

EBM in musculoskeletal diseases: where are we?

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It is often claimed that Evidence-Based Medicine (EBM) implies and causes a *paradigm shift* (EBM Working Group 1992), referring to the classical definition by Thomas Kuhn (1962). In Musculoskeletal diseases, the spread of the ideas of EBM and their implementation in clinical practice has been apparently slow and inhomogeneous, with areas of excellence where good clinical research has been performed and others where the physio-pathological paradigm and retrospective studies are still the main source of evidence. Another peculiarity of our field has been the co-existence of another small "revolution" in our way of thinking and practicing medicine, which can be summarized with the term Outcomes Movement (Epstein 1990, Swiontkowski et al. 1999). This has influenced our perception of clinical research, both as readers and as producers of evidence. Concrete proofs of this influence can be traced in Rheumatology (e.g. the OMERACT project, Boers et al. 1993, Tugwell et al. 2002), Rehabilitation (Johnson 1992, Wade 1999, Haigh et al. 2001), and Orthopaedics (e.g. the birth and reputation of national registries, Knutson et al. 1985, Havelin et al. 1993, Herberts and Malchau 1997).

We performed an online search on MEDLINE to verify and monitor the existence of this paradigm shift in the musculoskeletal literature.

Search methodology

The search was conducted online (April 2001) via the PUBMED web site (<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi>). The journal browser function was used to identify a subset of well-known musculoskeletal journals (Table

1), from the field of Orthopaedics, Rehabilitation Medicine and Physical Therapy, and Rheumatology. For the purpose of this review, no attempt was made to quantify the scientific quality of selected journals, with no explicit inclusion/exclusion criteria: thus they should be regarded as a non-random sample of the Musculoskeletal literature, and following data can be seen only as a general indication of the total production in our disciplines. The list is included so that anyone can judge the comprehensiveness of the sample.

Within each group of subspecialty oriented journals a similar set of searches was conducted to quantify the number of publications that belonged to specific methodologic publication types (Randomised Clinical Trial (RCT), Meta-analysis, Practice Guideline) or that included in their record some emblematic terms (effectiveness, evidence-based). In the first case the restriction was applied using the *Limits* function in PUBMED, and subsequently selecting the different publication types. The search for emblematic terms was conducted as a free text search in the main query box. The results for each search were then obtained again according to the period of publication: specific time cutoffs (1972, 1981, 1992, 1998) were chosen arbitrarily based on events that were considered to be representative of the shift, still allowing a comparable time span between each other, in order to visualize a possible trend (Table 2).

Results

A total 109,666 records published between 1966 and 2000 were retrieved from PUBMED for the specified subset of journals (Table 3). A definite growing trend can be seen for all searched terms

Table 1. Subset of musculoskeletal journals selected for the search in PUBMED

1. Acta Orthop Belg	23. J Rehabil
2. Acta Orthop Scand	24. J Rehabil Res Dev
3. Acta Orthop Scand Suppl	25. Nippon Seikeigeka Gakkai Zasshi
4. Acta Rheumatologica Scandinavica	26. Orthop Clin North Am
5. Am J Phys Med Rehabil	27. Orthopedics
6. Ann Rheum Dis	28. Phys Ther
7. Arch Orthop Trauma Surg	29. Prosthet Orthot Int
8. Arch Orthop Trauma Surg	30. Rev Chir Orthop Reparatrice Appar Mot
9. Arch Orthop Unfallchir	31. Revue du rhumatisme (English ed.)
10. Arch Phys Med Rehabil	32. Revue du rhumatisme et des maladies osteo-articulaire
11. Arthritis Rheum	33. Rheumatol Int
12. British journal of rheumatology	34. Rheumatology (Oxford, England)
13. Chir Organi Mov	35. Ryumachi
14. Clin Orthop	36. Scand J Rehabil Med
15. Clin Rehabil	37. Scand J Rehabil Med Suppl
16. Clin Rheumatol	38. Scand J Rheumatol
17. Disabil Rehabil	39. Scand J Rheumatol Suppl
18. Eur J Appl Physiol	40. Semin Arthritis Rheum
19. Int Orthop	41. J Rheumatol
20. J Bone Joint Surg Am	42. J Rheumatol Suppl
21. J Bone Joint Surg Br	43. Z Orthop Ihre Grenzgeb
22. J Orthop Trauma	44. Z Rheumatol

and publication types (Figure 1). Results are presented in terms of rate of citations per thousand records, in order to adjust for the concurrent increase in the amount of published papers (Table 3, second row). This increase is independent from the amount of years included in the selected period (Table 3, third row). Thus, the increasing rate entered in the graph truly reflects an increase in the utilization of the selected terms in the records of the specified time span. Selected cutoffs seem to be significant, as relevant changes in the citation rate occur between one period and the other (Figure 1).

Discussion

The purpose of this study was mainly descriptive: data were presented as an introduction of the e_Musk meeting in Ferrara (Zanoli et al. 2002), and served the purpose of promoting the discussion on

Table 2. Years selected as cutoffs for the diachronic analysis and main reason(s)

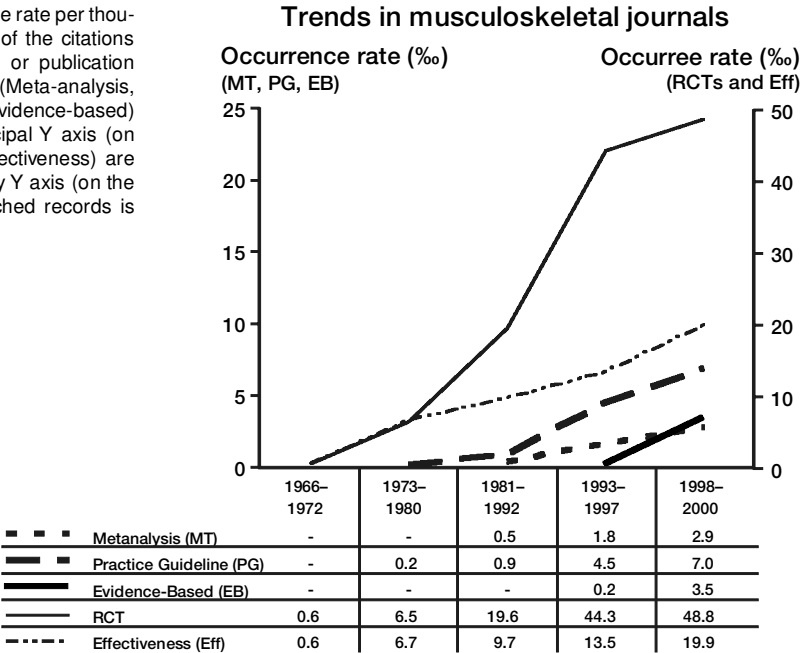
Year	Motivation
1972	publication of Archie Cochrane's book <i>Effectiveness and Efficiency</i> (Cochrane 1972)
1981	publication of How to read clinical journals series on CMAJ (How to...1981)
1992	publication of EBM editorial on JAMA (EBM Working Group 1992)
1998	launch of OMERACT (Boers et al. 1993) 2 more musculoskeletal (Back and Pain) collaborative review groups (CRGs) registered, 2 already active within the Cochrane Collaboration: musculoskeletal CRG (Tugwell et al. 2002) and musculoskeletal injuries CRG (Gillespie et al. 2002) the Italian workgroup for EBM (GLOBE) is officially recognised (Padua et al. 1998) Cochrane's book reprinted 1st edition of EBM manual (Sackett et al. 1998)

interaction between clinical research and EBM. Caution should be used when drawing conclusion

Table 3. Number of records and number of records per year retrieved in the different time periods

	1966–1972	1973–1980	1981–1992	1993–1997	1998–2000	TOTAL
No. of records	10,027	18,262	43,648	23,418	14,311	109,666
Records per year	1432.4	2282.8	3637.3	4683.6	4770.3	3133.3

Figure 1. The graph shows the rate per thousand (‰) PUBMED records of the citations in which the searched term or publication type occurred. **Thick lines** (Meta-analysis, Practice Guideline, and Evidence-based) are plotted against the principal Y axis (on the left). **Thin lines** (RCT, effectiveness) are plotted against the secondary Y axis (on the right). Total number of searched records is 109,666.



from this data: from a strict methodological point of view, many potential sources of bias could alter the significance of these findings.

For instance, the arbitrary choice of journals and time cutoffs. Many other journals which belong to neighboring fields publish musculoskeletal papers, and a great deal of outstanding musculoskeletal clinical research is published in generic medical journals. As for time cutoffs, many other authoritative publications and opinion-leading events could be chosen as *shift* markers (Roos et al. 1997, Muir Gray 1997, Sackett et al. 1998, the PEDro database <http://ptwww.cchs.usyd.edu.au/pedro/> in 1999, Wright and Swiontkowski 2000 and many more...), and especially the choice of GLOBE’s birthdate might seem self-referring and immodest. However, it represents to our knowledge the first officially recognized working group within a national orthopaedic society, and as the first e_Musk meeting had taken place in Italy we thought it could be a worthwhile citation and a deserved acknowledgement to our National society. Furthermore it is difficult to establish the minimal amount of time necessary for an event to exert its effects on the medical literature: choosing the very year in which it takes place as a time marker is probably a mere statistical curiosity.

Finally, MESH terms used for publication type search were introduced at later stages (1989, 1990, and 1993 for Meta-analysis, RCT and Practice Guideline respectively), and in many records the classification has been retrospective (Lefebvre 1994). To be as comprehensive as possible PUBMED was chosen instead of MEDLINE: citations that precede the date that a journal was selected for MEDLINE indexing and some additional life science journals that submit full text are included in PUBMED together with all MEDLINE records.

With all these limitations in mind, we believe the trend we obtained is rather suggestive, and a progress from a previous report (Ryd & Dahlberg 1994). It could perhaps be expected in some cases (i.e. the term evidence-based, whose meaning and spelling are quite definite), still, to “verify” the effects of ideas in determining practical changes in the production as well as in the storage of scientific data is an interesting possibility. Although cultural evolution is a continuous outcome, our understanding needs categorization to discriminate events in a recordable and transmittable manner; similarly, although time is a continuous dimension, we tend to divide it into smaller or bigger intervals in order to organize it.

No attempt has been made to assess the quality of published papers, so this is a mere quantitative analysis. Although it is well known (e.g. in the orthopaedic literature Gartland 1988, Gross 1988, Amadio 1993, Keller 1993, Bessette et al. 1996) that methodological errors and reporting flaws can be found even in many published papers, we believe the trend we report is very positive, and promising for the whole evidence-based movement in musculoskeletal diseases.

It will be interesting to see if the launch of the Bone and Joint Decade (Lidgren 2002) will also affect somehow the quantity of clinical research available in PUBMED for musculoskeletal specialists in ten or more years. This rough and simple method, maybe refined and validated, could be a very interesting outcome measure for the whole action.

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