

Research on return to work in European Union countries

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Background	Research on return to work (RTW) is increasing. It is important to benefit from studies originating from different countries since certain factors influencing the RTW process are specific to each country.
Aims	To compare RTW research in Europe with the USA and to describe research on RTW in Europe.
Methods	Medline was scanned with specific search strings to identify studies concerning RTW in Europe, in the USA and in the rest of the world. Characteristics of the European studies were analyzed with two specific tools for bibliometrics research.
Results	Four thousand five hundred and twenty-five studies were identified (1100, 1005 and 2420 coming from Europe, the USA and the rest of the world, respectively). The European countries producing the greatest number of research papers standardized for population of that country were Sweden, the Netherlands, Finland and Denmark. Sweden was 5.7 times more prolific than the USA. Specialties covered by the European publications included occupational medicine (the subject of 66% of the articles), neurology (36%), environment and public health (32%), physical medicine and rehabilitation (26%) and rheumatology (24%).
Conclusions	There is a worldwide trend upwards in the number of publications on RTW. Europe recently overtook the USA in the number of publications per head of population, although there were large differences in publication rates among the European countries. The publications of European researchers on RTW are spread over a wide variety of journals, making access to this research difficult.
Key words	Bibliometrics; European Union; occupational health; research; return to work.

Introduction

Over the past quarter century, research on return to work (RTW) has increased and has led to significant advances in understanding about the RTW process and associated outcomes [1]. We are now aware that the longer people are off work due to injury or illness, and the less likely it is that they will RTW [2]. This research has led to recommendations about how to manage RTW for a patient: what are the predictive factors associated with RTW success and can we implement these recommendations when we assist a patient to RTW? [3–8] There has been a shift from medically determined models to those that focus on the importance of workplace, cultural, economic and social factors in the RTW process.

Originally, this research was mainly conducted in the USA, where many factors that influence RTW issues, such as insurance or compensation systems, unionization, people-oriented culture, macroeconomic and microeconomic factors, are very different from Europe [9].

It is therefore important to benefit from research studies originating from different countries.

The aim of this study was firstly to compare the importance of RTW research in Europe and the USA and secondly to describe research on RTW in Europe in greater detail.

Methods

The Medline database was searched in November 2010 to identify studies concerning RTW whose main author belonged to one of the 27 European countries. Using the Boolean operator AND, we combined the search string 'Return to work' [All] (recall 60% and precision 87% [10]) with a string listing the European Union (EU) countries: 'Austria OR Belgium OR Bulgaria OR Cyprus OR Czech Republic OR Denmark OR Estonia OR Finland OR France OR Germany OR Greece OR Hungary OR Ireland OR Italy OR Latvia OR Lithuania

OR Luxembourg OR Malta OR Netherlands OR Poland OR Portugal OR Romania OR Slovakia OR Slovenia OR Spain OR Sweden OR United Kingdom'. To be able to compare, from a quantitative point of view, research from Europe to research originating from the USA or research overall, the search string 'return to work' [All] was used alone (i.e. with no restriction to the country) and in combination with 'USA' to obtain research originating from the whole world and specifically from the USA. We included all studies identified in PubMed by these search strings. No restriction was made concerning publication, language or publication date. A Medline Evaluator (Meva) developed by the Institute for Medical Statistics and Epidemiology of the Technical University of Munich (<http://www.med-ai.com/meva/index.html>) was used to extract year of publication of each study. This Medline postprocessor allowed us to condense the list of a MEDLINE retrieval outcome into a structured result showing relations of the MEDLINE fields by using frequency distributions, contingency tables and sorted lists. This tool has been used in previous bibliometric studies concerning occupational health [10,11]. With these data of date of publication and country of origin of the studies, we analyzed the evolution of the number of publications in Europe, the USA and the world.

Secondly, in order to describe European RTW research, we extracted the main characteristics (country of origin, language, authors, medical speciality) of the EU studies using three methods. The country of origin of the paper was identified using the search string 'Return to work'[All] combined with the name of each country one by one. The second tool used was the Medline Evaluator (Meva) that allowed us to extract information about language and authors. The third tool was a Medline categorization algorithm that we had previously developed [12]. It is based on semantic links between Medical Subject Headings (Mesh) terms and metaterms on one hand and between MeSH subheadings and metaterms on the other. These links are used to automatically infer a list of metaterms from any MeSH term or subheading indexing. This tool allowed us to assess the medical specialties covered by each study.

Results

Overall, 4525 studies on RTW were identified by the Medline search, 1100, 1005 and 2420 coming from one of the European countries, from the USA and from other countries, respectively. The first European article was published in 1916 [13] and the first US article in 1921 [14]. Figure 1 shows the number of studies by year between 1964 and 2010 ($n = 4492$) for Europe, the USA and other countries. The 33 studies published between 1916 and 1963 were not included in order to focus on the evolution of RTW research output over the last 50 years. The trend worldwide shows a steady increase, as well as for Europe, but with a delay. For the USA, we observed a sharp

increase in the mid-1990s, followed by a plateau. Since 2005, Europe has published more RTW papers yearly than the USA. For European publications, the most frequent countries of origin and languages of the articles are presented in Table 1. Each European country say for Bulgaria, Cyprus, Latvia and Malta contributed at least one study.

In decreasing order, the five countries with the highest numbers of publications were the Netherlands (21% of the total EU publications), Sweden (16%), Germany (13%), UK (12%) and France (10%) (Table 2).

When taking into account the number of inhabitants of each country, the ranking was different. The mean research productivity of Europe and the USA were 0.22 and 0.33 articles/100 000 inhabitants, respectively (Table 2). The most prolific European countries were, by decreasing order, Sweden, the Netherlands, Finland and Denmark. Sweden was 5.7 times more prolific in the field of RTW than the USA.

Overall, 3688 authors contributed to the 1100 European studies, which were published in 400 different journals. The 10 most prolific European authors and the 10 most important journals, i.e. those which published high numbers of studies originating from a European country, are presented in Table 3. The first 10 journals (2.5%) published 25% of the articles, and the first 10 authors contributed to 19% of the publications.

The 1100 European studies were published in journals concerning 55 different specialities, from acupuncture to vascular medicine and surgery. Occupational medicine was the most common specialty and was the subject of 66% of the articles, followed by neurology (36%), environment and public health (32%), physical medicine and rehabilitation (26%) and rheumatology (24%) (Table 4).

Discussion

This study shows that RTW research is increasing overall but that Europe is now publishing most research on RTW. Despite the high number of researchers involved in RTW research, there were large disparities among European countries in terms of their research output, probably due to different research funding policies and to the different economic impact of RTW issues.

Some methodological aspects concerning the choice of the data source and the selection criteria deserve consideration. The Medline database was chosen as it is the most accessible and utilized biomedical medium and has been shown to be suitable for bibliometric studies of biomedical scientific output of member states of the EU 27 [15]. According to the selection system used, this study did not analyze articles published in collaboration with non-EU institutions in which a European researcher did not appear as the first author. Furthermore, the Medline database is not comprehensive, especially in the field of occupational health [16,17] resulting in an underestimation of the number of publications. However, the

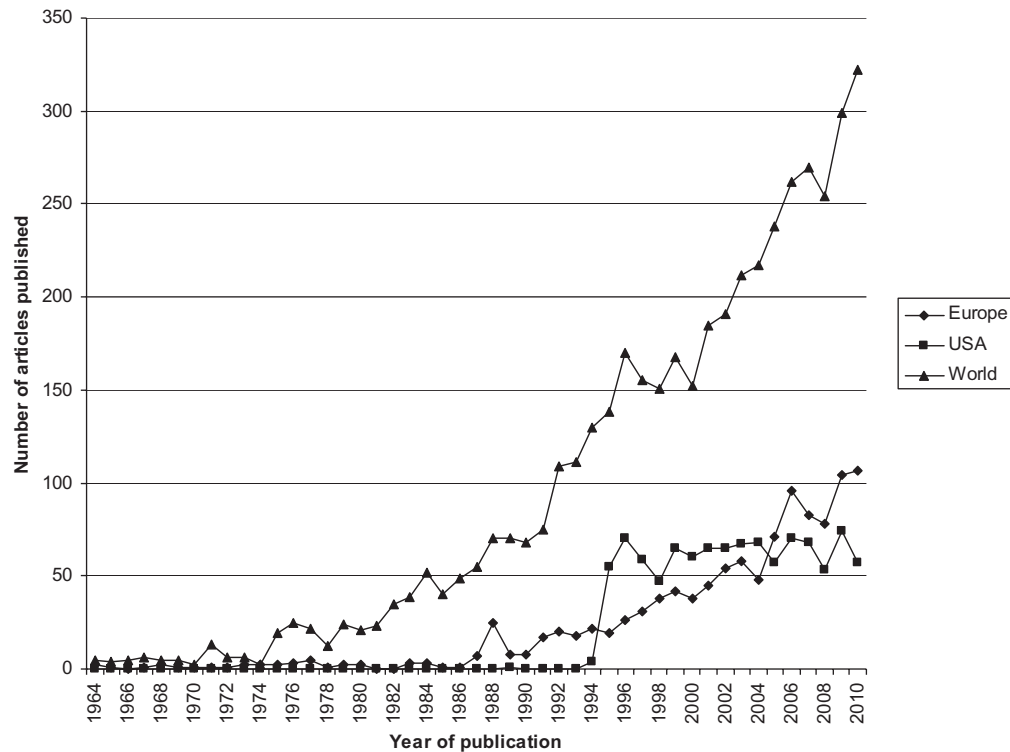


Figure 1. Number of studies about RTW published every year between 1964 and 2010 ($n = 4492$). The 33 studies published between 1916 and 1963 were not included in the graph to focus the graph on evolution of the 50 last years.

Table 1. The most frequent countries of origin and languages of the articles

	% of studies ($n = 1100$)
Countries of origin^a	
The Netherlands	21
Sweden	16
Germany	13
UK	12
France	10
Italy	7
Denmark	5
Finland	5
Languages^b	
English	85
German	6
French	4
Spanish	1
Italian	1

^aOnly countries who published at least 5% of the articles are presented.

^bOnly languages concerning at least 1% of the articles are presented.

precision and recall of the different search strings concerning RTW have only been studied for this database [10].

The search string used to identify 'RTW studies' was 'Return to work' [All] because we showed in a previous study that it provides the best compromise between recall and precision [10]. Precision of this search string was 87%, which means that only 13% of the articles retrieved

Table 2. Research productivity in number of articles/100 000 inhabitants concerning RTW

	Articles/100 000 inhabitants
Sweden	1.90
The Netherlands	1.39
Finland	1.04
Denmark	1.00
Ireland	0.54
Belgium	0.30
UK	0.23
Austria	0.20
Germany	0.17
France	0.17
Italy	0.13
Greece	0.12
Spain	0.07
Poland	0.03
Europe	0.22
USA	0.33

Number of articles published respectively by Europe in general and the USA per 100 000 inhabitants are given at the bottom of the table.

may not deal strictly with RTW. Since not all abstracts were available, it was impossible to assess relevance of all the studies we identified. We assumed that the percentage of potentially irrelevant studies was the same for every country and therefore that this potentially systematic error did not affect ranking of countries. The search string

Table 3. The 10 most important journals and most prolific authors

	Number of studies (<i>n</i> = 1100)
Journals	
<i>Journal of Occupational Rehabilitation</i>	57
<i>Spine (Phila Pa 1976)</i>	34
<i>Disability and Rehabilitation</i>	33
<i>Rehabilitation (Stuttg)</i>	29
<i>European Spine Journal</i>	25
<i>European Heart Journal</i>	21
<i>Journal of Rehabilitation Medicine</i>	21
<i>Occupational and Environmental Medicine</i>	21
<i>Work</i>	21
<i>Occupational Medicine</i>	16
Authors	
W. Van Mechelen	39
J. R. Anema	28
J. W. Groothoff	23
M. Van Tulder	21
K. Alexanderson	20
J. Verbeek	20
Henrica C. W. De Vet	16
M. H. W. Frings-Dresen	15
A. Burdorf	14
B. W. Koes	13

used to identify studies from Europe was the list of countries. We tried to restrict the search by searching only the field 'affiliation of the authors' for European countries but the recall was low (only 70 studies identified). The main reasons are that the country of origin is not always mentioned in this field, and when the country is mentioned, it can be written incorrectly (e.g. Polen instead of Poland). Hence searching different fields (abstract, title, affiliation of the authors) was more comprehensive since title and abstract are written in English.

Research on RTW is growing overall. Whereas the total number of articles indexed in Medline has increased by 50% between 1997 and 2007 [18], the number of articles on RTW issues has increased by 74%.

The EU and the USA are the leaders in biomedical research and publications, although the USA is ahead of the EU in most scientific disciplines [19,20]. Nevertheless, the EU has been gradually closing this gap [21,22] as suggested for the field of RTW in our study. Overall, one-quarter of the articles indexed in Medline concerning RTW issues came from European countries. Although the number of studies published on this topic has been quite similar in the past, the research output of many of the European countries, adjusted for population size, now exceeds the output of the USA.

When adjusting for the number of inhabitants (502 million for Europe and 308 million for the USA), the research output of the USA was greater than Europe (0.33 versus 0.22 articles per 100 000 inhabitants).

Table 4. Medical specialities concerned by the 1100 studies about RTW

Medical specialities	% of studies referring to this medical speciality (<i>n</i> = 1100)
Occupational medicine	66
Neurology	36
Environment and public health	32
Physical medicine and rehabilitation	26
Rheumatology	24
Cardiology	20
Traumatology	19
Vascular medicine and surgery	15
Gastroenterology	13
Orthopedics	10
Thoracic and cardiovascular surgery	9
Psychiatry	7
Oncology	6
Urology	3
Gynaecology	2
Obstetrics	2
Hepatology	2
Respiratory medicine	2
Endocrinology	2

Each study can refer to different specialities. Only medical specialities concerning at least 2% of the articles are presented.

Nevertheless, there was a clear increased trend in European output: between 1980 and 1989, about 10% of articles about RTW came from Europe; between 1990 and 1999, 19% and between 2000 and 2009, 30%. The predominance of Europe in recent years compared to the USA is probably an underestimation since US-based journals are more heavily represented than European journals in Medline, whereas scientific journals publish mainly research that is produced in the countries where these journals are based [23]. Furthermore, we did not include Norway and Switzerland in the analysis (they published 77 and 45 articles on RTW, respectively).

The research output of European countries was very diverse.

Sweden, the Netherlands and Finland published more than one article per 100 000 inhabitants. This prominence of Scandinavian countries has already been reported [24] as well as in occupational medicine more specifically [11].

These geographical trends may be explained by differences in sick leave policies among different countries [25]. For example, Scandinavian countries provide more sickness benefits than other countries and the economic impact of these policies may encourage research on this subject to improve RTW.

Since RTW is a broad issue, concerning many different specialties, it was not surprising to find that many different specialties were involved and that the studies were published in a wide range of journals. Among the 10 most

important journals, only three were organ speciality journals (journals concerning neurology and cardiology) and others were about rehabilitation or occupational health. When assessing the specialties covered by the European studies, most of them dealt with musculoskeletal disorders (MSD), since neurology, rheumatology, traumatology and orthopedics are among the 10 most relevant specialties, followed by vascular disorders (i.e. 'cardiology' and 'vascular medicine and surgery'). Therefore, MSD and cardiovascular diseases are frequent causes of impairment of work capacity [26]. The importance of MSD in this field was also observed in a study performed among national journals of physical rehabilitation medicine in Europe [27].

Many different authors were identified (3688). The mean number of authors per article was 3.3 and 62% of authors only contributed to one article which demonstrates the high number of researchers of RTW issues in Europe. It is important to maintain research on RTW in a range of countries since social security systems, contractual sick pay schemes, employer incentivization to provide vocational rehabilitation, availability of expertise in this area and societal attitudes to RTW are different among different countries. Comparisons of the result of research performed within different contexts could help to identify organizational barriers or facilitators for RTW and to implement more evidence-based vocational rehabilitation systems. The fact that output in this field in Europe has recently overtaken the USA suggests that research in RTW is more of a priority in Europe than elsewhere, particularly in the USA where social insurance systems are less universal.

Research in this field may also be proportional to the funding devoted to it and we found a negative geographical research output gradient from north to south and west to east in European countries. We hope that this gradient will decrease with increasing funds being channeled to research and development in the newer EU states.

Although research on RTW in a variety of countries allows comparisons to be made, it is still difficult to identify the relative influence of various factors on RTW. More international collaboration in this research field is warranted.

Key points

- The number of research publications on return to work has steadily increased.
- Europe recently overtook the United States in terms of the number of publications per head of population, although there were large differences in publication rates among the European countries.
- The publications of European researchers on return to work is spread over a wide variety of journals, making it difficult to source.

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