How is occupational medicine represented in the major journals in general medicine?

Jean-François Gehanno,[1,2] Laetitia Rollin,[1,2] Joel Ladner,[3] Stefan J Darmoni[2]

[1]Institute of Occupational Medicine, Rouen University Hospital, Rouen, France
[2]CISMeF team, LITIS Laboratory EA 4108, Rouen University Hospital, Rouen, France
[3]Department of Epidemiology and Public Health, Rouen University Hospital, Rouen, France

Correspondence to
Professor Dr Jean-François Gehanno, Institute of Occupational Health, Rouen University Hospital, 1 rue de Germont, 76000 Rouen, France; jean-francois.gehanno@chu-rouen.fr

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ABSTRACT

Objectives Most physicians have received only limited training in occupational medicine (OM) during their studies. Since they rely mainly on one 'general medical' journal to keep their medical knowledge up to date, it is worthwhile questioning the importance of OM in these journals. The aim of this study was to measure the relative weight of OM in the major journals of general medicine and to compare the journals.

Methods The 14 091 articles published in the *Lancet*, the *NEJM*, the *JAMA* and the *BMJ* in 1997, 2002 and 2007 were analysed. The relative weight of OM and the other medical specialties was determined by categorisation of all the articles, using a categorisation algorithm, which inferred the medical specialties relevant to each MEDLINE article file from the major medical subject headings (MeSH) terms used by the indexers of the US National Library of Medicine to describe each article.

Results The 14 091 articles included in this study were indexed by 22 155 major MeSH terms, which were categorised into 73 different medical specialties. Only 0.48% of the articles had OM as a main topic. OM ranked 44th among the 73 specialties, with limited differences between the four journals studied. There was no clear trend over the 10-year period.

Conclusions The importance of OM is very low in the four major journals of general and internal medicine, and we can consider that physicians get a very limited view of the evolution of knowledge in OM.

What this paper adds

- Most physicians receive only limited training in occupational medicine during their studies, and rely mainly on one 'general medical' journal to keep their medical knowledge up to date.
- The importance of occupational medicine in the four major journals of 'general and internal medicine' is very low, and did not increase over the last 10 years.
- This warrants the development of continuing medical education in occupational medicine for physicians who are not specialists in this field.

Many countries face a dramatic shortage of occupational physicians, as a result of which, more and more patients with occupational health problems tend to consult their primary care physician.[1 2] Nevertheless, many studies performed in various developed countries, have shown that the training of physicians in occupational medicine (OM) was very poor.[3 4] Therefore, one can hope that medical journals provide physicians not specialised in OM, with continuous medical education in this field. General practitioners read or consult a small number of key journals on a regular basis with regard to their particular clinical practice, including usually one 'major general medical journal'. Specialists usually read journals from their specialty and one or two 'general journals'. For example, British psychiatrists regularly read an average of three journals, among which is at least one general medical journal: 89% regularly read the *British Medical Journal* (*BMJ*) and 22% the *Lancet*.[5] A subsequent study among British surgeons found percentages of 77.9% and 30.8% for the *BMJ* and the *Lancet*, respectively, whereas, the *Journal of the American Medical Association* (*JAMA*) or the *New England Journal of Medicine* (*NEJM*) were read by less than 1% of respondents.[6] Among American surgeons, besides specialised journals, 67% and 66% read the *NEJM* and the *JAMA*, respectively.[7]

Since clinicians rely mostly on one or two general medical journals to keep their medical knowledge up to date, it is worthwhile questioning how OM is represented in these major journals in general medicine, and if there are differences among them.

The aims of this study were to measure the relative weights of OM in general medicine journals and to compare the journals.

MATERIAL AND METHODS

Construction of the database

We selected four major periodicals, in terms of impact factor, in the subject category 'Medicine, General & Internal' of the *Journal of Citation Report*. In order to have two US and two European journals, we included the 5th journal in this category (*BMJ*) instead of the 4th (*Annals of Internal Medicine*). Finally, the *Lancet*, the *NEJM*, the *JAMA* and the *BMJ* were analysed.

The relative weight of OM in these journals was assessed by comparing, in all the articles published in the four journals, and in the 3 years studied, the number of times OM was a major topic against the total number of times that all the other specialties were a major topic.

All the articles published by these journals in 1997, 2002 and 2007 were identified by searching PubMed (URL: http://www.pubmed.org) with the journal title and each of these publication years, combined with the Boolean operator OR.

The major keywords used by MEDLINE indexers to describe the articles retrieved at the end of this first stage were then gathered to build a database, which was used to categorise the journals one by

one, and 1 year at a time. This was done using a MEDLINE categorisation algorithm that we had previously developed.[8] In practice, this categorisation algorithm lists the medical specialties relevant to a MEDLINE file in decreasing order of their importance. These medical specialties are inferred from the medical subject headings (MeSH) thesaurus from the US National Library of Medicine (NLM), and enhanced by the concept of metaterms we previously developed.[9] Briefly, a metaterm is a medical specialty or a biological science (eg, 'cardiology' or 'occupational medicine'). The categorisation algorithm uses all the semantic links existing between MeSH descriptors of an article indexed in the MEDLINE bibliographic database and metaterms to infer the list of metaterms for that particular article. This automatic categorisation is based on the manual indexing of resources with MeSH (descriptors/qualifiers) pairs by NLM indexers. This process is performed recursively to obtain the list of metaterms related to any MEDLINE file obtained from any MEDLINE query.

We used only the major MeSH descriptors, which describe the major topics of the articles used by NLM indexers for the categorisation.

If an MeSH descriptor has a link to several metaterms, it can infer more than one metaterm. For example, the descriptor 'vocational rehabilitation' infers both the metaterms 'occupational medicine' and 'physical medicine and rehabilitation'.

Let us assume there are n major MeSH terms T1, T2, … Tn; the categorisation algorithm enables us to deduce k metaterms M1, M2, … Mn from these sets of terms.

The list of metaterms and their respective semantic links with MeSH descriptors are available at the following URL: http://doccismef.chu-rouen.fr/liste_des_meta_termes_anglais.html.

The categorisation algorithm was applied to all the articles in our database. Finally, we computed the number of occurrences of each metaterm for each journal and each year studied. We used only the metaterms related to medical or surgical specialties, and we excluded the metaterms related to methods (eg, 'statistics') or laboratory tests (eg, 'bacteriology' or 'parasitology').

RESULTS

Overall, 14 091 articles were published by the *BMJ*, the *JAMA*, the *Lancet* and the *NEJM* in 1997, 2002 and 2007. They were

Table 1 Mean ranking, in terms of frequency, of the 73 specialties in the BMJ, JAMA, Lancet and NEJM for the years 1997, 2002 and 2007 cumulated

Specialties	Rank	Relative weight, %*	Specialties	Rank	Relative weight, %*
Cardiology	1	684			
Neurology	2	650	Family medicine	38	0.70
Environment and public health	3	590	Emergency medicine	39	0.64
Cancerology	4	506	Developmental biology and medicine	40	0.59
Infectious diseases	5	479	Terminal care	41	0.59
Allergy and immunology	6	414	Medical informatics	42	0.57
Vascular medicine and surgery	7	356	Neonatology	43	0.50
Haematology	8	314	Occupational medicine	44	0.48
Surgery	9	290	Ophthalmology	45	0.47
Gastroenterology	10	287	Geriatrics	46	0.45
Psychiatry	11	286	Social affairs	47	0.44
Pulmonary disease (specialty)	12	276	Military medicine	48	0.38
Genetics	13	258	Nursing care	49	0.33
Paediatrics	14	250	Otolaryngology	50	0.32
Information science	15	247	Sleep medicine	51	0.32
Economics	16	226	Dentistry	52	0.31
Gynaecology	17	223	Physiotherapy	53	0.24
Obstetrics	18	222	Complementary medicine	54	0.24
Endocrinology	19	193	Physical medicine and rehabilitation	55	0.22
Rheumatology	20	182	Anaesthesiology	56	0.21
Toxicology	21	166	Haemobiology-blood transfusion	57	0.18
Risk management	22	159	Sports medicine	58	0.16
Nutrition	23	158	Evidence-based medicine	59	0.15
Law	24	151	Nuclear medicine	60	0.14
Ethics	25	151	Tropical medicine	61	0.12
Forensic medicine	26	145	Internal medicine	62	0.07
Education	27	144	Orthopaedics	63	0.07
Pharmacy	28	134	Humanitarian medicine	64	0.07
Urology	29	133	Critical care	65	0.07
Addiction	30	133	Homeopathy	66	0.04
Preventive medicine	31	128	Neurosurgery	67	0.04
Reproductive medicine	32	127	History of medicine	68	0.03
Thoracic and cardiovascular surgery	33	099	Acupuncture	69	0.03
Hepatology	34	086	Podiatry	70	0.02
Dermatology	35	084	Plastic and aesthetic surgery	71	0.02
Nephrology	36	077	Oral surgery and oral surgical procedures	72	0.01
Traumatology	37	074	Thermal medicine	73	0.01

*Relative weight: The relative weight of a specialty in these journals was assessed by comparing among all the articles published in the four journals and in the 3 years studied, the number of times this specialty was a major topic vis-à-vis the total number of times all the specialties were a major topic.

indexed by 141 474 MeSH terms, among which 22 155 were major MeSH terms. These major MeSH terms were linked by the categorisation algorithm to 73 different metaterms representing medical or surgical specialties, each of them occurring between 3 ('thermal medicine') and 4101 ('cardiology') times. OM occurred 285 times, overall.

Table 1 shows the mean ranking, in terms of frequency, of the 73 specialties. OM ranked 44th, far behind most of the traditional medical or surgical specialties. There was little difference between the four journals since occupational medicine ranked 38th, 39th, 44th and 47th in the *JAMA*, the *BMJ*, the *Lancet* and the *NEJM*, respectively. Nevertheless, there were differences between the journals in terms of relative weight of OM, since OM was the major topic of 0.85%, 0.91%, 0.38% and 0.43% of articles in the *BMJ*, the *JAMA*, the *Lancet* and the *NEJM*, respectively.

Overall, we observed a decrease of the weight of OM between 1997, 2002 and 2007, since OM was the major topic of 0.50%, 0.49% and 0.35% of articles, respectively. However, there was no clear trend with either positive or negative evolutions according to the time period and the journal.

DISCUSSION

The main finding of this study was that the importance of OM in the four major journals of 'general and internal medicine' was low, and did not increase.

Since the cited half-life of these journals is between 7.5 and 9.4 years (*Journal of Citation Reports*, 2008), we searched for articles published in 1997 and 2007, that is, 10 years before 2007. We then used 2002 as a mid-term to assess if trends between 1997 and 2007 could be identified. We did not include all the years between 1997 and 2007 because the volume of data would have overloaded the categorisation algorithm.

Our study relied on the use of the concept of metaterms. The validity of the semantic links between MEDLINE terms/subheadings and the metaterms may have been questioned. Nevertheless, the semantic links were created based on the known 'how' of professional librarians and medical experts, with the help of the Network of NLM using the Medlib-L listserv. Furthermore, this validity was recently compared with NLM journal descriptors to categorise scientific articles, and no significant difference was observed.[10]

The MEDLINE categorisation algorithm we used was able to classify scientific articles among 115 different specialties, whereas, there are only 22 MeSH disease categories. Moreover, the metaterms are broader than the MeSH disease categories, each of them being included in at least one metaterm. Finally, the same algorithm was applied to the four journals studied, and the comparisons between journals are, therefore, considered reliable.

The fact that our algorithm was restricted to the use of major MeSH terms allowed us to categorise articles only according to the main topics discussed in the articles.

The research activity and the number of published articles, worldwide, in the field of OM are increasing,[11 12] and attract a growing number of citations.[13] Nevertheless, this literature is concentrated in journals specialised in OM,[14] and the general medical literature cite far less occupational medical journals than the converse.[12] It was, therefore, worthwhile assessing if the readers of general medical journals have an overview of the evolution of the knowledge in the field of OM.

In our study on the major general medical journals, less than 1% of the articles that were published had OM as a main topic, whereas only 10 specialties were involved in nearly half (45.7%) the articles published.

The importance of OM, or lack of it, was rather similar in the four major journals studied. Nevertheless, in 2007, the *BMJ* performed 2.5 times better than the *JAMA*. Furthermore, in 2007, the two journals published in England performed better than the two journals published in the USA. Since physicians usually read journals from their own country,[5–7] physicians in the UK may be better informed in OM than those in the USA.

However, we can consider that, whichever of these journals a physician reads, he gets a very limited view of the evolution of knowledge in the field of OM. Although this was also the case for many other specialties in our study, we must take into consideration the fact that undergraduate teaching in OM is very limited in most of the medical faculties.[3 4] Therefore, most physicians graduate with a limited amount of knowledge in OM, and they do not gain any significant additional knowledge by reading the most popular general medical journals. One could hope that some physicians also read a journal specialised in OM, but this is probably wishful thinking.

The results of our study warrant the development of continuing medical education in OM for physicians who are not specialists in this field, since we cannot rely on the general medical journals to enhance their knowledge in OM and raise their level of awareness towards work-related ill health seen in a general practice setting.

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