

DEBATE

OLLE HÖÖK LECTURESHIP 2015: THE WORLD HEALTH ORGANIZATION'S PARADIGM SHIFT AND IMPLEMENTATION OF THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH IN REHABILITATION

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The World Health Organization's (WHO) paradigm shift, implied by the launch of the International Classification of Functioning, Disability and Health (ICF), is inextricably entwined with the emergence of rehabilitation as a key health strategy of the 21st century. To enable health systems to scale up rehabilitation we must spearhead the implementation of the ICF in rehabilitation towards its system-wide implementation in the healthcare system at large. In this essay, based on the Olle Höök lecture 2015¹, it is argued that the launch of the ICF in 2001 represents a paradigm shift, as it has enabled the WHO to more comprehensively act on its mandate and has guided WHO policies to shape the health system in response to population functioning needs. It is shown that this paradigm shift has important implications for rehabilitation, including its conceptualization and scientific methods. A prerequisite for the system-wide implementation of the ICF in clinical practice, policy, and research, is the availability of practical tools that allow for the universal and standardized description of functioning. Finally, some reflections are presented on how we may foster the system-wide implementation of the ICF by applying approaches from the implementation sciences.

Key words: ICF, rehabilitation; health system; health policy; outcome measurement.

¹Olle Höök was a pioneer of Physical and Rehabilitation Medicine (PRM) in Sweden, Scandinavia and internationally. He was the creator of the Foundation for Rehabilitation Information, a non-profit organization whose main task is to publish this journal, the Journal of Rehabilitation Medicine (JRM), originally named the Scandinavian Journal of Rehabilitation Medicine. The Olle Höök lecture was established in his honour by that foundation in 2007, and aims to provide leaders in PRM with the opportunity to share their vision on scientific topic areas, the strengthening of rehabilitation and the development of PRM, and since 2010, with an international audience at an international conference. The author of this essay was invited to give the 2015 Olle Höök lecture during the 4th Baltic & North Sea Conference on PRM in Riga on 16 September 2015 on the system-wide implementation of the ICF in rehabilitation. To share the presented ideas with a broader audience and to provide the arguments and relevant resources to support these ideas, the president of the board of the foundation, Professor Jan Ekholm, together with the editor of JRM, Professor Bengt Sjölund, suggested publishing an essay based on this lecture.

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INTRODUCTION

In 2001, the World Health Assembly (WHA) endorsed the International Classification of Functioning, Disability and Health (ICF) (1). The launch of the ICF was a landmark event for the health sector and especially for rehabilitation. At its core, the ICF offers a new perspective for describing and understanding a person's lived experience of health. This represents a new paradigm. The ICF serves as practical lens through which we can observe the lived experience of health in a way that is meaningful and useful to practitioners who aim to optimize functioning of individual patients, policy-makers who aim to shape the health system in response to persons' functioning needs, and researchers who aim to explain and influence functioning.

The notion of a paradigm is somewhat different in physics, which is engaged in the explanation of natural phenomena, and in the social sciences, which are engaged in the explanation of phenomena in the world. From our reading of Kuhn (2), paradigm shifts in physics occur when a current theory cannot, or does not, fully explain observed phenomena. The resulting crisis leads to attempts to find a better paradigm. One example is the shift to Einstein's theory of relativity, in which the previous paradigm of Newtonian classical physics has become a special case under defined circumstances.

In contrast, phenomena in the social sciences are typically observed through various paradigms established by different scientific traditions and disciplines engaged in its study. New paradigms emerge if phenomena cannot be fully described, and hence cannot be studied through currently prevailing paradigms. I argue that this is currently occurring with the new perspective on health as the lived experience of health. From this perspective health is seen as an intrinsic capacity

of the person (biological health), representing a basis to be developed in interaction with the environment (lived health) (3). Its scientific study requires as a practical lens a respective operationalization. As I will show, a most important example is the epidemiological study of the lived experience of health beyond studying the epidemiology of diseases.

In the social sciences the test of usefulness of a new paradigm and practical lens, such as the ICF, is not whether it can help explain every aspect of a phenomenon, such as health. Rather, the test is whether the new paradigm is superior to any other alternative to better understand phenomena that are currently not, or are incompletely, amenable, i.e. in our case the lived experience of health. Also, the paradigm represented by the ICF will not substitute, but will complement, existing paradigms relevant for the explanation of various aspects of health.

From the perspective of rehabilitation, the ultimate test for the ICF is its usefulness to guide practice in responding to individual person's functioning needs and to guide policies towards shaping the health system in response to population functioning needs. In terms of its application in the clinical sciences the test will be whether the ICF is useful in the explanation of functioning, in the identification of targets for rehabilitation interventions, and in the development and evaluation of rehabilitation interventions. In terms of public health and its core science epidemiology, the test will be whether the ICF is useful in the study of population functioning along the continuum of care, across persons living with different health conditions, who share diverse personal characteristics, and who are living in differently built and social environments.

In the first part of this essay I argue that the launch of the ICF in 2001 represents an important paradigm shift, as it has enabled the World Health Organization (WHO) to more comprehensively act on its mandate and has guided WHO policies to shape the health system in response to population functioning needs.

In the second part of this essay I show that this paradigm shift has important implications for rehabilitation, the emerging key health strategy of the 21st century, its conceptualization and the need to develop suitable methodological approaches for the study of the lived experience and how to influence it.

As I argue in the third part of this essay, a prerequisite for the system-wide implementation of the ICF in clinical practice, evidence-informed policy (a concept from the political sciences similar to the concept of evidence-based medicine) (4) and research is the availability of practical tools that allow for the universal and standardized description of functioning.

In the fourth part of this essay I provide some reflections on how we may move forwards towards the system-wide implementation of the ICF in the healthcare system at large, spearheaded by rehabilitation and by learning from the implementation sciences.

THE WORLD HEALTH ORGANIZATION'S PARADIGM SHIFT

Mandate of the WHO

Since its constitution in 1948, the WHO has never changed its mandate, which states in its preamble: "the enjoyment of the

highest attainable standard of health as a fundamental right of every human being", normatively defined as "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (5). For the first 50 years of its existence, the WHO has concentrated its actions on the second part of the aspiration, namely the "absence of disease or infirmity". To monitor this goal and take appropriate action, the WHO has developed and regularly updated the first child of the family of international classifications, the International Classification of Diseases (ICD) as a universal reference system for recording mortality and morbidity (6).

WHO's paradigm shift enabled by the ICF

The change, which has been described sarcastically as, from a "World Mortality and Morbidity Organization" to a "World Health Organization", came with the launch of the ICF in 2001. For the first time, the WHO and its member states could rely on an operationalization of health, enabling them to monitor and act on the first part of the aspiration described in WHO's normative definition, i.e. "complete physical, mental and social well-being". The ICF provides the operationalization or lens needed to achieve this aspiration, as it enables description and study of the lived experience of health. The ICF represents the reference system for the standardized description of functioning at all levels of the health and related systems and for a wide range of purposes, ranging from clinical practice to quality management as well as policy and research.

Monitoring the 3 related indicators: mortality, morbidity and functioning

With the ICF joining the ICD in the family of international classifications, WHO and governments worldwide can now monitor and act on all 3 indicators and related health goals. The first is reduction in mortality, which is documented through death certificates coded with the ICD. The second is control of health conditions or "disease control", which is documented through coding of health diagnosis in the healthcare system using the ICD. The third is optimization of functioning, which is documented through the ICF-based standardized description of data collected either "case-based" for individual patients in the healthcare system, or "population-based" through surveys.

For population-based data collection we can document functioning using 3 approaches. If functioning data are either collected based on the ICF or reported based on the ICF, we can analyse and interpret data across these 3 approaches, an unseen possibility and major advance in the study of functioning and disability.

The first approach is the observation of functioning through questions included in national and international health surveys, e.g. the questions developed by the UN Statistical Division/Washington City Group. The second approach is the observation of functioning with an ICF-based disability survey. Applied in the general population, it allows countries to study functioning across health conditions through what we refer to as "horizontal epidemiology". Towards this goal, WHO is in the process of finalizing the Model Disability Survey, an ICF-based survey that can be used

by WHO member states. Thirdly, we can observe functioning in health-condition specific surveys. An example is the ICF-based survey employed in the Swiss Spinal Cord Injury Cohort Study (SwiSCI). It can serve as a model for the development of other health condition-specific surveys (7, 8). Based on the model developed for SwiSCI, an International Spinal Cord Injury Survey (INSCI) will be conducted in 2017 as an effort under WHO's Global Disability Action Plan (9), albeit as a first internationally comparative ICF-based survey for a health condition studying functioning in interaction with different health systems.

WHO initiatives to improve population functioning

After the adoption of the ICF the WHO embarked on a sequence of resolutions, reports and actions plans with the goals of optimizing population functioning and minimizing the negative consequences of disability through a range of efforts, including rehabilitation. Table I shows the most important activities from the perspective of rehabilitation and selected contributions made by the International Society of Physical and Rehabilitation Medicine (ISPRM) (10), the umbrella organization of Physical and Rehabilitation Medicine (PRM) physicians in official relation with the WHO, in the context of these activities. The most important current activity supported by the ISPRM is the *Global Disability Action Plan 2014–2021* (11).

One may note that the ICF served as framework for the chapter structure of the *World Report on Disability* (WRD) (12) and

the *International Perspectives in Spinal Cord Injury* (IPSCI) (13). The reports follow the different perspectives implied in the ICF, including relevant chapters, such as: prevention of spinal cord injury, healthcare and rehabilitation needs, health systems strengthening, attitudes, relationships and adjustment, enabling environments and education and employment.

IMPLICATIONS OF THE WHO'S PARADIGM SHIFT FOR REHABILITATION

Rehabilitation is fundamental to achieve the mandate of the WHO

From the WHO's actions, shown in Table I, it becomes clear that rehabilitation is fundamental to achieve the aspiration of "complete physical, mental and social well-being". With some distance, and in retrospect, we may recognize that the WHO's paradigm shift, with its more comprehensive mandate, and the emergence of rehabilitation as the health strategy of the 21st century, are inextricably entwined. Realizing the contribution of rehabilitation to achieve the WHO's mandate requires the adoption of the ICF in the conceptualizations of rehabilitation and other health strategies. In terms of science, we should review, and possibly adapt, our methodological approaches for the study of the lived experience of health, including a possible expansion of the scope of the broad field of human functioning and rehabilitation research.

Table I. *Actions of the World Health Organization (WHO) following the launch of the International Classification of Functioning, Disability and Health (ICF) in 2001*

Year	Resolutions, reports and action plans of the World Health Organization (WHO)	International Society of Physical and Rehabilitation Medicine (ISPRM)
2001	The 54 th General Assembly of the WHO adopted the International Classification of Functioning, Disability and Health (ICF) (1)	
2005	The 58 th General Assembly of the WHO adopted Resolution WHA58.23, in which the development of the World Report on Disability and Rehabilitation was decided (37)	
2006–2011	Disability and Rehabilitation (DAR) Disability Action Plan 2006–2011 (38)	
2009		Approval of the ICF Core Sets Publication of scientific publication on the development of professional society ISPRM Chapter 2: ISPRM's Way Forward (39) and on the policy agenda of ISPRM, Chapter 6: The policy agenda of ISPRM
2011	Launch of the World Report on Disability by Dr Margaret Chan, Director-General of the WHO (12)	Approval of the "Conceptual Descriptions" of rehabilitation as a health strategy (16) and of Physical and Rehabilitation Medicine (PRM) (18)
2013	Launch of the International Perspectives on Spinal Cord Injury (IPSCI) (13)	
2014	The 67 th General Assembly of the WHO adopted the resolution A67/16 for a Global Disability Action Plan 2014–2021 (http://www.who.int/disabilities/actionplan/en/) (9)	Scientific publication to implement the World Report Disability (2011): Dissemination, analysis, and implementation of the World Report on Disability: the roadmap of the ISPRM (40)
2015		WHO includes the collaboration with ISPRM: WHO-ISPRM Workplan (41) Kick-off Meeting Initiative of Learning Health System (LHS) and the International Spinal Cord Injury Surveys (INSCI) Scientific publications on the relevance of the Global Disability Action Plan 2014–2021 (42)

Emergence of rehabilitation as the key health strategy of the 21st century

If we put the 3 health strategies, prevention, cure and rehabilitation, into historical context, we may recognize, in hindsight, the relative dominance of each in achieving improvements in health. Thus, we may come to see the 19th century as the century of prevention. Indeed, the main achievement of the 19th century, namely the major increase in life expectancy across population groups (and not just for the few rich), was realized through preventive measures, including clean water, sanitation and access to better nutrition.

Again in hindsight, we may come to see the 20th century as the century of the emergence of the curative strategy, with its achievements in addressing the challenges of injuries through war and violence and new approaches to addressing health conditions, including infectious diseases through antibiotics, and cancer and autoimmune diseases through targeted molecular therapies.

The emerging challenges faced by countries at the beginning of the 21st century are an ageing population, the increase in chronic conditions, and an increasing number of people who survive conditions previously considered lethal. The common denominator of these conditions is a limitation in functioning. At its core, the challenge is to optimize intrinsic health capacity and to translate intrinsic health capacity into performance in interaction with the environment. This translation of “biological health” into “lived health” can be understood as the “second translation”. This is the domain of rehabilitation and the professional and clinical sciences engaged in it (14). This second translation, which may be called “social translation”, complements the first translation now commonly referred to as translational medicine, denoting the translation from the laboratory to the bedside.

Applying the ICF in the rethinking of rehabilitation as a health strategy

The adoption of the ICF enabled the rethinking of rehabilitation as a health strategy in conjunction with prevention and cure (15). Its goal can now be most simply defined as to optimize people's functioning and to minimize the experience of disability. A slightly modified part of the conceptual description, published in 2007, was used in the definition of rehabilitation in the WRD, launched in 2011. In the same year, after an international discussion, ISPRM developed and endorsed an updated version of the conceptual description (16). The conceptual description of rehabilitation serves as the basis for derived conceptualizations for specific applications.

A first attempt to develop a derived conceptualization was made for the medical specialty PRM, again in a first version for international discussion (17) and a revised version endorsed by ISPRM in 2011 (18). This conceptual description lends itself to the development of derived conceptualizations for specific areas of PRM. A second derived conceptual description has been developed for vocational rehabilitation (19).

THE ICF IN THE CONCEPTUALIZATION OF OTHER HEALTH STRATEGIES

While the ICF is immediately relevant for rehabilitation, as the health strategy that aims to optimize persons' functioning, the ICF as a now universally accepted operationalization of health is also meaningful in the conceptualization of other health strategies, as alluded to in the first conceptual description of rehabilitation in 2007 (15). As the goal of the promotive health strategy is optimal biological or intrinsic health, the ICF, from the perspective of capacity, can now serve as a universal comparable indicator. Similarly, the ICF from the perspective of capacity can serve as a universal reference system for the evaluation of curative interventions. Obviously, the ICF, both from the perspective of capacity and performance, is the indicator for the rehabilitative strategy with its goal of optimal functioning. The ICF, from the perspective of performance, is a suitable indicator for the supportive health strategy that aims to optimize lived health. As the ultimate goal of the palliative health strategy is wellbeing, the ICF from the perspective of lived health may serve as proxy indicator.

EXPANDING THE SCOPE OF FUNCTIONING AND REHABILITATION RESEARCH

The ICF, a universal framework for the conceptualization and organization of human functioning and rehabilitation research

The ICF provides us with the unique opportunity to rethink health research into the understanding of, and how to influence, the lived experience of health (20). Towards this goal the author, together with Professors Gunnar Grimby and John Melvin, has proposed an approach on how to use the ICF as a universal framework for the conceptualization, organization and development of human functioning and rehabilitation research towards overcoming current limitations (21). The framework suggested 5 related and broad areas, with 4 areas representing defined and variously developed areas. The fifth area, to which we refer as “human functioning sciences”, stands out as one that needs to be developed as the basic science of the understanding of the lived experience of health from the comprehensive perspective, as represented by the ICF framework (22).

In a conceptual description of the human functioning sciences we identified a number of areas for research, including functioning epidemiology, described as the study of the incidence, prevalence, and distribution of factors associated with functioning and disability across health conditions, populations and environments, and over time. What becomes obvious from this definition is its inconsistency with most current definitions of epidemiology. That is, the prevailing current understanding of epidemiology and its respectively accepted methods are not fully suitable for the epidemiological study of the lived experience of health. This is the hallmark of a crisis in the context of a paradigm shift.

A crisis in epidemiology?

According to Kuhn a paradigm shift is occurring if a current theory is insufficient to explain phenomena. Such a shift typically involves a crisis, such as we now see in the epidemiological study of functioning. The reason is, that prevailing definitions of epidemiology focus on the study of the distribution, causes and effects of health conditions towards informing policies aimed at the second part of the aspiration denoted in the WHO's mandate, the "absence of disease or infirmity".

To illustrate this point I would like to guide the reader through current definitions. The popular website Wikipedia (23) defines epidemiology as "the study and analysis of the patterns, causes, and effects of health and disease conditions in defined populations". This view is shared by the renowned British Medical Journal (24), which defines epidemiology as "the study of how often diseases occur in different groups of people and why".

Both definition examples are guided by the biomedical perspective, which focuses on mortality as primary outcome and sees functioning as the effect or consequence of a health condition, and health as a secondary outcome, as it is understood biologically. These definitions are of no, or only limited, value in guiding the epidemiological study of people's lived experience of health in light of health conditions, under consideration of personal resources and in interaction with the environment. What is therefore needed is an understanding and definition of epidemiology that encompasses the possibility of studying functioning to inform policies aiming to achieve the first part of the aspiration denoted in WHO's mandate "complete physical, mental, and social well-being".

It is not unexpected, and is fortunate, that such a comprehensive definition of epidemiology is advocated by the WHO as "the study of the distribution and determinants of health-related states or events (including disease), and the application of this study to the control of diseases and other health problems" (25). This definition implies the possibility of considering functioning not simply as an outcome of health conditions, but as the focus of study. As a definition of what we may refer to as comprehensive epidemiology it encompasses biomedical epidemiology, focusing on the study of diseases, as well as functioning epidemiology, focusing on the study of functioning in the light of health conditions.

Human Functionomics: the study of the complex associations in human functioning.

Two of the most important features of functioning epidemiology are the need to model complex interactions of various aspects of functioning, similar to the study of associations in molecular biology, including the lack of an *a priori* assumed directionality in research designs. This is different from classical research designs in biomedical epidemiology, which typically assume uni-directionality, leading from risk factors or causes to the occurrence of health conditions and effects or outcomes. One possible statistical method to examine such complex associations structures, graphical modelling, which has been

applied successfully in molecular biology, was also found to be of potential value in the study of functioning (26–28).

In discussions with Professor Henk Stam, following the Olle Höök lecture it was suggested that "human functionomics" could serve as a suitable umbrella term for the methodological approaches used in the study of the lived experience of health. It is important to note that functioning, methodologically intended, must be treated differently in functioning epidemiology vs biomedical epidemiology. In functioning epidemiology the aim is to understand the determinants of people's lived experience of health and living with health conditions. Conversely, in biomedical epidemiology functioning is treated as an effect and secondary outcome. Accordingly, the functioning level of a person at the time of death must be considered in cohort analyses, e.g. by propagating the last observed level of functioning.

A first large comprehensive epidemiological study, including both functioning epidemiology into the lived experience of health, and biomedical epidemiology examining secular trends in mortality, morbidity and functioning as an outcome, has been established in Switzerland as Swiss Spinal Cord Injury Study (SwiSCI) in cooperation with persons living with spinal cord injury (29). Its methodological approaches and results have recently been published in a special issue in this journal (8) and will inform the already mentioned international comparative study, referred to as INSCI, to be conducted in more than 15 countries worldwide as an effort under WHO's Global Disability Action Plan (9) in 2017.

PRACTICAL TOOLS: A PREREQUISITE FOR THE SYSTEM-WIDE IMPLEMENTATION OF THE ICF IN REHABILITATION

The broad or "system-wide" application of a new paradigm in science, clinical practice and the healthcare system at large requires the development of suitable tools. In the case of the WHO's new "lens", the ICF, this requires the development of practical tools that allow us to observe and study the lived experience of health in order to guide clinical practice, evidence-informed policy, and scientific inquiry. While costing only a fraction of developing a physical science infrastructure, the effort to develop the principles and tools to apply the ICF has now taken one and a half decades and required substantial human resources. As these tools are intended for universal and non-proprietary use they were developed in a cooperation between the umbrella organization of rehabilitation physicians, the International Society of PRM (ISPRM), the ICF Research Branch, a cooperation partner within the WHO collaborating centre for the family of international classifications (www.icf-research-branch.org) and the WHO's classification, terminology and standards team, and involving a worldwide network of committed clinicians, scientists, institutions and societies, including professional organizations in official relation with the WHO's Disability and Rehabilitation team.

As the ICF is the ontological reference for the reporting of functioning, we need tools that allow us to specify which

ontological domains to document, tools that allow us to collect data on functioning, and finally, tools that allow us to report the data collected using a common metric. Such a common metric enables the sound comparison of data. Accordingly, in the planning of a study or the reporting of already collected data, ICF users may ask themselves the following 3 questions: what ICF domains to document, what data collection tools to apply, and, what approach to use for reporting (30–32). As users can now find answers to all 3 questions we may deem the ICF fit for purpose.

TOWARDS THE SYSTEM-WIDE IMPLEMENTATION OF THE ICF IN REHABILITATION

To achieve the system-wide implementation of the ICF remains a major challenge. Here I present some considerations, rather than a detailed examination and concrete action plan, as this would be beyond the scope of this essay and, indeed, would need the mandate of relevant international bodies.

Understanding what the ICF represents

A main challenge towards the system-wide implementation is the lack of recognition of the ICF as a new and powerful lens to observe, understand and influence the people's lived experience. It is my hope that this essay will encourage debate towards addressing misconceptions, including the claim that the ICF is just another outcome measure. It is also my hope that the understanding of what the ICF represents, as presented in this essay, encourages the exploration of its opportunities, e.g. in clinical decision-making, and the evaluation sciences, which are now becoming possible with interval scale data in relation to the ICF's ontological reference of domains.

Spearheading the implementation of the ICF in rehabilitation towards its general implementation in medicine and the healthcare system at large

Professor Jianan Li, the current president of the ISPRM, has emphasized that implementing the ICF solely in rehabilitation is not enough. Only if the ICF is universally adopted by our medical colleagues and the healthcare system at large can we use it as a general shared language for clinical practice, evidence-informed policy and research. What rehabilitation must do towards achieving this goal is to demonstrate how to apply the ICF successfully in rehabilitation, and hence to provide convincing arguments for its implementation in the healthcare system at large.

From the perspective of a medical discipline we may consider the similarity of PRM with radiology. Radiology is spearheading advances in imaging, which are subsequently used by many other medical disciplines in cooperation with radiology. By the same token, PRM assisted by other health professions involved in rehabilitation, should spearhead the use of the ICF in the management of functioning, to guide its use by all medical specialties and health professions involved in patient care.

With respect to the healthcare system we can contribute to the use of the ICF by advocating its use in all building blocks or functions. A most efficient mechanism may be the integration of the ICF in reimbursement systems, as it has been shown that functioning improves case-mix adjustments of diagnosis-related groups (DRGs) for the elderly and poly-morbid patient (33). Furthermore, the ICF should, in the future, be considered as reference framework in the development of function-related groups (FRGs).

Implementation beyond dissemination: applying push and pull strategies

We must understand that implementation goes beyond dissemination. Dissemination through the classical challenges of publication and training, as coordinated, for example, by the ICF Research Branch is certainly a useful starting point for implementation (34). From the perspective of the implementation sciences they represent typical "push" efforts (35). An interesting mechanism combining "push" with "pull" forces is the so-called "stakeholder dialogue", which has been developed to facilitate the uptake of research evidence into health programmes and policy planning (36). Stakeholder dialogues in rehabilitation are coordinated by Swiss Paraplegic Research (SPF) in the context of establishing a Learning Health System for Spinal Cord Injury, an effort under the WHO's global disability action plan and in cooperation with the ISPRM and the International Spinal Cord Society (ISCOs).

Important pull forces for the implementation of the ICF are normative frameworks by International Classification for Standardization (ISO) and the European Union (EU), which request that the documentation of functioning for e-health informatics should use the ICF. Another powerful pull force would be the requirement that rehabilitation services seeking accreditation, e.g. by the European Union of Medical Specialists (UEMS) PRM Section or by the Commission on Accreditation of Rehabilitation Facilities (CARF), use an ICF-based standardized reporting of results or an ICF-based measurement improvement system.

CONCLUSION

The WHO's paradigm shift, implied by the launch of the ICF and a series of subsequent actions, is inextricably entwined with the emergence of rehabilitation as the key health strategy of the 21st century. To enable health systems to scale up rehabilitation we must spearhead the implementation of the ICF in rehabilitation in practice and research towards its system-wide implementation in the healthcare system at large.

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¹Stucki, G. Olle Höök Lecture. System wide implementation of ICF in rehabilitation: state of the art and recent scientific developments. 4th Baltic & North Sea Conference on PRM Riga, Latvia, 16 September 2015.

An essay based on a lecture, such as the one in honour of Olle Höök, is written by a single author. The ideas presented, are, however, the result of years of collaborations, precious discussions and continuous support, which the author would like to acknowledge. Susanne Stucki has guided the author on his journey from the biomedical outcomes perspective to understanding functioning in light of health conditions. Professor Jerome Bickenbach, the philosophical mind behind the ICF, has been the author's most influential critic and sounding board. Professor John Melvin has, as then president of ISPRM, immediately recognized the potential of the ICF and took action to apply it towards strengthening rehabilitation and PRM. Professors Gunnar Grimby, the former editor of JRM, and John Melvin have challenged and guided the author in examining the potential of the ICF as a universal framework for the conceptualization and organization of human functioning and rehabilitation research.

Without the leadership of Professor Alarcos Cieza, now heading the Disability and Rehabilitation team at the WHO and the coordination of Mirjam Brach, first at the Ludwig Maximilian University and now at SPF, as well as the contributions of our colleagues at the ICF Research Branch, including, in alphabetical order, Michaela Coenen, Reuben Escorpizo, Eva Grill, Birgit Prodinge, Melissa Selb, Jan Reinhardt and Alan Tennant, as well as numerous respected colleagues worldwide, the practical tools presented in this essay, and that are needed for the application of the ICF in the real world would not have come to exist.

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