

Physiotherapy, citation analysis, evidence-based practice, libraries, databases.

by Richard W Bohannon

Core Journals of Physiotherapy

Summary This retrospective document analysis was carried out to generate a current list of core journals of physiotherapy, to compare the list with previously published lists, and to determine how well the journals of the current list were covered by three major biomedical bibliographic databases. Through citation analysis 47 core journals of physiotherapy were identified. With notable exceptions, most of the journals on the current core list were on three previously published lists of core journals. The majority of core journals on the current list were included in every database; Embase was most comprehensive in its coverage (95.7%). The list of core journals provided in this study is a good starting point for obtaining information for evidence-based practice. Physiotherapists who use databases to find information in the core journals will need to use either Embase or both Medline and CINAHL if they are to identify most of the relevant literature.

Introduction

Physical therapists, whether functioning as clinicians, educators or researchers, require up-to-date information if they are to fulfill their professional obligations. Current information can be acquired from multiple sources, but articles recently published in peer-reviewed journals are a particularly legitimate source of information (Bohannon, 1990; Harris, 1996). With so many biomedical journals published it is difficult to know for certain which are most likely to contain relevant articles. The apparent lack of familiarity of physiotherapists with research and the journals in which it is published (Turner and Whitfield, 1996, 1997a, 1997b; Bohannon, 1990) precludes the surveying of physiotherapist clinicians to identify journals which are core for physiotherapy.

One alternative to such a survey is expert opinion. 'The Information Resource Centre staff at the Chartered Society of Physiotherapy have collaborated with others' to offer an opinion regarding core physiotherapy journals (Sewerniak, 1997). Their list included nine journals: *Archives of Physical Medicine and Rehabilitation*, *The Australian Journal of Physiotherapy*, *Journal of Manual and Manipulative Therapy*, *Manual*

Therapy, *Physical Therapy*, *Physical Therapy Reviews*, *Physiotherapy*, *Physiotherapy Research International* and *Physiotherapy Theory and Practice*.

Another alternative for identifying core journals is citation analysis. In its simplest form, citation analysis merely involves tallying the frequency with which authors writing in a particular publication cite (reference) specific sources. Although not without problems, citation analysis is a valid means of identifying quality sources (Lawani and Bayer, 1983). Several citation analyses of the physiotherapy literature have been performed. At least three have resulted in lists of core journals of physiotherapy (Bohannon, 1987; Bohannon and Tiberio, 1989; Wakiji, 1997).

Research has also examined the degree to which the core journals of physiotherapy are included in the major biomedical bibliographic databases (Bohannon and Tiberio, 1989).

Given the ongoing changes in the biomedical literature, it seemed appropriate that current core journals of physiotherapy should be identified, that a list of current core journals should be compared to previous lists, and that the inclusion of current core journals in the major biomedical bibliographic databases should be examined. That was the purpose of this study.

Method

This study involved a form of quantitative document analysis called citation analysis. The documents were a year's span of the most current issues of seven physical therapy journals available to the author. The journals (year [issues]) were: *Physical Therapy* (1997[7]) - 1998[6]), *Physiotherapy* (1997[1-12]), *Physiotherapy Canada* (1997[3] - 1998[2]), *The Australian Journal of Physiotherapy* (1997[3] - 1998[2]), *Physiotherapy*

Bohannon, R W (1999). 'Core journals of physiotherapy', *Physiotherapy*, 85, 6, 317-321.

Author

Richard W Bohannon
Edd PT NCS is a Professor of Physical Therapy at the University of Connecticut, and at the Institute for Outcomes Research, Hartford Hospital, Connecticut.

This article was received on September 3, 1998, and accepted on February 6, 1999.

Address for Correspondence

Professor R W Bohannon,
 Department of Physical Therapy, School of Allied Health, U-101, University of Connecticut, Storrs, CT 16269, USA.

Theory and Practice (1997[2]-1998[1]), *Physiotherapy Research International* (1997[1-4]), and the *Journal of Physical Therapy Science* (1997[1, 2]). The reference lists of all articles, commentaries and letters of all journal issues indicated above were included in the analysis. Each journal cited in the reference lists of these documents was identified, as was the number of times it was cited. (Magazine, book and newsletter citations were not identified or counted.)

For journals with known title changes, citations were tallied under the most recent title (eg *Physiotherapy Practice* citations went under *Physiotherapy Theory and Practice*).

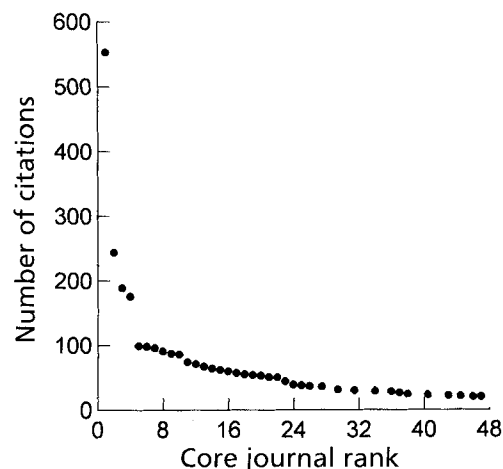
A list of core journals was identified using the tallies generated. A core journal was defined operationally as one which was: (1) cited 20 or more times across the seven citing journals and (2) included in the citations of at least four of the seven physiotherapy/physical therapy citing journals. The convergent validity of these two criteria was checked by calculating the Spearman correlation between the number of citations of a journal and the number of journals citing it.

The list of core journals generated in this study was compared to lists provided in three previous papers (Bohannon, 1987; Bohannon and Tiberio, 1989; Wakiji, 1997). The comparison involved documentation of the percentages of journals in the current list that were also in the previous lists and determination of the Pearson correlation between the number of citations of the journals in the current list and the same journals in Wakiji's (1997) list.

The inclusion of these core journals in three computer bibliographic databases with a biomedical focus (Medline, Embase and CINAHL [Cumulative Index of Nursing and Allied Health Literature]) was checked using Ulrich's International Periodicals Directory (1998). In cases where this check did not provide definitive information, database inclusion was determined by consulting the list of journals indexed in Index Medicus (1998) and CINAHL (1998) and the cited journals themselves.

Results

The citation analysis of the seven physiotherapy journals used in this study yielded 5,534 citations from 973 different source journals. Forty-eight journals were cited 20 or more times; 95 journals were cited in four or more journals. Forty-seven journals met both selection criteria and



Scatterplot illustrating the relationship between a core journal's citation rank and number. (The ranks assigned to specific journals are noted in the table)

were considered core (see table). Citations of these journals totalled 3,150 (56.9% of all journal citations). Among the journals on the current core list, the number of citations dropped off rapidly with the journal's rank (see figure). Consequently 54.6% of the citations in the core list journals were from ten journals with the highest number of citations. The number of citations of each core journal was correlated significantly with the number of journals in which the core journal was cited (Spearman rho = 0.756, $p < .001$). Many of the core journals, but by no means all, had the words physical therapy or physiotherapy (6) or the word rehabilitation (5) in the title. This was true for the three most cited journals: *Physical Therapy*, *Physiotherapy*, and *Archives of Physical Medicine and Rehabilitation*. Journals from closely related fields such as occupational therapy (one journal) and sports medicine (three journals) were also represented as were journals focusing on types of patients frequently treated by physiotherapists (eg older people, patients with stroke, patients with spinal problems).

The table indicates whether the journals in the current core list were also in previous lists. Of the journals of the current list, 27 (57.4%) were also in the Bohannon (1987) list, 30 (63.8%) were also in the Bohannon and Tiberio (1989) list, and 36 (76.6%) were also in the Wakiji (1997) list. The number of citations of the journals in the current list correlated significantly ($r = 0.687$, $p < 0.001$) with the number of citations of the same journals in the Wakiji study.

Coverage of the current core journals by the three major bibliographic biomedical databases is indicated in the table. While no

Core journals of physiotherapy identified by citation analysis of seven physiotherapy journals

Journal title (rank)	Total citations	Physiotherapy journals citing	Previous core list inclusion			Bibliographic database inclusion		
			Bohannon (1987)	Bohannon and Tiberio (1989)	Wakiji (1997)	Medline	CINAHL	Embase
Physical Therapy (1)	553	7	✓	✓	✓	✓	✓	✓
Physiotherapy (2)	244	7	✓	✓	✓		✓	✓
Archives of Physical Medicine and Rehabilitation (3)	189	7	✓	✓	✓	✓	✓	✓
Spine (4)	176	7		✓	✓	✓	✓	✓
New England Journal of Medicine (5)	99	7		✓	✓	✓	✓	✓
Journal of Bone and Joint Surgery* (6)	98	6	✓	✓	✓	✓		✓
Physiotherapy Canada (7)	96	7	✓	✓	✓		✓	✓
Australian Journal of Physiotherapy (8)	91	6	✓	✓			✓	✓
Journal of Orthopaedic and Sports Physical Therapy (9)	87	7	✓	✓	✓	✓	✓	✓
Clinical Orthopaedics (10)	86	7	✓	✓	✓	✓	✓	✓
Pain (11)	74	7	✓	✓	✓	✓	✓	✓
British Medical Journal (12)	71	7	✓	✓	✓	✓	✓	✓
American Journal of Sports Medicine (13)	67	6	✓	✓	✓	✓	✓	✓
Journal of the American Geriatrics Society (14)	64	6			✓	✓	✓	✓
Physiotherapy Theory and Practice (15)	62	7	✓	✓			✓	✓
Journal of Respiratory and Critical Care Medicine (16)	60	6	✓	✓	✓	✓	✓	✓
Journal of Gerontology (17)	57	6			✓	✓	✓	✓
Journal of Neurology, Neurosurgery and Psychiatry (18)	55	6	✓	✓	✓	✓		✓
Journal of the American Medical Association (19)	54	7	✓	✓	✓	✓	✓	✓
Medicine and Science in Sports and Exercise (20)	53	6	✓	✓	✓	✓	✓	✓
Medical Care (21)	51	5			✓	✓	✓	✓
Scandinavian Journal of Rehabilitation Medicine (22)	50	7	✓	✓	✓	✓	✓	✓
Journal of Applied Physiology (23)	44	7	✓	✓	✓	✓		✓
Neurology (24)	39	6	✓	✓	✓	✓		✓
American Journal of Physical Medicine and Rehabilitation (25)	38	7	✓	✓	✓	✓	✓	✓
American Journal of Occupational Therapy (26)	37	7	✓		✓	✓	✓	✓
Stroke (27.5)	36	7			✓	✓	✓	✓
Journal of Clinical Epidemiology (27.5)	36	5			✓	✓	✓	✓
Psychological Bulletin (29.5)	31	6		✓		✓		
Chest (29.5)	31	5	✓	✓	✓	✓	✓	✓
Arthritis and Rheumatism (31.5)	30	6			✓	✓	✓	✓
Brain (31.5)	30	5	✓	✓	✓	✓	✓	✓
Disability Rehabilitation (34)	29	5				✓	✓	✓
Clinical Rehabilitation (34)	29	5				✓	✓	✓
Journal of Rheumatology (34)	29	6				✓		✓
Journal of Motor Behaviour (36)	28	4						✓
Journal of Biomechanics (37)	26	4	✓	✓	✓	✓		✓
Developmental Medicine and Child Neurology (38)	24	5		✓	✓	✓	✓	✓
Annals of Internal Medicine (40.5)	23	5			✓	✓	✓	✓
Annals of Neurology (40.5)	23	4			✓	✓		✓
Annals of the Rheumatic Diseases (40.5)	23	5	✓	✓	✓	✓	✓	✓
Lancet (40.5)	23	6	✓	✓	✓	✓	✓	✓
Journal of Advanced Nursing (43)	22	5				✓	✓	✓
Sports Medicine (44.5)	21	5				✓		✓
Clinical Biomechanics (44.5)	21	5						✓
Arthritis Care Research (46)	20	5					✓	
European Journal of Applied Physiology (47)	20	5	✓	✓	✓	✓		✓

*As American and British volumes were not always differentiated among citations, they are combined.

database was completely comprehensive in its coverage, each included the majority of the core journals. Embase was the most comprehensive; it included 45 (95.7%) of the core journals. Medline covered 40 (85.1%) and CINAHL included 34 (72.3%) of the core journals. Together Medline and CINAHL covered 45 (95.7%) of the core journals. To cover all 47 of the core journals, all three databases would have to be employed.

Discussion

The identification of a set of core journals can benefit individual physiotherapists who wish to keep up to date as well as educational programmes and libraries whose role it is to help them. The list of current core journals provided in this study should be quite helpful in this regard. The first ten journals might be considered particularly relevant. Other less highly ranked journals may have more relevance to specific specialties. At least one journal, *Psychological Bulletin*, is an aberrant inclusion. That journal was cited because of its description of a statistical procedure used in other studies. Citation analysis, which was employed in this study, is an acceptable method of generating a list of core journals. The use of two citation criteria to establish core journals in this study (number of citations and number of citing journals) is supported by the significant correlation between the two criteria.

The list of 47 journals generated in this study is quite consistent with previously published lists (Bohannon, 1987; Bohannon and Tiberio, 1989; Wakiji, 1997). Most of the journals in the present list have been identified before. The correlation between the frequency of citations in this list and the list of Wakiji (1997), in fact, helps to validate the present list. Some journals in the present list may be absent from previous list because they are relatively young journals. Examples of such journals are *Clinical Rehabilitation*, *Clinical Biomechanics*, and *Arthritis Care and Research*. Some journals which would appear to be highly relevant (eg *Physiotherapy Research International*) are probably much too new to achieve prominence in a citation analysis of recent journals. Only five of the nine core journals listed by Sewerniak (1997) were included in the core list of this study. The four journals she listed that did not find their way on to the list of this study (and the

total number of times they were cited) were: *Journal of Manual and Manipulative Therapy* (four times in three journals), *Manual Therapy* (15 times in three journals), *Physical Therapy Reviews* (never), and *Physiotherapy Research International* (seven times in two journals). Rather than procuring these four relatively new journals, therapists, educational programmes and libraries may be served better at present by subscribing to other journals already established as core and focusing on physiotherapy or rehabilitation or on specific areas of interest.

The results of this study indicate that use of the correct bibliographic biomedical database or databases will provide quite a thorough coverage of the core journals identified in this study. Obtaining such coverage, however, may require that therapists use a different strategy from that to which they are accustomed. Use of Medline alone, for example, will be far from comprehensive. It will have to be used in conjunction with CINAHL for good results. Although Embase alone is nearly complete in its inclusion of the core journals identified in this study, it seems that few therapists routinely employ Embase (Bohannon, 1990). Acknowledging that it is impractical for bibliographic databases to be totally exhaustive in their coverage of source journals, the addition of a few key journals can greatly add to the comprehensiveness of the databases' coverage of physiotherapy literature. For example, the simple addition of *Physiotherapy*, *Physiotherapy Canada*, *The Australian Journal of Physiotherapy*, and *Physiotherapy Theory and Practice* to Medline would render it nearly as comprehensive of physical therapy core journals as Embase is already and as Medline and CINAHL are together at present. With the demand for physiotherapy growing, and the scientific foundations of physiotherapy expanding, it seems appropriate that databases that do not now include these journals should consider incorporating them. Granting that physiotherapy has not had the eminence historically of some other areas of healthcare, much of the research published in physiotherapy journals today is of sufficient quality and value to merit indexing. Until research published in physiotherapy journals other than *Physical Therapy* is indexed extensively, it is unlikely that most physiotherapists or other healthcare practitioners will know of it.

References

- Bohannon, R W (1987).** 'Core journals of physiotherapy', *Physiotherapy Practice*, **3**, 126-128.
- Bohannon, R W (1990).** 'Information accessing behavior of physical therapists', *Physiotherapy Theory and Practice*, **5**, 215-225.
- Bohannon, R W and Tiberio, D (1989).** 'Physiotherapy literature in medical indexes: How comprehensive is index coverage of journals cited frequently by five physiotherapy journals?' *Physiotherapy Practice*, **5**, 201-205.
- CINAHL Information Systems (1998).** *Cumulative Index to Nursing and Allied Health Literature*, **43**, X111-L111.
- Harris, S (1996).** 'How should treatments be critiqued for scientific merit?' *Physical Therapy*, **76**, 175-181.
- Lawani, S M and Bayer, A E (1983).** 'Validity of citation criteria for assessing the influence of scientific publications: New evidence with peer assessment', *Journal of the American Society for Information Science*, **34**, 59-66.
- National Library of Medicine (1998).** *List of Journals Indexed in Index Medicus*, National Library of Medicine, National Institutes of Health, Bethesda, Maryland.
- Sewerniak, A (1997).** 'Which database?' *Physiotherapy*, **83**, 275-276.
- Turner, P A and Whitfield, T W A (1996).** 'A multivariate analysis of physiotherapy clinicians' journal readership', *Physiotherapy Theory and Practice*, **12**, 221-230.
- Turner, P and Whitfield, T W A (1997a).** 'Physiotherapists' use of evidence based practice: a cross-national study', *Physiotherapy Research International*, **2**, 17-29.
- Turner, P and Whitfield, T W A (1997b).** 'Journal readership amongst Australian physiotherapists: A cross-national replication', *Australian Journal of Physiotherapy*, **43**, 197-202.
- Ulrich's International Periodicals Directory (1998).** R R Bowker, New Providence, NJ, 36th edn.
- Wakiji, E M (1997).** 'Mapping the literature of physical therapy', *Bulletin of the Medical Library Association*, **85**, 284-288.