ready access to a multitude of sources, computerized and print. With medical literature exploding at a dizzying pace, it is becoming impractical to limit oneself to using only a reprint collection or personal library when the world’s medical literature is available and accessible through modern telecommunications techniques. Not surprisingly, professional as well as geographic isolation was felt to be a barrier for the rural general surgeons. Computer illiteracy, lack of knowledge about appropriate information sources, and practice demands were also considered barriers. Although interested in critical care, new surgical techniques, disease diagnosis, and new drugs as continuing education topics, more than half of the surgeons were also interested in using the biomedical literature to solve patient management problems, discovering new sources of

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information available through the library, and learning new techniques for accessing standard informational sources.

The picture of surgical practice in a rural state that emerges is one of burdensome practice demands, which allow little or no time for doctors to keep up with advances in the surgical field. If there is time, the surgeons are not sure how to access up-to-date information appropriately. These surgeons use familiar information sources because of the barriers to information access they perceive: geographic isolation, practice demands, and computer illiteracy. They want to learn more about using the biomedical literature and new sources of information available through libraries, but either they have no professional library access, or the libraries are not taking advantage of opportunities to promote their resources or teaching role. The use of electronic information access for research, teaching, and patient care is essential for surgeons to succeed in their field [33-35].

One question that needs to be answered is whether surgeons suffer from computer illiteracy because they do not have access to computers, or whether they ignore computer access because they are computer illiterate.

Many of New Mexico's general surgeons attended medical school and residency when the emphasis was on using print sources for information retrieval. Although most medical schools now incorporate some kind of computer instruction into their curricula, with the goal of fostering a computer approach to lifelong, self-directed learning [36-39], limitations in those programs have been demonstrated [40]. Minimum standards of computer literacy should be attained by the completion of surgical residency. Although professional surgical organizations have not recognized the benefits of involving librarians in the lifelong learning habits of surgeons, Gramlich [41], a proponent of lifelong learning for surgeons, and others [42] have been strong advocates of the role played by medical libraries in providing continuing education for surgeons. For the surgeon already in practice who feels especially limited in modern information retrieval techniques, continuing education for surgeons at the state and national levels, in collaboration with professional groups such as the Medical Library Association and the Special Libraries Association, is proposed. Introductory courses on computerized information retrieval [43-45], including such topics as e-mail, the Internet, and end-user searching are appropriate courses to be sponsored in collaboration with surgical organizations such as the Association for Academic Surgery and the American College of Surgeons. Medical schools and medical school libraries must also begin to offer introductory hands-on computer classes (with American Medical Association Category I credit) for their states' practicing physicians. Such courses would help to break down many of the barriers perceived by rural surgeons, as well as the very real barriers faced by surgeons, rural or urban, who employ outdated information retrieval techniques. These courses, however, must be concise, efficient, and geared to adult learners, and might have to be taken "on the road" in light of the practice demands outlined in Table 3.

The Internet, as the foundation of the information superhighway, would allow New Mexico general surgeons access to a myriad of communication features, such as continuing education via telecommunications, communication with colleagues around the state and world via e-mail, and access to electronic bulletin boards or discussion lists [46-50]. Surgical discussion groups of potential interest to surgeons are SURGERYNET, a discussion list for general surgeons that offers a forum for the exchange of ideas, knowledge, and information; the Food and Drug Administration (FDA) Electronic Bulletin Board, which lists recently approved drugs and devices; AIC-L (anesthesia and intensive care); PED-EM-L (pediatric emergency medicine); EMERG-L (emergency medicine); RURALCARE (rural health care); and the Center for Disease Control and Prevention's Morbidity and Mortality Weekly Report. Online reference sources, searches of medical databases, and university catalogs are also available on the Internet, and can bring the world's medical literature into a practitioner's office or home, functioning as an adjunct to professional library services. Some major advantages of having Internet access—communicating with colleagues, accessing bulletin boards, and accessing informational databases—would reduce the isolation felt by rural practitioners. Model programs of telemedicine via the Internet are described in the literature [51-53].

CONCLUSIONS

The data suggest that, despite significant information needs, New Mexico general surgeons have not embraced newer, computerized methods of information retrieval to any great extent. Despite the fact that they use computers and computer networks less than one-third of the time, 73% of urban and 58% of rural general surgeons feel that their ability to access biomedical information is adequate. They use the biomedical literature from their personal libraries more than they access literature searches and other resources from a professional medical library; this may result in excessive and ineffectual use of limited time and outdated resources. This is a significant problem in rural areas where practitioners already feel a sense of isolation from resources and colleagues. With today's rapid advances in information it is imperative that surgeons, as well as all other health professionals, know the basics of electronic information retrieval.
al as a means of remaining up-to-date in their profession. In the present climate of information proliferation and rapid technology transfer, health professionals should know basic computer usage to further and maintain their self-directed, lifelong learning habits. New Mexico general surgeons are poised for continuing education opportunities that include new library sources of information and new techniques for accessing standard information sources. Leaders in the surgical profession such as the Association for Surgical Education, the Association of Program Directors in Surgery, the American College of Surgeons, and the Association for Academic Surgery, in collaboration with experienced medical librarians, must take the lead in preparing surgeons to access information and learning opportunities in the twenty-first century.

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APPENDIX A

University of New Mexico School of Medicine Information Needs and Uses of Surgeons

Unique # __________ County ____________ # Beds primary hospital ____________ Years in practice __________

A. Type of practice
1. _____ solo 2. _____ group 3. _____ institution-based

B. For what purposes do you seek medical information? (Check those that apply.)

4. _____ patient care 8. _____ medicolegal purposes
5. _____ teaching 9. _____ research for publication
6. _____ curiosity 10. _____ patient education
7. _____ continuing medical education

C. From what sources do you receive your information?

(KEY: 1 = <monthly; 2 = > monthly; < weekly; 3 = >weekly; <daily; 4 = daily)

11. _____ M.D. colleagues 18. _____ CE courses
12. _____ medical literature 19. _____ computerized literature searches (by you)
13. _____ pharmaceutical reps 20. _____ computerized literature searches (by librarian)
14. _____ professional meetings 21. _____ personal library
15. _____ hospital/medical library 22. _____ community library
16. _____ professional organizations 23. _____ state medical school
17. _____ UNM Medical Library outreach programs

D. What barriers to information retrieval do you encounter? (Check those that apply.)

24. _____ practice demands 27. _____ lack of knowledge about appropriate sources
25. _____ rural environment 28. _____ computer illiteracy
26. _____ limited hospital budgets

Isolation from:
29. _____ medical schools
30. _____ research institutions
31. _____ conferences
32. _____ expert colleagues
33. _____ libraries

Received February 1996; accepted May 1996
E. What training in medical school/residency did you receive in information-retrieval techniques?

34. _____ use of *Index Medicus*
35. _____ clinical medical librarian service
36. _____ use of computerized literature searching
37. _____ other

F. What non-print media do you use? (Check those that apply.)

38. ____ audiotapes
39. ____ television
40. ____ computers
41. ____ computerized information networking (e-mail, Internet)
42. ____ motion pictures
43. ____ CDs
44. ____ videotapes

G. What are your continuing education needs? (RANK: 1 = important, 2 = somewhat important, 3 = not important)

45. _____ surgical techniques
46. _____ critical care
47. _____ health care financing
48. _____ disease diagnosis
49. _____ using the biomedical literature to solve patient management problems
50. _____ dealing with information overload difficulties
51. _____ new library sources of information
52. _____ new techniques of accessing standard information sources
53. _____ new drugs
54. _____ health care systems (EMS)
55. _____ certification (ACLS/ATLS)
56. _____ other

H. Your current ability to access biomedical information is: _____ adequate _____ inadequate