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SPECIAL ISSUE REPORT

# HISTORIC PERSPECTIVES ON THE DEVELOPMENT OF PHYSICAL AND REHABILITATION MEDICINE AND THE JOURNAL OF REHABILITATION MEDICINE

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This paper is based on a lecture that was presented at the symposium for the 50th anniversary of *Scandinavian Journal of Rehabilitation Medicine/ Journal of Rehabilitation Medicine* in October 2019 at the meeting of the Baltic and North Sea Forum for Physical and Rehabilitation Medicine in Oslo, Norway. The paper gives a brief review of the development of physical medicine and rehabilitation medicine from an international perspective and its development in the Nordic countries, and comments on the development of the journal during its 50 years.

## INTERNATIONAL AND NORDIC DEVELOPMENT OF PHYSICAL AND REHABILITATION MEDICINE

Some of the milestones in the development of rehabilitation as a clinical discipline were: the first university department in Physical Medicine, headed by Professor Frank Krusen, at Temple University in Philadelphia in the USA; the need for rehabilitation after large polio epidemics in the USA, and in countries in Europe; the special need for rehabilitation of persons with war injuries and, within that context, the development of active care for patients after spinal cord injuries.

The polio epidemics, especially in the 1930s, 40s and early 1950s, were of importance for the development of rehabilitation programmes for these patients. Of importance was the creation of special centres in the USA; such as Warm Springs in Georgia, which was used by President Franklin Roosevelt, and other places, such as Minneapolis. President Roosevelt tried to hide his disability in various ways during his lifetime, but could actively train and be treated at Warm Springs. Respiratory muscle paralysis in some polio patients needed special respiratory care and the development of different kinds of respiratory support. The large number of such patients, for example in Denmark, was first treated, rather heroically, by manual ventilation; respirators were subsequently developed for this purpose.

A description of the history of Physical and Rehabilitation Medicine, especially in Europe, can be found in a chapter in the most recent edition of the *White Book on Physical and Rehabilitation Medicine* (1).

Two names of note in the development of Physical and Rehabilitation Medicine are Professor Howard Rusk in the USA and Sir Ludwig Guttman in England. After treating war-injured patients during the Second World War, in 1948 Howard Rusk started a rehabilitation centre in New York, the Institute of Rehabilitation Medicine at New York University Medical Center. The basis for modern treatment of spinal cord injuries and of other groups of persons injured by war and road traffic accidents was established and, later, for broader groups of patients. Sir Ludwig Guttman, a German neurosurgeon who left Germany in 1939 because he was a Jew, started the National Spinal Cord Injury Centre at Stoke Mandeville, in the UK. This became a leading centre for rehabilitation in patients after spinal cord injury, where physicians and other health professionals, including those from other countries, could gain experience in handling these patients. Guttman also took the initiative in setting up competitions in handicap sports, which later developed into the Paralympics.

For the Nordic countries, examples of the early development of rehabilitation medicine are described here. This will provide the background to the creation of the *Scandinavian Journal of Rehabilitation Medicine*, at which time comprehensive rehabilitation medicine clinics were established in the Nordic countries.

In Denmark the term *"fysiurg"* (physiatrist) was used early on for a speciality using physical means to treat patients. The Danish Physiatrists Society was founded in 1921. Frank Krusen first suggested that this group of physicians be called physiatrists in the USA in 1938. In 1964 Ove Bøje became the first professor in Denmark in *"fysiurgi"* (physiatry), and such departments were started in central hospitals. However, in 1982, due to the interaction with rheumatology, it was decided that the speciality would only be called rheumatology. Thus, in Denmark, a specific speciality in rehabilitation no longer existed at that time. The idea was that rehabilitation should be done vertically, handled by the different clinical disciplines. Another important development in Denmark was the foundation of a rehabilitation hospital in 1952 in Hornbaeck, north of Copenhagen, in connection with the last large polio epidemics in Denmark, which was initially specifically for children. That unit then also took other groups of patients and, from 1955, adult patients with spinal cord injury. In 1980 it was connected with Rigshospitalet

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in Copenhagen, where a unit for spinal cord injury patients was also started as part of a Neurocenter.

In Finland the Second World War marked the start of rehabilitation. Units were started for the support and rehabilitation of people with war injuries and their disabilities. The first rehabilitation unit for that purpose was Kauniala Hospital, which was established in 1946. The first rehabilitation physicians often had a background in surgery. A second boost to the start of rehabilitation in Finland was the use of electromyography, where specialists in rehabilitation were active before the creation of a speciality of Clinical Neurophysiology. The Medical Society of Rehabilitation Medicine was founded in 1956. Rehabilitation in Finland has a profile of physical medicine, but is also involved in occupational and insurance medicine.

In Iceland, vocational training for patients with tuberculosis started at Reykjalundur Rehabilitation Centre outside Reykjavik. Odd Olafsson was the Chief Physician at this centre between 1945 and 1972. From around 1970 it became a general rehabilitation centre. Haukur Thordarson then became Head of Rekjalundur Rehabilitation Centre and also started a rehabilitation unit at Landspitali University Hospital in Reykjavik. A rehabilitation unit at Borgaspitali, the hospital of the city of Reykjavik, was started in 1968. The development of rehabilitation in Iceland, thus occurred rather early on, and was supported not least by 2 politicians from different parties who themselves became disabled.

In Norway, the Norwegian Society for Physical Medicine was founded in 1951. In 1963 the speciality Physical Medicine and Rehabilitation was established. After the large polio epidemics in 1950s and 1960s the special training units, managed by neurologists, were turned into more general rehabilitation units. The rehabilitation hospital, Sunnaas Hospital outside Oslo, was founded though a donation by Rolf and Birgit Sunnaas. It was first set up as a nursing home from 1954 and, in 1960, turned into a rehabilitation hospital for different groups of patients, with great activity, from both clinical and research points of view, and with international contacts, becoming a university hospital from 1995. Nils Sponheim was its first head, from 1961 to 1988.

In Sweden a spinal cord unit was started by Olle Höök within the Department of Neurology at Serafimer Hospital in Stockholm in the mid-1950s. It moved to Karolinska Hospital in 1964. In 1957, a Neurological Rehabilitation Unit, mainly for patients after polio and spinal cord injury, was started in Göteborg, connected to the Department of Neurology. Bo Bjerner, a neurologist who was himself living with the effects of polio, became the head of that unit. He developed new ideas for rehabilitation, including the importance of teamwork and of social contacts for patients. In 1958, Gösta Eriksson, originally from Internal Medicine, with the support from his wife and colleague Kerstin Waller-Eriksson, started the first general rehabilitation medicine clinic in Borås in western Sweden. In 1962, a rehabilitation unit for ambulatory patients was started in Göteborg, with Einar Helander as its first chief. In 1963, Bo Bjerner moved to Danderyd Hospital outside Stockholm and started a rehabilitation clinic. Olle Höök moved to Göteborg in 1966 as the first professor in Sweden in Medical Rehabilitation, as it was called at that time. In 1969, he started a unit with both inpatients and outpatients with different diagnoses. In 1950 a Swedish Society of Physical Medicine was founded, and in 1967 the Swedish Society of Rehabilitation and Physical Medicine was founded, with Olle Höök as its first chairperson. The speciality Rehabilitation and Physical Medicine was established in 1969. In 1992 the name for the speciality and the society was changed to Rehabilitation Medicine. In Sweden, patients of working age with acquired brain injuries (stroke and traumatic brain injuries) are now predominant.

## PUBLICATIONS IN PHYSICAL AND REHABILITATION MEDICINE AND DEVELOPMENT OF THE SCANDINAVIAN JOURNAL OF REHABILITATION MEDICINE/ JOURNAL OF REHABILITATION MEDICINE

### *History*

The first journal in Physical Medicine and Rehabilitation (which, in Europe, is nowadays usually called Physical and Rehabilitation Medicine) was *Archives of Physical Medicine and Rehabilitation* started in 1920. This was the official journal both for the American Academy of Physical Medicine and Rehabilitation and the American Congress of Rehabilitation Medicine, but nowadays is the official journal only for the latter. In 1922, the *American Journal of Physical Medicine and Rehabilitation* was started as an official journal for the Association of Medical Physiatrists, which at present is also the official journal for the Associación Médica Latinoamericana de Rehabilitación. The first European journal was *Europa Medicophysica*, which started in 1965, currently called *European Journal of Physical and Rehabilitation Medicine*. Initially it was an official journal for the European Federation of Physical Medicine and Rehabilitation (now the European Society for Physical and Rehabilitation Medicine) and currently also for the Mediterranean Forum of Physical and Rehabilitation Medicine and the European Union of Medical Specialists – Physical and Rehabilitation Medicine Section. In 1969 the *Scandinavian Journal of Rehabilita-*

OLLE HÖÖK (1918–2006)
Professor in Göteborg 1966–1983
Editor-in-Chief SJRM 1969–1998

**Fig. 1.** Olle Höök, the founder and first Editor-in-Chief of *Scandinavian Journal of Rehabilitation Medicine*.

*tion Medicine (SJRM)* was started, after having being founded in 1967 (2), the owner being the Foundation of Rehabilitation Information. Its first chairperson was Olle Höök (1967–2000), followed by Gunnar Grimby (2000–2007), Jan Ekholm (2007–2015), when the journal became its own publisher, now with Katharina Stibrant Sunnerhagen as chair (2015 to present).

The initiative to start SJRM was taken by Olle Höök at the 2nd Scandinavian Congress on Medical Rehabilitation (Fig. 1). He was also the Editor-in-Chief from 1969 to 1998. At that time, as mentioned above, rehabilitation was established in the Nordic countries, although with somewhat different names and profiles. At the start of the journal 2 Associate Editors were appointed, both from Sweden; Lars-Göran Ottosson from Jönköping and Harald Sanne from Göteborg. There was an Editorial Board with 9 members from the Scandinavian countries: Svend Clemmesen, Copenhagen; Sven Forssman, Stockholm; Gudmund Harlem, Oslo; Karl Hartviksen, Oslo; Castor Lindqvist, Helsinki; Leo Noro, Helsinki; Oddur Olafsson, Reykjavik; K.H. Sparup Copenhagen; and Haukur Thordarson, Reykjavik.

The first 4 volumes of *SJRM*, published in 1969–1972, were dominated by articles from Sweden, with some contributions from the USA, Finland, Denmark, Israel, and a few from some other European and Asian countries (Table I). The topics for the articles in the first 4 volumes (Table II) published in 1969–1972 were dominated by musculoskeletal conditions, cardiac diseases and, to a large extent, methodological studies and "general" papers on rehabilitation issues (3). Taken together, there were also a considerable number of articles within the neurological field. This is in some contrast to the distribution of topics for articles in more recent years (2004–2018), as seen in Fig. 2, with articles on various neurological disorders being more common, although a relatively large proportion of articles on musculoskeletal conditions still exists. During the years 1970–1999 a number of supplements were published, mainly of Swedish doctorate theses, but also from different conferences and symposia.

**Table I.** Country of origin of the first author of articles in the first 4 volumes of *Scandinavian Journal of Rehabilitation Medicine*, 1969–1972

| Country of origin of first author | *n* |
|---|---|
| Sweden | 57 |
| USA | 8 |
| Finland | 5 |
| Denmark | 4 |
| Israel | 3 |
| Poland | 2 |
| Japan | 2 |
| Netherlands | 2 |
| UK | 2 |
| Canada | 1 |
| Germany | 1 |
| Ireland | 1 |
| Norway | 1 |
| Spain | 1 |

**Table II.** Percentage distribution of topics in the published articles in the first 4 volumes of *Scandinavian Journal of Rehabilitation Medicine*, 1969–1972

| Topic | *n* |
|---|---|
| Stroke | 5 |
| Other brain injuries | 8 |
| Spinal cord lesions | 10 |
| Neuromuscular diseases | 2 |
| Musculoskeletal conditions | 23 |
| Cardiac diseases | 21 |
| Other conditions, methodological studies, "general" papers | 32 |

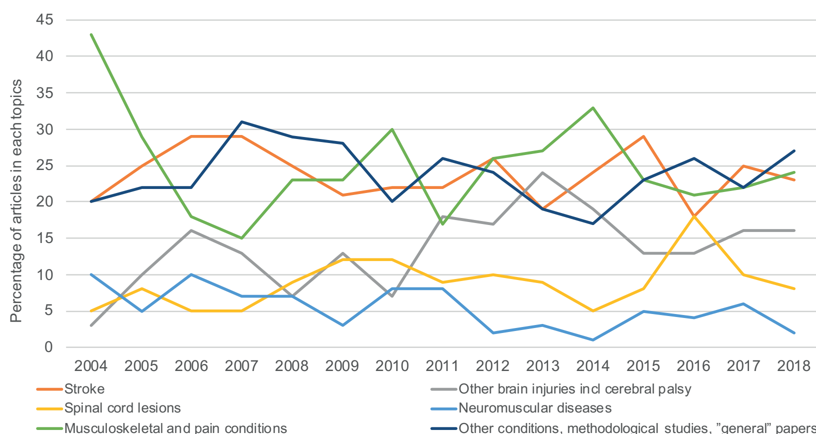


**Fig. 2.** Distribution of topics in *Journal of Rehabilitation Medicine*, 2004–2018.

Randomized controlled trials (RCT) did not appear during the first years, but in 1995 these comprised 21% and, in 2015, 27% of studies, whereas non-controlled evaluative studies decreased from 25% in 1975 to 8% in 2015 (1).

*JRM* has had an interest in publishing articles connected to the International Classification of Functioning, Disability and Health (ICF), as Supplement 44, 2004 (ICF Core Sets for chronic conditions) edited by Grimby & Stucki (4), and Special issue no 4, 2007 (The ICF: a unifying model for the conceptualization, organization and development of human functioning and rehabilitation research) edited by Grimby, Melvin & Stucki (5), and a large number of separate articles. In 2011, 10% and, in 2016, 5.5% of the articles in *JRM* were related to the ICF. This made *JRM* second after *Disability and Rehabilitation*, for these years, among rehabilitation journals in the number of publications related to ICF. It is also of interest to note the publication of the *White Book on Physical and Rehabilitation Medicine in Europe* in 2007, edited by Gutenbrunner, Ward & Chamberlain (6).

### *Development of the journal*

Some of the important steps in the development of *SJRM*, later to become *JRM*, are described here. The name of the journal was changed in 2001, an event, which occurred in parallel to discussion with the Union Européenne des Médecins Spécialistes (UEMS) European Board of Physical and Rehabilitation Medicine. This organization was seeking an official journal, with the possibility of regularly publishing some material. The Board for the different professional medical specialists deals especially with the training of physicians and the requirements for becoming a specialist in a particular field. At the time of the discussion between *SJRM (JRM)* and the European Board, Professor Alain Delarque from Marseille was the chairperson of the Board and active in these efforts. In 2001 *JRM* became the official journal of the European Board of Physical and Rehabilitation Medicine. The journal continued its efforts to create formal international establishments and contacts. Thus, in 2006 it became the official journal of the International Society of Physical and Rehabilitation Medicine and, in that year also, the official journal of the European Academy of Rehabilitation Medicine. In Europe, a system then evolved with journals published in association with a particular organization. *JRM* gained such status with the European Society of Physical and Rehabilitation Medicine in 2009, with the Asia Oceania Society of Physical and Rehabilitation Medicine in 2010, as also with the Canadian Association of Physical Medicine and Rehabilitation, and, finally, in 2012 with the Baltic and North Sea Forum for Physical and Rehabilitation Medicine.

### *Steps towards open access*

*JRM* endeavoured to allow readers access to publications as soon as possible, and in 2006 started to provide 6-months open access. This meant that all articles were free to read without subscription 6 months after publication. In addition some material, such as invited reviews, special reports and letters to the Editor were free to access immediately after publication. In 2017 the journal introduced immediate open access to all of its material. An electronic version was already being published, and from 2019 *JRM* phased out the printed version to publish as an electronic version only.

### *Termination of commercial publisher*

An important step was taken in 2007, when the journal became its own publisher, instead of publishing with Taylor and Francis. This resulted in definite freedom in decision-making and a valuable reduction in the cost of publication. The capacity of the Editorial office, managed by Agneta Andersson, was increased and fulfilled the new duties very successfully.

### *Editor-in-Chief*

Olle Höök served for 30 years as Editor-in Chief. The Editors-in-Chief and, from 2005, the Associate Editors are listed in Table III. For a summary of subjects and authors published in the journal up to 1993, the reader is directed to an article by Olle Höök published in 1997 (7). When Olle Höök resigned in 1998, Gunnar Grimby was appointed Editor-in-Chief and served as such until 2012. He summarized some of his experience as an Editor-in-Chief in an Editorial published in 2012 (8).

### *Content*

The journal increased successively in size, from 4 issues per year, usually with 48 pages in each issue,

**Table III.** Editors-in-Chief and Associate Editors of *Scandinavian Journal of Rehabilitation Medicine/Journal of Rehabilitation Medicine*

| |
|---|
| Editors-in-Chief |
| Olle Höök 1968–1998 |
| Gunnar Grimby 1999–2012 (June) |
| Bengt Sjölund 2012 (July)–2016 (June) |
| Kristian Borg and Henk Stam 2016 (July) – |
| Associate Editors |
| Björn Gerdle, Linköping and Jörgen Borg, Uppsala, Sweden 2005–2006 |
| At present 10 Associate Editors from Australia (1), Belgium (1), China (1), Italy (1), the Netherlands (1), Norway (1), Sweden (1), Switzerland (2), Turkey (1) |

JRM Journal of Rehabilitation Medicine JRM Journal of Rehabilitation Medicine JRM

after 1999 to 6 issues per year, usually with 64 pages, and during 2001–2006 to 10–13 issues per year, with 96 pages in each issue. In recent years there have usually been 10 issues per year with 80–96 pages in each. The increase in number of published articles soon after the millennium is seen in Fig. 3. This increase occurred markedly from 2007, a year after the journal had become an official journal of the International Society of Physical and Rehabilitation Medicine, although the total number of published articles has decreased slightly in recent years.

As mentioned above, Sweden initially dominated the submitted and published articles, although an international contribution to the journal could be seen from its beginning. As shown in Fig. 4, Scandinavia still dominated in 1996, although contributions from other parts of Europe and Australia-Asia had increased. In 2011, contributions from Australia-Asia, which had increased further, plateaued, and contributions from the USA increased, although not as much. Scandinavia no longer had a dominant role (Fig. 4). After 2012, contributions from Europe decreased somewhat. In 2018, the relative contribution from Australia-Asia increased further, whereas the relative contribution from the USA decreased, as did the total number of submitted manuscripts in recent years (Fig. 5). Fig. 5, in general, illustrates the same tendencies as Fig. 4, but shows continuous numbers from 1999 to 2018.

### *Impact factor*

The impact factor (Fig. 6), shown here as the 2-year impact factor (IF), is the number of citations received in a particular year of articles published in a journal during the 2 preceding years, divided by the total number of "citable items" published in the journal during these 2 preceding years. The impact factor was well below 2 until 2004, when it started to increase, and exceeded 2.0 in 2006. It then reduced slightly, but has been in the order of 1.6 to 1.9 during 2007–2018.

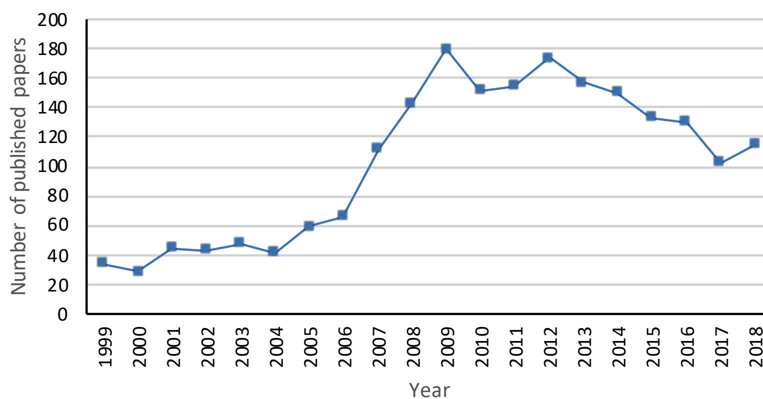


**Fig. 3.** Number of published articles in *Scandinavian Journal of Rehabilitation Medicine/ Journal of Rehabilitation Medicine*, 1999–2018.

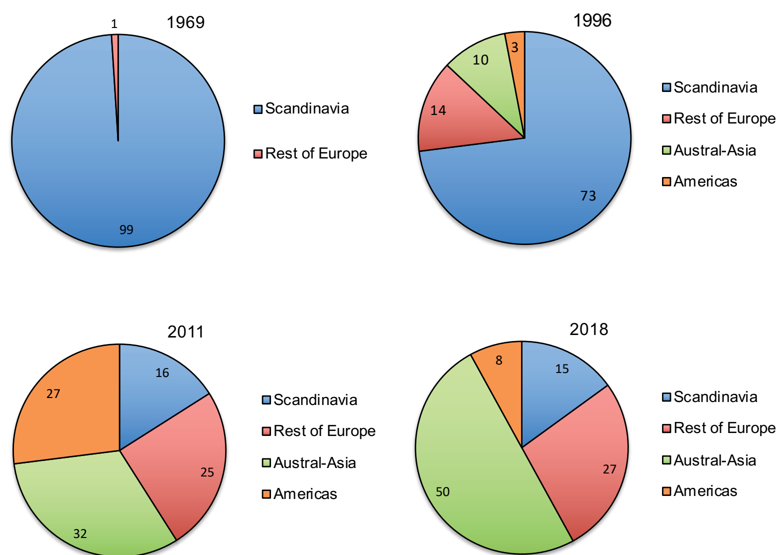


**Fig. 4.** Distribution of articles submitted from different parts of the world for *Scandinavian Journal of Rehabilitation Medicine/Journal of Rehabilitation Medicine* in 1969, 1996, 2011 and 2018.

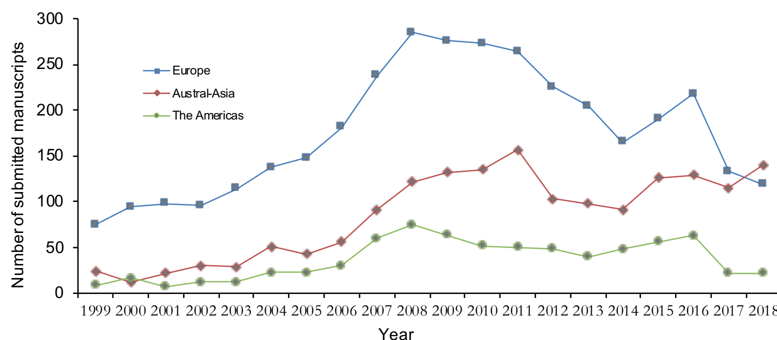


**Fig. 5.** Number of manuscripts submitted from different parts of the world to *Scandinavian Journal of Rehabilitation Medicine/Journal of Rehabilitation Medicine* in 1999–2018.

50 years JRM 1969–2019

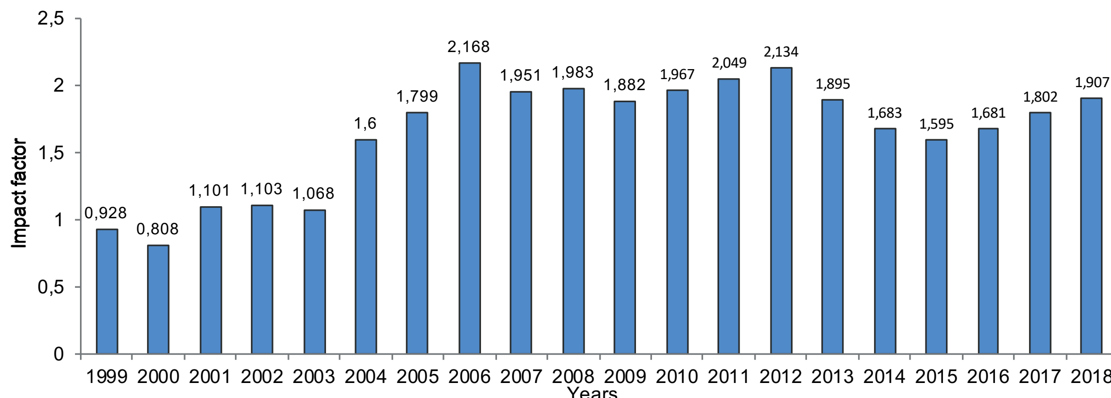


**Fig. 6.** Two-year impact factor of *Scandinavian Journal of Rehabilitation Medicine/Journal of Rehabilitation Medicine* from 1999 to 2018.

In comparison with other rehabilitation journals with connections to organizations, in 2006 the impact factor of *JRM* was the highest, but has since been overtaken by several of the "official" clinical rehabilitation journals. Hopefully, it is now on a rising trend again.

For clinical journals 2 years are often too short a time to be representative, and the use of a 5-year impact factor would be more relevant. As pointed out by the present 2 Editors-in Chief and the Editorial Manager of *JRM* in an Editorial in 2019 (9), the highest number of citations generated by *JRM* articles occurs first in the third and fourth years after publication. The question was raised as to whether the impact factor or other rankings, such as that by SCImago, reflect the "marked effect of influence" of the articles published. A high download number might be another way to characterize the influence of articles on the scientific and layperson communities. With a large number of downloads, *JRM* has been very successful, especially after the introduction of immediate open access in 2017.

### *Citations*

It is of interest to note the most cited articles from the journal. This paper presents only the 5 most cited articles (Table IV), whereas the Editorial from 2012 (5) lists the 20 most cited papers during 1999–2011. The topics in that list were dominated by methodological and conceptual papers, of which several are connected to the ICF, whereas randomized controlled studies are almost absent. Of the 5 most cited articles published between 1999 and 2018 (Table IV), 3 were methodological papers and 2 were from a special issue on mild traumatic brain injury with results from the World Health Organization (WHO) Collaborating Centre Task Force on Mild Traumatic Brain Injury.

The overall most cited articles in *Scandinavian Journal of Rehabilitation Medicine* are on perceived exertion as an indicator of somatic stress, published by Gunnar Borg in 1970, in one of the first volumes of the journal (10), which has well over 4,700 citations, and on an assessment system for motor impairments in hemiplegic patients, published by Axel R. Fugl-Meyer and co-workers in 1975 (11), with more than 4,200 citations to date. That article has been used as a "gold standard" for many studies within the field of rehabilitation and training in hemiplegic patients after stroke.

## GENERAL COMMENTS

Rehabilitation has always been more or less part of medicine. Examples are introduction of medical gymnastics by Henrik Ling in Sweden, the interest in training equipment in Europe in the 19th century, and the awareness that physical activity had a role in the prevention and treatment of impairments. However, organized rehabilitation on a more comprehensive

**Table IV.** The 5 most cited articles in *Scandinavian Journal of Rehabilitation Medicine/Journal of Rehabilitation Medicine*, 1999–2018

| Most cited articles | Times cited |
|---|---|
| 1. ICF linking rules: An update based on lessons learned. Cieza, A, Geyh, S, Chatterji, S, Kostanjsek N, Ustün B, Stucki G. J Rehabil Med 2005; 37: 212–218. | 726 |
| 2. Prognosis for mild traumatic brain injury: results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury. Carroll LJ, Cassidy JD, Peloso PM, Borg J, von Holst H, Holm L, et al. J Rehabil Med 2004; 36, (43 Suppl): 84–105. | 658 |
| 3. Incidence, risk factors and prevention of mild traumatic brain injury: results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury. Cassidy JD, Carroll LJ, Peloso PM, Borg J, von Holst H, Kraus J, et al. J Rehabil Med 2004; 36 (43 Suppl): 28–60. | 644 |
| 4. Linking health-status. Cieza A, Brockow T, Ewert T, Amman E, Kollerits B, Chatterji S, et al. J Rehabil Med 2002; 34: 205–210. | 503 |
| 5. Reliability of gait performance tests in men and women with hemiparesis after stroke. Flansbjer UB, Holmbäck AM, Downham D, Patten C, Lexell J. J Rehabil Med 2005; 37: 75–82. | 483 |

JRM Journal of Rehabilitation Medicine JRM Journal of Rehabilitation Medicine JRM

scale was established mainly in connection with the large polio epidemics in the 1940s and 1950s and with the need to support the rehabilitation of people injured during the Second World War. Furthermore, the need to modernize the care and rehabilitation of patients with traumatic spinal cord injuries, a condition that initially had a very high mortality, also supported the development of rehabilitation programmes. Programmes for comprehensive rehabilitation were established in the USA, the UK, and in the Nordic and other countries. Rehabilitation units were subsequently set up in many developed countries. The interest in physical means in the treatment of patients was evident, especially in the early days, creating the field of rehabilitation called physical medicine in some countries. Thus, in many countries Societies for Physical Medicine were first started. Societies for Physical Medicine and Rehabilitation, as in, for example, the USA, or Physical and Rehabilitation Medicine, as in Europe and the international organizations, then followed. In Sweden and some other countries the only name currently used is Rehabilitation Medicine.

As a consequence of the development of modern rehabilitation, scientific research and publication in rehabilitation also began to appear. Journals were started first in the USA. The journal celebrated at today's 50th anniversary, *Scandinavian Journal of Rehabilitation Medicine*, from 2001 *Journal of Rehabilitation Medicine*, was founded at a Scandinavian Congress on Medical Rehabilitation in 1967. Its first issue was published in 1969. It was initially dominated by articles from the Nordic countries, especially Sweden, but became successively more internationally oriented. That the journal, in the early 2000s, became an official journal of both European and the international organizations was of importance. The number of submitted articles increased dramatically from around 2004–2006. It is of interest to note the increasing number of submission of articles from Australia-Asia, besides Europe, whereas contributions from the USA have been sparser. A reason for this is probably the number of well-established journals in the USA. The topics in *SJRM/JRM* have always been well distributed across different areas of rehabilitation, with no specialization with respect to subject matter. However, it is notable that there are a number of methodological articles, which are well cited, among them a number connected to the ICF. Articles by Borg (10) in 1970 and by Fugl-Meyer and co-workers (11) in 1975 have outstanding citation rates (at present above 4,700 and 4,200, respectively).

## ACKNOWLEDGEMENTS

Thanks are due to representatives of the Nordic countries; in Denmark (Fin Biering Sørensen), Finland (Olavi Airaksinen), Iceland (Gisli Einarsson), and Norway (Johan Stanghelle), for providing valuable information on the start and development of rehabilitation in their countries. Thanks are also due to the Editorial Manager Agneta Anderson for providing material for the figures and tables and their layout.

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