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ORIGINAL RESEARCH

Systematic Reviews and Clinical Trials in Rehabilitation: Comprehensive Analyses of Publication Trends

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Abstract

Objective: To analyze publication trends of clinical trials (CTs) and systematic reviews (SRs) in rehabilitation.

Design: PubMed searches were performed with appropriate combinations of Medical Subject Headings. All entries until December 2013, and their yearly distributions since 1981 (when the first rehabilitation SR was identified), were retrieved. After the initial data visualization, data analyses were narrowed to specific periods. Linear regression techniques analyzed the growth of publications and their relative percentages over time.

Setting: Not applicable.

Participants: Not applicable.

Interventions: Not applicable.

Main Outcome Measures: Not applicable.

Results: Although not observed for SRs, CTs have grown at a much higher rate in rehabilitation than in the broader health/medical field—more than twice the difference for both periods analyzed (1989−2001, 2001−2013). Rehabilitation journals published about 20% or less of the rehabilitation SRs and CTs, and no significant increases were observed over time ($P>.05$; 2001−2013). Neurologic conditions, particularly cerebrovascular, were the most addressed by rehabilitation SRs and CTs, while differences between neurologic and other groups of conditions typically widened over time (eg, more than doubled between neurologic and musculoskeletal conditions in 15y).

Conclusions: While publications of CTs are increasing at a much higher rate within rehabilitation than within broader health care, further research is warranted to explain why this trend is not being followed by SRs, particularly those with meta-analysis. Similarly, research might determine whether the (growing) differences in the publications of rehabilitation SRs and CTs across groups of conditions are justified by clinical or population need.

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Clinical trials (CTs), particularly randomized controlled trials (RCTs), and systematic reviews (SRs), especially systematic review and meta-analysis (SR&MA), have been increasing in popularity as research designs in health care. Accordingly, the number of publications with such designs has been growing substantially over the years.[1]

Publications of CTs and SRs in rehabilitation have also been rising extensively in physical rehabilitation.[2,3] One recent study[2] found that publications with "high-quality" study designs (eg, RCTs, CTs, meta-analyses) have been steadily increasing over the years, even more than "low-quality" study designs (eg, reviews, case reports). This study, nonetheless, made no distinction between systematic and nonsystematic reviews.

There is little doubt that publications of CTs and SRs are growing in the broader health care field[1,4] and in rehabilitation in particular.[2,3] However, important details of the rehabilitation publication trends for CTs and SRs remain unanswered. For instance, within the available data, it is hard to ascertain whether the publications of SRs and CTs in rehabilitation are increasing more than the publications of SRs and CTs in the broader health/medical field, since both are increasing.[1,4] Furthermore, even though publication trends have been analyzed within specific rehabilitation journals,[5-13] little is known about the distribution of

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rehabilitation SRs and CTs published across rehabilitation journals. Finally, publication trends have been analyzed within the rehabilitation of specific conditions[14-16]; however, they do not reveal how rehabilitation CTs and SRs are distributed over the full range of conditions typically treated by rehabilitation.

In filling these knowledge gaps, informing further research, its funding, and even journal editorial policies, this article aims to comprehensively analyze the publication trends of SRs and CTs in rehabilitation. Specifically, it aims to determine (1) how much publications of CTs and SRs in rehabilitation (and their subforms SR&MA and RCTs) have increased over time, inclusively when compared with the increase of the same research designs for the broader health/medical field; (2) the number and percentage of rehabilitation-related CTs and SRs published by (which) rehabilitation journals; and (3) the number and growth of CTs and SRs published across (groups of) conditions typically benefiting from rehabilitation.

Methods

The PubMed database (http://www.ncbi.nlm.nih.gov/pubmed) was used for this analysis, as it was in previous analyses of rehabilitation publication trends.[2,14,15] Although not fully comprehensive, PubMed indexes many journals within a field (eg, at any given time, PubMed indexed 113 journals within the field of physical and medicine rehabilitation). To any new article added to the PubMed database, trained indexers assign relevant key terms from a hierarchical tree of Medical Subject Headings (MeSH), which then can be used for any tailored searches.

Based on these search facilities, targeted searches were conducted on PubMed, all filtered for "humans." To further streamline these searches, a set of MeSH terms related to rehabilitation was assembled (using the operator "OR"),[2] but excluding (using the operator "NOT") any related MeSH terms deemed nonapplicable (eg, "substance abuse treatment centers"). The set of rehabilitation MeSH terms was then appropriately combined (using the operator "AND") with relevant MeSH terms for research designs, rehabilitation journals, or both.

With regard to research designs, SRs, CTs, SR&MA, and RCTs were first searched within the rehabilitation field, and then for the entire PubMed (ie, the broader health/medical sciences). A combination of research-based study designs (SRs, CTs, observational, validation, and comparative studies, etc, excluding case reports) was also searched together within the rehabilitation niche, to calculate the prevalence of SRs and CTs within rehabilitation research.

With regards to searches across journals, those journals covering the field of rehabilitation were first searched altogether. Then, the search strategy was narrowed to a group of 6 rehabilitation journals (approximately 5% of all of those indexed in PubMed) that published the highest number of SRs and CTs, determined by counting the number of rehabilitation SRs and CTs published in each journal. Finally, a search analysis within each of those 6 journals was performed.

List of abbreviations:

CT	**clinical trial**
MeSH	**Medical Subject Headings**
RCT	**randomized controlled trial**
SR	**systematic review**
SR&MA	**systematic review and meta-analysis**

Importantly, the set of rehabilitation MeSH terms was applied all through journal searches. This meant that articles not indexed for any rehabilitation-related MeSH terms were not considered, albeit published by "rehabilitation" journals.

Lastly, (groups of) conditions typically benefiting from rehabilitation were selected from the MeSH tree and then exclusively searched as a major field, coupled with a rehabilitation subheading. This allowed for an exclusive focus on the main condition(s) addressed. Supplemental appendix S1 (available online only at http://www.archives-pmr.org/) details the search strategy used.

Searches were conducted in February 2016, but only articles published until December 2013 were retrieved in order to account for the typical 2-year delay of PubMed indexation.[15] All the entries from each search, and their yearly occurrences since 1981 (when the first SRs in rehabilitation were identified), were exported into Excel[a] spreadsheets, computed into appropriate statistics (eg, percentages), and displayed into time-series plots.

After primary data visualization, the plots and data analyses were narrowed to relevant periods emerging from the data. For example, SR&MA were found indexed only after 2001. Therefore, SR analyses were conducted only within the 2001 to 2013 period. CTs, on the other hand, became prevalent at an earlier date; hence, CT analyses were also conducted over the previous period, within the same extension of time (1989−2001). The same period is nonetheless used for any direct comparisons.

Within the relevant periods, simple linear regression analyses were conducted using Excel. Specifically, linear regressions were used to analyze publication growths and their relative percentages over time. P values $<.05$ were considered statistically significant.

Results

SRs and CTs in rehabilitation versus the broader health/medical sciences

Rehabilitation SRs totaled about 4066 entries (24.3% of which were SR&MA), while there were approximately 8 times more rehabilitation CTs (32,577 entries, 67.7% of which were RCTs). Figure 1 shows that publications of all these designs have increased significantly over time ($P<.01$; minimum $r^2=.86$: 2001−2013).

More importantly, table 1 shows that yearly publications of CTs have increased at a much higher rate in the rehabilitation field than in the broader health/medical field: more than twice the difference, for both periods analyzed (1989−2001; 2001−2013). Table 1 also shows that the percentage increase of rehabilitation SRs was nearly double that of rehabilitation CTs (20.2% vs 10,7% per year, 2001−2013), but was similar to that of SRs in the broader health/medical field (20.2% vs 18.9%). Finally, yearly publications of SR&MA had the highest percentage increases within the rehabilitation field, but such growth was, nonetheless, lower than that of SR&MA in the broader health/medical field (37.3% vs 53.6%).

Evolving preponderance of SRs and CTs within rehabilitation research

Figure 2 shows that overall, publications of either SRs or CTs have been gaining preponderance within a set of rehabilitation research designs, but that increase was particularly evidenced