

# Pulmonary rehabilitation: Recommended but not implemented

Sir,

Pulmonary rehabilitation (PR) is an integral part of the clinical management and health maintenance of patients with chronic respiratory diseases who remain symptomatic or continue to have decreased function despite standard medical treatment.<sup>[1,2]</sup> PR includes patient education, exercise training, psychosocial and behavioral intervention, and outcome assessment and is implemented by a multidisciplinary team of healthcare professionals to improve symptoms, exercise tolerance, health-related quality of life, reduction in exacerbations, and hospital days.<sup>[2-5]</sup>

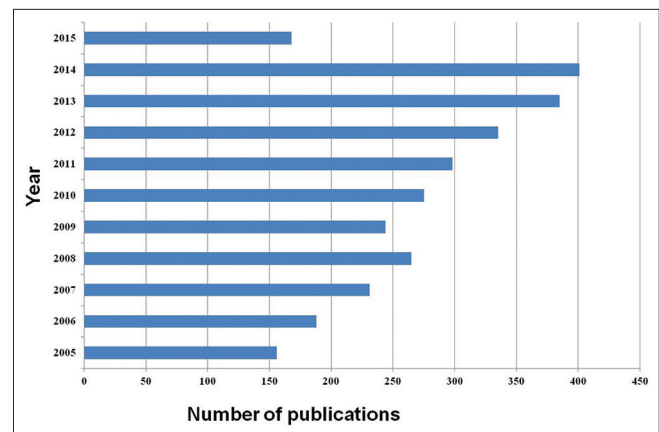
Although the prevalence of chronic respiratory diseases (especially chronic obstructive pulmonary disease and interstitial lung diseases) was lower than today, PR can be traced back to the medical literature for a century ago.<sup>[6]</sup> However, this medical application could not take the place it deserves. In recent years, fortunately, there has been increasing interest in PR as evident by the increasing number of publications in the literature. In this letter, we aimed to provide an overview of the nature of publications about PR, especially with regard to the countries, authors and affiliations of origin of publications, and the journals in which these papers were published. Hence, publications concerning PR for last 10 years were searched and documented to conduct an overview of the characteristics of the publications about PR, especially with regard to countries of origin, document types, and journal categories. We searched all publications between 2005 and 2015 using Elsevier's Scopus, which is the largest abstract and citation database of peer-reviewed literature: Scientific journals, books, and conference proceedings (<http://www.scopus.com/>). "Pulmonary rehabilitation" was selected as "article title, abstract, keywords," and "2005 to present (July 21, 2015)" was selected as "date range." A total of 2946 documents were obtained.

The distribution of publications among years is demonstrated in Figure 1. The number of publications has increased annually since 2005; the highest number of publications was in 2014. Until date, 650 (22.06%) documents were published from USA. More than 50% of all documents have been originated from developed countries including UK, Italy and Canada. The list of the top 20 countries is given in Table 1. The top 10 journals in which these articles were published are listed in Table 2. As expected, except one cardiopulmonary rehabilitation and prevention journal, all other nine journals (86% of published articles in these 10 journals) were distinct respiratory journals. It is possibly related to that topic of PR does not reflect an over

attractiveness to physical therapy and rehabilitation physicians and rehabilitation journals. Hence authors have needed to rely more on respiratory journals to reach a wide audience. English language was the preferred language to display their works in the literature (83.9%) [Table 3].

The article types of publications are presented in Table 4. The highest numbers of article types were an original article (55.7%) and review article (25.1%).

The top 10 list of authors who were interested in PR is depicted in Table 5. The top 10 list of the institution of all authors published their articles on PR is outlined in Table 6. Two



**Figure 1:** Distribution of the scientific publications related with the topic "Pulmonary Rehabilitation" by year of publication (between 2005 and 2015)

**Table 1: Distribution of scientific publications about pulmonary rehabilitation from all countries in the world (top 20 countries)**

Number	Country	n (%)
1	USA	650 (22.1)
2	UK	452 (15.3)
3	Italy	228 (7.7)
4	Canada	222 (7.5)
5	Australia	199 (6.8)
6	France	175 (5.9)
7	The Netherlands	160 (5.4)
8	Germany	159 (5.4)
9	Japan	99 (3.4)
10	Belgium	92 (3.1)
11	Spain	91 (3.1)
12	Brazil	79 (2.7)
13	Switzerland	63 (2.1)
14	Turkey	46 (1.6)
15	Norway	38 (1.3)
16	Poland	38 (1.3)
17	Denmark	33 (1.1)
18	Greece	33 (1.1)
19	China	30 (1.0)
20	Sweden	29 (1.0)

**Table 2: Top 10 journals ranked by the number of scientific publications**

Number	Journal	Impact factor*	n (%)
1	Respiratory Medicine	3.086	115 (3.9)
2	Journal of Cardiopulmonary Rehabilitation and Prevention	1.583	112 (3.8)
3	Chest	7.483	96 (3.2)
4	Chronic Respiratory Disease	2.694	85 (2.9)
5	European Respiratory Journal	7.636	82 (2.8)
6	International Journal of COPD	3.141	69 (2.3)
7	Respirology	3.345	66 (2.2)
8	Thorax	8.29	65 (2.2)
9	COPD Journal of Chronic Obstructive Pulmonary Disease	2.673	57 (1.9)
10	Revue Des Maladies Respiratoires Actualites	0.62	50 (1.7)

\*2014 impact factor of the journals that was calculated and released by Thomson Reuters in 2015

**Table 3: Languages of scientific publications (top 5 languages)**

Number	Languages	n (%)
1	English	2472 (83.9)
2	French	152 (5.2)
3	German	106 (3.6)
4	Spanish	73 (2.5)
5	Italian	39 (1.3)

**Table 4: Document type distribution for publications on pulmonary rehabilitation**

Number	Document type	n (%)
1	Original article	1641 (55.7)
2	Review	740 (25.1)
3	Editorial	185 (6.3)
4	Conference paper	104 (3.5)
5	Letter	86 (2.9)

**Table 5: Top 10 authors ranked by the number of scientific publications**

Number	Authors	n (%)
1	Spruit <i>et al.</i>	53 (1.8)
2	Wouters <i>et al.</i>	50 (1.7)
3	Brooks <i>et al.</i>	50 (1.7)
4	Troosters <i>et al.</i>	44 (1.5)
5	Singh <i>et al.</i>	40 (1.4)
6	Bourbeau <i>et al.</i>	38 (1.3)
7	Ambrosino <i>et al.</i>	35 (1.2)
8	Decramer <i>et al.</i>	34 (1.2)
9	Maltais <i>et al.</i>	33 (1.1)
10	Clini <i>et al.</i>	31 (1.0)

institutions from each country (Canada, Australia and Italy) have been seen to be interested and published their articles regarding PR within all top 10 countries.

With these results, we consider that, there is need to draw the pulmonary physicians' attention to the fact that despite

**Table 6: Top 10 affiliations ranked by the number of scientific publications**

Number	Affiliation	n (%)
1	University of Toronto, Canada	79 (2.7)
2	Glenfield Hospital, UK	60 (2.0)
3	VA Medical Center, USA	54 (1.8)
4	The University of Sydney, Australia	45 (1.5)
5	University of Modena and Reggio Emilia, Italy	44 (1.5)
6	University Hospital Maastricht, The Netherlands	43 (1.4)
7	Katholieke Universiteit Leuven, Belgium	43 (1.4)
8	Curtin University, Australia	38 (1.3)
9	The University of British Columbia, Canada	36 (1.2)
10	IRCCS Fondazione Salvatore Maugeri, Italy	35 (1.2)

its increasing popularity and being recommended in the worldwide guidelines, prescription and implementation of PR remains limited to some medical centers in some developed countries. We consider that the major obstacles that prevent the universal application of PR all around the world are lack of awareness and knowledge of physicians on PR. Therefore, assemblies of societies in many countries should focus on training and assessment of competence of physicians about PR. Courses aiming to develop skills and knowledge in the field of PR are needed to implement PR in physicians' daily practice. We believe that this analysis and contribution of physicians of different departments to the literature are essential in developing and improving future researches regarding PR.

#### Financial support and sponsorship

Nil.

#### Conflicts of interest

There are no conflicts of interest.

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Access this article online	
Quick Response Code: 	Website: <a href="http://www.thoracicmedicine.org">www.thoracicmedicine.org</a>
	DOI: 10.4103/1817-1737.172300

**How to cite this article:** Gunay S, Sariaydin M. Pulmonary rehabilitation: Recommended but not implemented. *Ann Thorac Med* 2016;11:85-7.