

Carpal Tunnel Syndrome in ARL Libraries

Joyce K. Thornton

Carpal tunnel syndrome (CTS), commonly found in manufacturing operations, is spreading from this traditional haunt to nontraditional settings. Libraries are one setting where employees are sustaining an increasing number of CTS injuries. This study reports the results of a survey of the libraries holding membership in the Association of Research Libraries. Based on information obtained via a questionnaire, the study reports the incidences of CTS and the measures libraries are taking to cope with this pervasive health condition. Repeated comments from respondents also are included. This article concludes by listing recommendations to help reduce carpal tunnel syndrome.



The computer's presence is so pervasive in our lives today that we hardly notice it. It is a very rare occasion when a person's life and occupation are not in some way affected by computers. Libraries are no exception. Computers have become indispensable tools in library culture because they are effective and efficient in serving the library's needs, but recent information suggests that computer operations may cause pain, create emotional stress, and diminish the quality of work life for users. Computers simplify jobs into smaller, more repetitive tasks so that people can work faster and longer while producing more—but at what price?¹ As staff pound away on the keyboard rapidly and continually, it in turn is pounding them. This repetitive pounding can lead to debilitating pain, hours of physical therapy, and in many cases

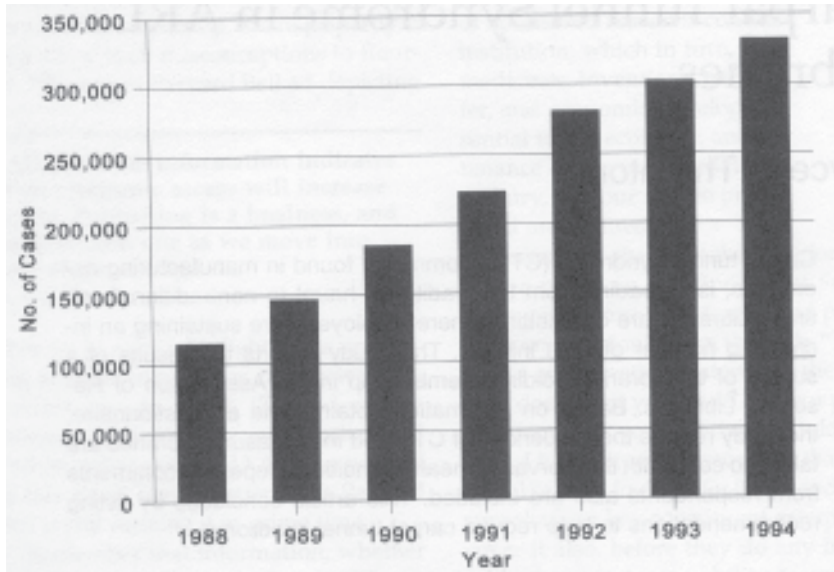
surgery. If not currently at your library, carpal tunnel syndrome is on its way.

Carpal Tunnel Syndrome Described

Rapid continual motion or rapid repetitive motion can cause injuries to the body. These injuries are known collectively as repetitive strain injuries (RSIs), repeated trauma disorders (RTDs), or cumulative trauma disorders (CTDs). The terms refer to the group of musculoskeletal disorders involving injuries to the tendon, tendon sheaths, and related bones; and the muscles, ligaments, and nerves of the hands, wrists, elbows, arms, shoulders, neck, back, or legs.² One CTD, carpal tunnel syndrome (CTS), has reached epidemic proportions and has been called the technological disease of the '90s. Often CTS is caused by repetitive motion and is common in occupations that require repetitive use of the hands, such as keyboard use. Kate Montgomery de-

Joyce K. Thornton is Executive Assistant to the Dean and Director of Libraries at Texas A&M University; e-mail: jkthorn@tamu.edu.

FIGURE 1
Growth in Number of Cumulative Trauma Disorders Cases



Source: U.S. Department of Labor, Bureau of Statistics, *BLS Reports on Survey of Occupational Injuries and Illness*.

scribes CTS as entrapment and compression of the median nerve because of structural, muscular, and postural misalignment. It is brought on by the overworked, overstrained muscles of the arms and hands, resulting in a loss of nerve conductivity leading to muscle-strength problems.³ According to the Bureau of Labor Statistics, CTDs are growing far more rapidly than other work-related problems (see figure 1). The 302,400 CTD cases reported in the United States in 1993 were 165 percent higher than those reported in 1988. In 1996, the Occupational Safety and Health Administration (OSHA) provided a more specific breakdown of CTD injuries, including type of CTD.

These reports also suggest that CTDs are spreading from their traditional haunts in manufacturing and are affecting increasing numbers of workers in offices, retail stores, and other nonfactory settings.⁴ CTS is the most commonly re-

ported of the CTDs, and recent information suggests that libraries are one setting where employees are sustaining an increasing number of CTS injuries.

Thomas suggests that the condition may affect both hands or only one hand, but the symptoms are usually greater in the dominant hand.⁵ Some library positions require workers to hold a sustained posture as they carry out the same tasks again and again. Many jobs focus the entire workday into one or two small sets of muscles that hold or repeat a motion all day. The amount of time these muscles and tendons spend under tension reduces their blood supply, thereby contributing to CTS.⁶ CTS and related repetitive stress injuries are removing employees from their jobs and requiring hours of rehabilitation therapy and sometimes surgery.⁷ Current automation practices that call for extensive use of computers, coupled with the application of anticipated new technologies essential to li-

brary operations, are requiring administrators to assess CTS problems in the organization and to provide ways of preventing and reducing this sometimes crippling disease.

Literature Survey

Medical, corporate, and government publications are replete with articles on CTS, repetitive stress, and repetitive motion injuries. However, a search of library literature reveals few articles on CTS in libraries. Ricks has defined CTS, and described its causes and treatments. He concludes that as libraries implement new technologies, the risk of developing CTS among employees will increase.⁸ LaRue has looked at health hazards (including repetitive strain injuries) surrounding the use of video display terminals. He cautions that RSI is not to be taken lightly and that CTS is costly, thus prevention is far better and cheaper than the cure.⁹

In 1990, James M. Kusack surveyed fifty-eight large public libraries to find out whether public library employees were affected with CTS as much as newspaper or telephone company employees were.¹⁰ Of the thirty-eight libraries responding to his survey, seventeen reported one or more employees with CTS (one of which reported nine cases) and twenty-one said they were unaware of any injured employees in their libraries. Forty-nine injuries were reported, six of which required surgery and one of which required steroid injections. Most required time off the job or the use of braces. Kusack found that all categories of employees were affected—thirty-four cases were support staff and three were librarians. Thirteen of the forty-nine injured spent more than 50 percent of their time at keyboards or computer workstations, and three of those injured spent less than 10 percent of their time at a keyboard. This library reported that it could not trace its three cases specifically to library-related work because the three injured persons spent only 10 percent of their

time at keyboards. Eight of the reported cases were among circulation clerks who were responsible for sensitizing and desensitizing library materials. Kusack reports that the nature of the work and the amount of time spent on a single task are contributing factors for potential injury. Other factors include incorrect workstation design and poor work methods.

Related articles include Richard Eissenger and Thomas W. Ricks's discussion of how a large academic library was coping with repetitive-motion injuries.¹¹ Eissenger and Ricks surveyed members of a library staff to find out the number of work-related injuries in the library and to establish the level of the staff's con-

Eight of the reported cases were among circulation clerks who were responsible for sensitizing and desensitizing library materials.

cerns about and knowledge of repetitive-motion injuries. The researchers concluded that new technologies will continue to be implemented by librarians who must be aware of the potential problems that come with them. The authors think that working within a cooperative rather than an adversarial environment can allow the fullest use of these new technologies, where productivity and a healthy environment can exist together. Teri Switzer has outlined a six-step cost-effective ergonomics program developed at Colorado State University.¹² She concludes that the key elements to a successful ergonomics program are creating a sense of ownership and helping staff to realize that their well-being is important. Prevention is an important management tool in the fight against carpal tunnel syndrome.

An article by Elizabeth N. Steinhagen and Carolyn J. Mueller discusses ergonomics from the catalog librarian's perspective.¹³ The authors reemphasize the fact that "little is found in the literature"

on how, or whether, librarians are addressing ergonomic concerns. They developed a questionnaire to obtain data, focusing on the catalog librarian in 185 medium-sized academic libraries, on the amount and types of cataloging being done, and on the availability of ergonomic options. The authors concluded that as online public access catalogs become more prevalent, catalog librarians are expected to become more frequent users of computers, leading to concerns about physiological effects of computer use and greater availability of ergonomic furniture and other remedies. This survey is the first attempt at reporting on how a group of academic libraries is coping with CTS.

Methodology

This author's interest in carpal tunnel syndrome in academic libraries stems from being employed in a large academic library with a collection of 2.1 million volumes where over a five-year period (1990-95), twenty-seven (13.5%) of the two hundred employees were diagnosed with, or showed symptoms of, CTS; two (1%) required surgery and eight (4%) wear wrist braces for therapeutic reasons.

The goals of this study of CTS among libraries that are ARL members are to: (1) determine the number of reported cases of CTS, (2) learn what measures these libraries are taking to alleviate this affliction, (3) provide information on the positions most affected, (4) find out if the amount of time spent at keyboards or computer workstations influences the number of cases, and (5) ascertain whether changes are being made in personnel policies because of CTS. A comments section and a request for pertinent information were included on the survey.

To obtain information, a short questionnaire was formulated and mailed to the 119 ARL directors in November 1995. To increase the number of surveys received, a reminder was faxed to the sixty nonresponding libraries in January ex-

Library	Total Staff	No. of Diagnosed CTS Cases	% of Staff Affected
1	215	4	1.9%
2	282	3	1.1
3	229	0	0.0
4	95	0	0.0
5	110	1	0.9
6	200	2	1.0
7	500	50	10.0*
8	509	3	0.6
9	129	0	0.0
10	245	5	2.0*
11	300	7	2.3*
12	338	10	3.0*
13	205	2	1.0
14	111	3	2.7
15	125	3	2.4
16	137	2	1.5
17	398	10	2.5*
18	210	5	2.4*
19	170	9	5.3
20	165	4	2.4
21	150	3	2.0*
22	160	0	0.0
23	187	3	1.6
24	124	5	4.0*
25	262	1	0.4
26	204	6	2.9
27	417	50	12.0
28	140	1	0.7
29	109	8	7.3
30	275	27	9.8*
31	187	5	2.7
32	278	UA	0.0
33	200	10	5.0
34	435	7	1.6
35	250	9	3.6*
36	114	1	0.9

cont.

tending the deadline to February 15, 1996. Ultimately, seventy-six libraries (64%) responded, including seven of the eleven nonuniversity libraries. Four of the seventy-six responding libraries did not

TABLE 1 cont.
CTS Incidence Rate

Library	Total Staff	No. of Diagnosed CTS Cases	% of Staff Affected
37	432	1	0.2%
38	125	0	0.0
39	255	1	0.4
40	170	15	8.8*
41	181	12	6.6*
42	283	2	0.7
43	180	1	0.6
44	146	5	3.4*
45	66	0	0.0
46	380	5	1.3*
47	116	7	6.0
48	210	4	1.9
49	272	1	0.4
50	421	18	4.3*
51	230	4	1.7
52	145	0	0.0
53	110	1	0.9
54	514	10	1.9*
55	368	6	1.6
56	535	4	0.6
57	75	7	9.3*
58	115	8	7.0
59	201	27	13.4
60	151	1	0.7
61	124	4	3.2
62	208	10	4.8*
63	216	0	0.0
64	380	5	1.3*
65	176	29	16.5
66	91	3	3.3
67	423	23	5.4
68	165	11	6.7
69	213	3	1.4*
70	227	10	4.4
71	143	8	5.6*
72	157	4	2.5
Total	16,463	509	3.1

*Estimates provided by libraries.

complete the survey for various reasons including: requested information not collected, insufficient staff to answer all survey requests, and library policies restrict-

ing responses to surveys. Seventy-two libraries completed the survey.

Findings

One of the goals of the study was to learn the number of cases of CTS, thus the first question asked for the total size of the staff to calculate the reported incidence rate of CTS for each library. Size of staff (excluding students) ranged from 66 to 535 (see table 1). The second question asked for the number of staff who had reported incidences of carpal tunnel syndrome. Respondents were instructed to give an estimate if a precise number could not be given. One library reported having no procedure for providing this information; nine libraries reported no CTS injuries; and twenty-one libraries (29%) provided estimates ranging from one to fifty injuries per library. One library that provided an estimate said that CTS is occurring but because medical and claims policy exclude the unit from being involved, only self-reporting is available. Two libraries reporting estimates stated that some complaints came from staff who also had repetitive hand movement from recreational or outside interests.

In all, forty-one libraries reported a total of 277 injuries. One library of 500 employees estimated that 10 percent of the staff suffered from CTS; another library with 201 employees reported twenty-seven injuries; a third reported fifty injuries in the past five to six years; and a fourth reported twenty-nine cases within a staff of 176.

In reporting the number of staff receiving medical treatment for CTS, fourteen libraries reported estimates ranging from three to fifty cases per library, and three libraries said that the information was unavailable (although one of these said that it had an increasing number of employees out on medical leave). Two libraries reported that the number was unknown. One library did not respond to this question. Two libraries said that the question was not applicable. Seven librar-

ies reported that none of the staff had received medical treatment. Forty-three libraries reported that 322 employees received medical treatment, including twenty-two who had surgery and seven

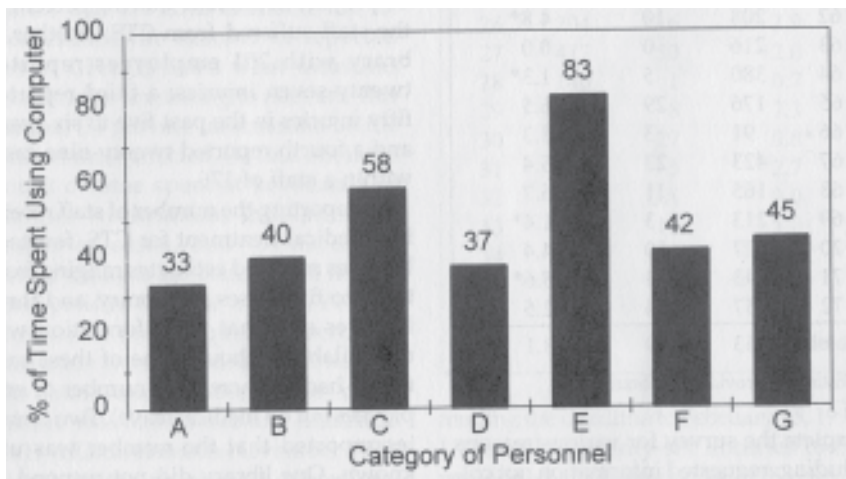
Forty-three libraries reported that 322 employees received medical treatment, including twenty-two who had surgery and seven who received therapy.

who received therapy. Several libraries that provided an estimated number of incidences of CTS were able to report exact numbers for those staff who received medical treatment.

The fourth question solicited information on job titles and percent of time spent using keyboards or sensitizing/desensitizing equipment. Fourteen libraries did not answer this question. Five libraries reported job titles, but not percent of time spent at keyboards. Figure 2 shows the average percentage of the workweek each category of personnel spent using

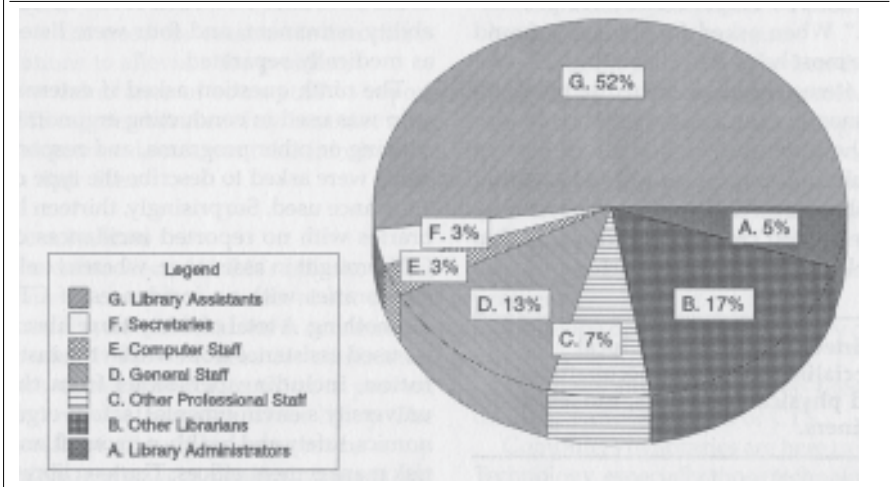
computer keyboards. Group E, which included computer support specialists, database managers, programmers, heads of automation, and system heads, spent a large part of the workweek (83%) using keyboards. The nonlibrarian professional group (group C) used a keyboard 58 percent of the time. This group included administrative assistants, executive assistants, staff assistants, newsletter editors, and development officers. Library technicians, library assistants, and library specialists (group G) were the third heaviest users of keyboards, spending an average of 45 percent of their workweek at keyboards. Interestingly, the secretaries group (group F) and the nonadministrative librarians in group B reported similar computer use (42% and 40%, respectively). The library administrators, which included library directors, archivists, and department heads, used a keyboard an average of 33 percent of the workweek. Individuals classified as clerks, photocopy staff, and mail room clerks (group D) reported a keyboard frequency of 37 percent.

FIGURE 2
Average Time Spent Using Computers



- A. Lib. Admin.
- B. Other Lib.
- C. Other Prof.
- D. Gen. Staff
- E. Comp. Staff
- F. Secretaries
- G. Lib. Assts.

FIGURE 3
Percent of Total Cases in Each Job Category



For comparison purposes, figure 3 provides the percentage of the total cases of CTS that fall within each category. It should be noted that group G included 52 percent (individual) of the CTS cases. Thus, libraries would do well to include this particular staff in any educational or preventive program.

Regarding the measures libraries had undertaken to eliminate, prevent, and provide relief for CTS, respondents were asked to check all items that applied. Sixty-five libraries bought adjustable ergonomic chairs, some in response to CTS problems. Several libraries that reported no cases of CTS purchased ergonomic chairs anyway. Forty-five libraries purchased ergonomic desks/workstations, thirty-two purchased ergonomic keyboards, and fifty-one purchased other supporting equipment such as wrist rests, footrests, and keyboard shelves, mostly on a case-by-case basis. Forty-two libraries provide training in the use of ergonomic chairs/workstation, and forty routinely provide training on preventive measures, whereas some provide training as requested. Twenty libraries provide training exercises to develop flexibility and strength in vulnerable areas.

Fourteen libraries actually changed their personnel policy to allow more frequent breaks; others have achieved the same effects informally by encouraging staff to take frequent breaks. The response for varying tasks seemed to follow the same pattern as taking more frequent breaks. Job rotation was informal and left up to the discretion of the department head.

Other noted changes included: (1) educating employees and sharing responsibility for prevention, (2) changing heights of work surfaces/retrofitting existing desks and tables, (3) including ergonomics as a part of new staff orientation, (4) creating active ergonomic committees or teams, (5) establishing task forces to review the literature and develop training sessions, (6) developing a light-duty program (work not involving heavy computer use), (7) outlining procedures to follow in case of injury, (8) trying a combination of solutions as circumstances dictate, and (9) evaluating staff for potential problems. One library said that it was in the middle of evaluating its central technical services unit of more than 100 employees, and had found that 20 percent are at high risk and 80 percent are at varying levels of risk. These find-

ings have led this library to embark on a "program of education of employees plus shared responsibility for prevention." When asked for the items found to be most helpful in alleviating CTS, the two items listed most frequently were ergonomic chairs and wrist rests/pads.

The seventh question asked for the number of employees shifted to other jobs because of CTS and to what jobs they were shifted. Several libraries said that employees have the opportunity to job

Thirteen libraries used local specialists including occupational and physical therapists, nurses, or trainers.

share where computers are not needed. Several indicated that some employees were shifted on a temporary basis when warranted. One library reported one employee on leave waiting for the results of surgery. One person was shifted from typing to answering the phone—headsets were provided. One was shifted from photocopying to equipment maintenance, and one to a branch library where time at a keyboard was reduced dramatically. One person was shifted to several different jobs/areas and special projects were designed to find a suitable match. Some employees were temporarily shifted to light-duty work. One was shifted from shelving to payroll; and a stack assistant was placed on modified assignment, progressively reintroducing the regular assignment with instruction, assistance, and close monitoring by the head of the institution's Environmental Safety and Health Office. One person was promoted from a billing clerk to a professional position, one was shifted from a circulation clerk to a branch library assistant, and one was shifted from administrative assistant to library assistant.

Responses to the eighth question show that twelve employees resigned due to CTS. Of these, workmen's com-

pensation benefits had expired for two individuals and no alternate position could be found. Two other received disability retirement, and four were listed as medically separated.

The ninth question asked if external help was used in conducting ergonomic training or other programs, and respondents were asked to describe the type of assistance used. Surprisingly, thirteen libraries with no reported incidences of CTS brought in assistance, whereas only six libraries with no incidences of CTS did nothing. A total of thirty-three libraries used assistance from within the institution, including personnel from the university's environmental, safety, ergonomics, safety and health, personnel, and risk management offices. Thirteen libraries used local specialists including occupational and physical therapists, nurses, or trainers. Other types of assistance included an accident investigator and a consultant. Four libraries used library staff, ergonomic committees, or task forces using published materials, videos, etc. Three did not say what type of assistance was used. One library did not answer the question. Six libraries used more than one type of assistance.

The last section of the study questionnaire asked for comments on any of the questions. The major comments included:

- the belief that CTS is underreported;
- the helpfulness of ergonomic training and review;
- the evolving definition of ergonomics;
- the lack of assistance and special funding to enable libraries to implement university-mandated occupational injury prevention programs;
- the need for a better means of reporting CTS;
- the seriousness of CTS;
- the pleasure for staff that library administration is encouraging them to learn more about preventing work-related injuries;

- the need for a general survey of computer-related complaints by long-term users;
- the need for reasonable accommodations to alleviate the problem;
- reluctance of some staff to report CTS injuries because they have not seen a doctor or do not want this information in their files.

Conclusions

The data collected in this study show that there is cause for concern about carpal tunnel syndrome injuries in academic libraries. It shows a need for administrators to take immediate action to prevent and reduce the potential for injury. The health of all employees must be a top priority—financial constraints must not be used as an excuse to do nothing or to do very little.

Continued extensive use of computers and new technologies essential to library operations will heighten the problem. Measures must be in place to counteract the consequences. Administrators must take a close look at how jobs are structured. The more narrowly a job is defined (only computer input), the more likely it is that staff will develop CTS. Diversifying jobs may result in fewer cases. Prevention is the best approach to combat CTS. Purchasing ergonomic furniture and peripherals, promoting changes in job habits, and educating employees through well-designed ergonomic programs are the keys to maintaining a healthy, productive work environment. The results show that in many instances, the library should use external help in implementing ergonomic programs.

A further implication of the study is that other library tasks, including the handling of materials, photocopying, and outside activities may contribute to CTS. Administrators must take responsibility for reducing or removing the environmental factors that contribute to this serious health condition.

Recommendations

The author recommends that libraries:

- immediately implement a proactive ongoing ergonomics program;
- solicit input from staff when developing solutions for ergonomic problems;
- provide guidelines for reporting CTS;
- bring in external help from other agencies on the campus or elsewhere;
- stress preventive measures and education in the fight against CTS;
- immediately investigate ergonomic problems;
- provide diverse tasks for heavy computer users;
- periodically view the web sites addressing various aspects of CTS.

Computers in libraries are here to stay. Technology, especially those technologies calling for extensive computer use, will continue to transform the library workplace. With this transformation, there will likely be a considerable surge in the number of CTS cases. As we use technology to enhance the capabilities of our human resources, we must take measures to provide a safe and comfortable work environment for our employees.

Additional Areas of Study

To ascertain the full impact of carpal tunnel syndrome in the workplace, other areas should be studied. There exists a need to research the indirect cost of CTS including loss of productivity, absenteeism, cost for workers taking over for injured staff, and time lost for medical appointments, therapy, and surgery/recovery. These costs may reveal the urgent need for libraries to take more active measures in helping to prevent and eliminate CTS. Surely prevention is less costly than the alternatives.

A second area for study is the number of workmen's compensation and insurance claims being filed for CTS. This study could show more precise incidence rates for various job categories or departments. This would reveal high-risk areas—areas that would need frequent monitoring.

Notes

1. Thomas W. Ricks, "What, Exactly, Is Carpal Tunnel Syndrome?" *College & Research Libraries News* 53 (Mar. 1992): 164-65.
2. Robert E. Thomas et al, "A Computer-Aided Algorithm for Evaluating Thermogram of the Hand," *Computers and Industrial Engineering* 26 (July 1994): 501-09.
3. Kate Montgomery, "The Body Is Not a Robot," Sportstouch CTS article, available at <http://www.sportstouch.com/art.html>.
4. U. S. Department of Labor, Bureau of Labor Statistics, "Repetitive Tasks Loosen Some Workers' Grip on Safety and Health," *Issues in Labor Statistics*, Summary 94-9 (Aug. 1994): 1.
5. Thomas et al, "A Computer-Aided Algorithm," 501.
6. "Repetitive Strain Disorders," RSIFAQ, available at <http://www.impaccusa.com/impacc9b.html>.
7. James M. Kusack, "The Light at the End of the Carpal Tunnel," *Library Journal* 115 (July 1990): 56-59.
8. Ricks, "What, Exactly, Is Carpal Tunnel Syndrome?" 165.
9. James LaRue, "Terminal Illnesses," *Wilson Library Bulletin* 66 (Sept. 1991): 85-88.
10. Kusack, "The Light at the End of the Carpal Tunnel," 56-59.
11. Richard Eissenger and Thomas W. Ricks, "Coping with Repetitive-Motion Injuries in a Large Academic Library," *College & Research Libraries News* 53 (Mar. 1992): 161-62.
12. Teri Switzer, "Ergonomics: An Ounce of Prevention," *College & Research Libraries News* 56 (May 1995): 314, 316-17.
13. Elizabeth N. Steinhagen and Carolyn J. Mueller, "Ergonomics and the Catalog Librarian," *Technical Services Quarterly* 9, no. 4 (1992): 29-37.