
Citation patterns in the health sciences: implications for serials/monographic fund allocation

By Amrita J. Burdick
Assistant Chief Health Sciences Librarian

Anne Butler*
Clinical Medical Librarian

Marilyn G. Sullivan
Chief Health Sciences Librarian

University of Missouri-Kansas City Health Sciences
Library
Kansas City, Missouri 64116

This study sought to determine optimal serial-to-monograph ratios for collection development by comparing citation frequency with current library practice. Internal medicine literature cited an average of 88% serial references and 12% monographs. In an observational study, teaching physicians on internal medicine rounds cited 89.5% serials and 10.5% monographs to student teams. By contrast, health sciences libraries included in the Houston statistics spend an average of 79% of acquisitions budgets for serials and 21% for monographs. An 88:12 acquisitions budget ratio would be more appropriate, reflecting actual use of serials and monographs in the health sciences.

Many studies have focused on optimal procedures for determining serial-to-monograph ratios for collection development; most have addressed allocation of the budget among various academic departments. However, there are no consistent standards for allocating acquisitions funds in academic libraries [1-2]. Some authors have stated that allocations should be based on the usage of material types across disciplines [3-4]. As a rule, serials are used heavily in the sciences, while monographs are used more widely in the humanities [5-6]. The present study, assuming that budget allocations should reflect actual use of materials, seeks to ascertain the use of cited references in research and clinical settings.

A recent review by Devin and Kellogg referred to historical studies in various subject areas as a basis for determining percentages allocated to serial and monograph budgets. They concluded that the serial-to-monograph ratio "should be based on the use of the literature by researchers in that subject area as determined by citation studies" [7]. For the medical subject area, they cited a 1932 study by Sherwood

which showed that 85.2% of citations referred to serial sources [8]. Two other studies of citation patterns in health sciences also dated back some fifty years [9-10]. While some of the data regarding the frequency of journal citations covered in the 1930s studies now are published annually as part of the SCI Serial Citation Reports [11], the ratio of monographs to serials is not provided. The present study replicated this section of the Sherwood study in case the advent of online access had changed citation patterns.

Although citation studies have been a standard measure, they reflect many variables, including the author's reputation and the availability of materials [12]. There has been some question as to whether they reflect usage [13]. While the citation count represents the use of monographs and serials in published clinical research, it may not be representative of use for education or patient care. Moreover, a citation measure does not take into account acquisitions fund allocations within health sciences libraries.

Before designing a tool for measuring actual use, the authors examined articles that used a variety of measures. A national science lending library lent 91% serials [14]. A national health sciences library lent 94% serials [15]. Self-reported studies of clinical information use gave little feedback on the use of serials

* Currently Medical Librarian, North Kansas City Hospital, 2800 Hospital Drive, North Kansas City, Missouri 64116.

Table 1
Serials-to-monographs citations analysis

Journals	Books cited	Serials cited	Total	Serials (%)
<i>British Medical Journal</i>	171	486	657	74
<i>Lancet</i>	112	1,009	1,121	90
<i>American Journal of Medicine</i>	96	1,226	1,322	92
<i>Annals of Internal Medicine</i>	208	1,572	1,780	88
<i>Annual Review of Medicine</i>	149	2,570	2,719	95
<i>Archives of Internal Medicine</i>	98	1,125	1,223	92
<i>JAMA</i>	237	1,098	1,335	82
<i>Mayo Clinic Proceedings</i>	84	1,671	1,755	95
<i>Medicine</i>	288	4,690	4,978	94
<i>New England Journal of Medicine</i>	245	1,549	1,794	86
Total	1,688	16,996	18,684	91
Monographs				
Cecil's	72	261	333	78
Harrison's	154	416	570	73
Harvey's	127	490	617	79
Kelley's	88	327	415	79
Oxford's	115	601	716	84
Stein's	118	470	588	80
Total	674	2,565	3,239	79
Combined total	2,362	19,561	21,923	89
Weighted total serial %			88.3	

and monographs, although physicians in one study estimated they spent five hours per month reading medical serials and two hours each month using monographs [16].

DESIGN AND METHODOLOGY

The authors reviewed monograph and serial distribution from three perspectives to determine the ratio reflecting actual use of serials and monographs. The first section of the study was modeled on the citation data from the Sherwood study, although it expanded the range of sources reviewed. As a source of citations, the authors chose the ten general internal medicine serials that appeared in the top 500 journals of the

Table 2
Serials cited during clinical rounds

Physician	Mono-graphs	Serials	Total	Serials (%)
1	0	4	4	100.0
2	0	2	2	100.0
3	0	2	2	100.0
4	2	28	30	93.0
5	0	12	12	100.0
6	1	13	14	93.0
7	1	11	12	92.0
8	9	6	15	40.0
9	0	5	5	100.0
10	0	9	9	100.0
11	0	19	19	100.0
Total	13	111	124	89.5

Table 3
Serials budget allocations by academic health sciences libraries* 1980-1981; 1985-1986; 1989-1990†

	1980-1981	1985-1986	1989-1990
Serials minimum	38%	48%	52%
Serials maximum	100%	100%	100%
Serials average‡	78%	77%	82%

* The lowest average for any institution for the years sampled was 61%; the highest average for any institution, 96%.

† Data from *Annual Statistics of Medical School Libraries in the United States & Canada, 1980-81, 1985-86, and 1989-90*.

‡ This average represents the mean of all institutional averages for the year.

1989 *Science Citation Index* serial impact factor list. Because some studies had found that monographs tended to cite monographs and serials tended to cite serials [17-18] and that there were some national biases in citation [19], the authors also checked citations in two British and five American internal medicine textbooks (all well known) from the Brandon-Hill list [20].

For each of the ten serials, the number of articles published in 1989 was checked on MEDLINE, not counting editorials and letters. Fifty articles were chosen randomly from the citation numbers in the online search. The chapters in each of the textbooks were counted, and fifty chapters also were chosen at random. The references were tallied from each of the chosen articles and textbook chapters, and the ratio of serials to monographs was determined (Table 1).

After examining other literature on library use, the authors decided to supplement the citation measure with an observational measure in a clinical educational setting. This measure was an attempt to gauge literature use within a clinical teaching setting directly, to balance the publications sources possibly slanted to research. A two-week period was established to collect data for each of eleven teaching physicians on internal medicine rotations. Four clinical medical librarians recorded the number of times the physicians, residents, and students referred to a monograph or a serial article in response to questions or topics addressed on hospital rounds. After the final two-week period, the data were tabulated (Table 2).

The Houston statistics have long been a rich resource of data on medical library practice. The authors checked data from three sets of Houston statistics, 1980-1981, 1985-1986, and 1989-1990, to determine how institutions were spending their acquisitions budgets [21-23]. To avoid skewing the figures toward institutions with large budgets, serial and monograph percentages were calculated for each institution and then averaged. These data were used along with a random telephone survey to gather information on

trends and changes in budget allocations (Table 3). The brief survey determined whether institutions listed in the Houston statistics had a funding formula and, if so, its nature.

RESULTS

In the citation study, the ten internal medicine serials cited 91% serials, and the six internal medicine textbooks cited 79% serials. The weighted average, allowing for the different number of titles in each set, was 88% serial citations and 12% monograph citations.

The eleven teaching physicians cited thirteen monographs and 111 serial articles over a two-week teaching period, a ratio of 89.5% serials and 10.5% monographs.

The libraries in the Houston statistical report had an overall budget ratio of 79% for serials and 21% for monographs. The lowest three-year average budget for serials at any institution was 60.8%; the highest was 96.4%. In the random telephone survey, the collection development officers reported that the percentage of the budget allocated to serials ranged from 78% to 95%. None of the libraries surveyed had a mandated formula, although one respondent said "our director gets nervous when the journal expenditures get close to 80%." At one library, expenditures are negotiated yearly and are based on predictions for the coming year. Most of the libraries have reduced (or plan to reduce) funding for monograph purchases and are shifting money to the serials budget. One respondent said they would not sacrifice monographs for serials, and, if they had to cut the budget, they would reduce funding for both types of materials. About half of the libraries contacted have made extensive cuts in periodical holdings. Many libraries rely on gift funds to purchase monographs. Two of the libraries had a separate budget line for serials and monographs.

CONCLUSIONS

Academic health sciences libraries have been allocating budgets in a serials-to-monographs ratio of approximately 80:20. The authors' research findings, covering primarily materials from 1989 to 1991, revealed higher ratios: clinical research, as represented by citation measures, used 88% serial references, while references used in clinical education were 89.5% serials. Thus, the ratio of 88:12, because it represents the more scientific and structured measure of cited use, would be more appropriate than 80:20 for library allocations.

Although a varied clientele uses health sciences library resources, and basic textbooks are used routinely by medical students, nursing staff, and nursing students, this study revealed that references in a clin-

ical educational setting closely followed the pattern in the literature.

ACKNOWLEDGMENTS

The authors extend special thanks to Lydia Miller, Kelly Parish, and Jeanne Sarkis for their assistance in gathering data on the use of citations during clinical rounds.

REFERENCES

1. DEVIN RB, KELLOGG M. The serial/monograph ratio in research libraries: budgeting in light of citation studies. *Coll Res Libr* 1990 Jan;51(1):46-54.
2. PACKER D. Acquisitions allocations: equity, politics, and formulas. *J Acad Libr* 1988;14(5):276-86.
3. GENAWAY DC. Administering the allocated acquisitions budget: achieving a balanced matrix. In: Katz B, ed. *The acquisitions budget*. New York: Haworth Press, 1989: 145-68.
4. MARTIN MS. The implications for acquisitions of stagnant budgets. In: Katz B, ed. *The acquisitions budget*. New York: Haworth Press, 1989: 105-18.
5. CARPENTER KH. Forecasting expenditures for library materials: approaches and techniques. In: Katz B, ed. *The acquisitions budget*. New York: Haworth Press, 1989: 31-48.
6. COOPER M. Collection development in science and technology: a focus on books. *Sci Tech Libr* 1983 spring;3(3): 15-30.
7. DEVIN, op. cit., 54.
8. SHERWOOD KK. Relative value of medical magazines. *Northwest Med* 1932 Jun;31(6):273-6.
9. JENKINS RL. Periodicals for medical libraries. *JAMA* 1931 Aug 9;97(9):608-10.
10. GREGORY J. An evaluation of medical periodicals. *Bull Med Libr Assoc* 1937 Feb;25(3):172-88.
11. GARFIELD E. SCI journal citation reports; a bibliometric analysis of science journals in the ISI data base. *Science Citation Index 1988 annual*; 20. Philadelphia: Institute for Scientific Information, 1989.
12. GARFIELD E. Citation analysis as a tool in journal evaluation. *Science* 1972 Nov 3;178:471-9.
13. RAISIG LM, SMITH M, CUFF R, KILGOUR FG. How biomedical investigators use library books. *Bull Med Libr Assoc* 1966;54:104-7.
14. WOOD DN, BOWER CA. Survey of medical literature borrowed from the National Lending Library for science and technology. *Bull Med Libr Assoc* 1969 Jan;57(1):47-63.
15. LACROIX EM, DUTCHER GA. A comparison of interlibrary loan requests received by the National Library of Medicine: 1959 and 1984. *Bull Med Libr Assoc* 1987 Jan;75(1):7-13.
16. STINSON ER, MUELLER DA. Survey of health professionals' information habits and needs: conducted through personal interviews. *JAMA* 1980 Jan 11;243(2):140-3.
17. BROADUS RN. The applications of citation analyses to library collection building. *Adv Libr* 1977;7:299-335.
18. LINE MB. The influence of the type of sources used on the results of citation analyses. *J Docum* 1979 Dec;35(4): 265-84.
19. CAMPBELL FM. National bias: a comparison of citation

practices by health professionals. *Bull Med Libr Assoc* 1990 Oct;78(4):376-82.

20. BRANDON AN, HILL DR. Selected list of books and journals for the small medical library. *Bull Med Libr Assoc* 1991 Apr;79(2):195-222.

21. Annual statistics of medical school libraries in the United States & Canada, 1980-81. 4th ed. Houston: Association of Academic Health Sciences Library Directors, 1981.

22. Annual statistics of medical school libraries in the United States & Canada, 1985-86. 9th ed. Houston: Association of Academic Health Sciences Library Directors, 1986.

23. Annual statistics of medical school libraries in the United States & Canada, 1989-90. 13th ed. Houston: Association of Academic Health Sciences Library Directors, 1991.

Received October 1991; accepted May 1992

FROM THE *BULLETIN*—25 YEARS AGO

Role of the librarian

By Charles Watkins, M.D., Professor of Psychiatry, Louisiana State University School of Medicine, New Orleans

What of the future? The problems being faced by libraries at this time are different but perhaps no more difficult of solutions than were those in the great medical library at Alexandria. We are now confronted with the impact of magnetic tapes, film libraries, photocopies, TWX, long range Xerox, and the publish or perish society. I suspect that when the monastery librarians heard of the Gutenberg press they immediately went to the administration and pointed out that they would not be able to function without a drastic increase in personnel during the next fiscal year. Times have not changed.

Bull Med Libr Assoc 1968 Jan;56(1):38