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WHITE BOOK ON PHYSICAL AND REHABILITATION MEDICINE IN EUROPE

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WHITE BOOK ON PHYSICAL AND REHABILITATION MEDICINE IN EUROPE

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the European Board of Physical and Rehabilitation Medicine



and

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FOREWORD

This book sets out the position of Physical and Rehabilitation Medicine (PRM) in Europe. It defines the specialty, its work, the competencies of its practitioners and its relationships to other medical disciplines and professions allied to health. It also aims to ensure that PRM is seen as a European specialty, where high quality practitioners working to good standards of care can practise in accordance with the evidence-base and within the context of their differing national practices. In doing so, the book describes training and skills of PRM specialists in detail. It also gives the underlying principles of specialised rehabilitation, which will allow policy makers, health planners, medical and paramedical colleagues to identify how PRM works and how it can assist the process of allowing people with disabilities to participate fully in Society.

The Book has been produced by the UEMS Section of Physical and Rehabilitation Medicine under the authorship of its President and Chairman of the Professional Practice Committee and the President of the Académie Européenne de Médecine de Réadaptation. It has been

adopted by the three bodies representing the specialty in Europe as a whole, the Section for Physical and Rehabilitation Medicine of the Union Européenne des Médecins Spécialistes, the Académie Européenne de Médecine de Réadaptation and the European Society of Physical and Rehabilitation Medicine, whose participation give it its authority.

We, the editors have been assisted by contributions from across Europe, but have developed the text in the interests, of ensuring a uniform presentation and consistent approach. Considerable thought has gone into producing a document, which fits into the systems across Europe in the light of some of the national differences. In particular, we would like to thank those who have contributed for their considerable effort to produce a truly pan-European work: The names have been listed in alphabetical order above.

The White Book is available via Section's website on www.euro-prm.org or through the General Secretariat of the UEMS Section, as well as the website of Journal of Rehabilitation Medicine (www.medicaljournals.se/jrm).

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EXECUTIVE SUMMARY

1. Introduction

- 1.1. This book has been written for:
 - Policy makers in health care concerned with rehabilitation and disability
 - The general public and, in particular, people with disability and representatives of their organisations; and
 - Health care professionals in other medical specialties and professions allied to medicine
- 1.2. It sets out the nature, area of work and parameters of Physical and Rehabilitation Medicine (PRM), the competencies of the speciality and of its specialists, the clinical content of the work of the specialty and the nature of the education and training of specialists in this field. The Greater European Space has been enlarged recently and this book seeks to promote the harmonisation of specialised PRM activity to help ensure that the public and especially those experiencing disability are well served irrespective of their location.

2. Definitions

- 2.1. The World Health Organisation's (WHO) definition of rehabilitation is: "The use of all means aimed at reducing the impact of disabling and handicapping conditions and at enabling people with disabilities to achieve optimal social integration".
- 2.2. The definition of PRM by the Union Européenne des Médecins Spécialistes (UEMS) Section of PRM is "an independent medical specialty concerned with the promotion of physical and cognitive functioning, activities (including behaviour), participation (including quality of life) and modifying personal and environmental factors. It is thus responsible for the prevention, diagnosis, treatments and rehabilitation management of people with disabling medical conditions and co-morbidity across all ages".

3. Relevance of Rehabilitation for People with Disabling Conditions and to Society

- 3.1. The prevalence of disability is accepted in most European countries as around 10%. Populations are ageing and this brings increasing levels of disability. This is reflected in an increased

burden of care for individuals and, for society, with increased costs for health and social care. Survival from serious disease and trauma is improving but may leave an increasing number of people with often complex functional problems. Additionally, the people of Europe have increasing expectations of maintaining good health.

Rehabilitation is effective in reducing the burden of disability and in enhancing opportunities for people with disabilities. Its cost is frequently no greater than would have otherwise been incurred by health services, had such services not been provided. Preventing the complications of immobility, brain injury and pain (for which there is good evidence) leads to many benefits both qualitatively for the individual and quantitatively in terms of the financial implications.

- 3.2. *The Bio-Psycho-Social Model of Disability.* PRM is guided by a bio-psycho-social approach to rehabilitation. This was developed in cooperation with user organisations and adopts the WHO's International Classification of Functioning Disability and Health (ICF), which was approved by the World Health Assembly (WHA) as recently as in May 2001. The framework is aetiologically neutral and adopts a terminology that is accepted worldwide to delineate functioning both at individual and population levels. This framework is useful for managing the individual nature of any rehabilitation programme and intervention. It identifies the underlying pathology, the problems at the level of organ functioning and the potential for restoring/optimising personal function or preventing further limitation of activity. In addition, it considers the ability to participate in society, which depends not only on personal functioning, but also on contextual factors affecting the individual's life and environment.
- 3.3. *Ethical Aspects and Human Rights.* Access to Rehabilitation is a basic human right, which is supported by the United Nations Charter through its standards (1993) by the European Year for People with Disabilities, 2003 and the 58th Resolution of the World Health Assembly (2005). In addition, many European states have anti-discrimination laws, which can be used to support people with disabilities and their families and assistants. PRM specialists are routinely

involved in discussions on ethical and legal dilemmas during the care of their patients.

Equity of access to rehabilitation and social participation without any kind of discrimination are fundamental to the provision and practice of rehabilitation. PRM specialists are aware of the pressures put on individuals by differences in race, culture, religion and sexual orientation. Rehabilitation has the aim of supporting people's independent living and their autonomy and takes a holistic approach to facilitate this.

PRM is important to all sections of society across Europe. It supports the confirmation by both the International Year for Disabled People (1981) and the European Year for People with Disabilities (2003) that access to rehabilitation after injury or illness is a fundamental human right.

- 3.4. People with disabilities should be active participants in the creation and development of rehabilitation services. Good practice in rehabilitation makes sure that the person with disabilities is at the centre of a multi-professional approach and able to make informed choices of treatment. If appropriate, the family is involved in the rehabilitation process too.
- 3.5. *Aims and Outcomes of Rehabilitation.* The overall aim of rehabilitation is to enable people with disabilities to lead the life that they would wish, given any restriction imposed on their activities by impairments resulting from illness or injury as well as from their personal context. In practice, this is often best achieved by a combination of measures to overcome or to work around their impairments and to remove or reduce the barriers to participation in the person's chosen environments. Such a process will optimise both activity and participation. The two fundamental outcomes of rehabilitation that have to be demonstrated are the person's well-being and their social and vocational participation.

4 Principles of Physical and Rehabilitation Medicine

- 4.1. Learning is a modern and the most important part of the rehabilitation process. The PRM specialist is a teacher, especially when new concepts of plasticity and motor learning have to support rehabilitation programmes. PRM specialists have to know the principles of adaptation and plasticity and to understand

the theoretical background of the principles of teaching and learning.

- 4.2. Physical and Rehabilitation Medicine aims at reducing the impairment caused by disease where possible in preventing complications, in improving functioning and activity and enabling participation. All these activities have to take into account the individual's personal, cultural and environmental context. Practice is in various facilities from acute care units to community settings. PRM specialists use specific diagnostic assessment tools and carry out many types of treatments, including pharmacological, physical, technical, educational and vocational interventions. Rehabilitation is a continuous and coordinated process, which starts with the onset of an illness or injury and goes on right through to the individual achieving a role in society consistent with his or her lifelong aspirations and wishes.
- 4.3. Teams of health care professionals working closely together in multi-professional teams deliver rehabilitation in an organised goal-oriented, patient centred manner. PRM specialists are usually the leaders of these teams and are responsible for their patients' care in specialised PRM facilities. They also work closely with other medical disciplines and, where rehabilitation becomes the main focus of clinical activity, will lead this multi-disciplinary cooperation.
- 4.4. *Physical and Rehabilitation Medicine in Different Phases of the Rehabilitation Process.* Rehabilitation can be provided in a number of settings, which range from specialised rehabilitation centres and departments in acute hospitals to outpatient and community settings. Acute rehabilitation is important in order to utilise plasticity as effectively and as early as possible and to reduce the potential for complications. This requires not only a peripatetic team of rehabilitation professionals able to give advice to all wards in a hospital, including intensive care, but also dedicated rehabilitation beds, with both under the responsibility of a PRM specialist. Patients also require rehabilitation in dedicated rehabilitation facilities directed by PRM specialists and those with longstanding, often progressive, disabilities and disorders, will need it in the community to ensure that their fitness, health and abilities are maintained and their independence is promoted.

5. The Specialty of Physical and Rehabilitation Medicine

The role of the specialist in PRM, the conditions treated, the diagnostic tools, assessments and the interventions frequently used are discussed in detail in Chapter 5 and Appendix IV.

6. Standards in Physical and Rehabilitation Medicine

- 6.1. PRM is an independent medical specialty in all European countries except Denmark and Malta. The duration of training is usually at least 4 years. There are variations in the training and content of work across Europe but the European Board of PRM has developed a comprehensive system of post-graduate education, which includes a curriculum, logbook and examinations. In addition, trainers are accredited and rehabilitation facilities are accredited. There is continuing medical education with the purpose of ten-yearly revalidation. Details can be found on the Board's website www.euro-prm.org. PRM specialists are active in providing undergraduate education, for the principles of rehabilitation should be taught to all medical undergraduates to ensure the better care of all people with disabilities.
- 6.2. Specialists in PRM have a holistic approach to people with acute and chronic conditions. Their work is most frequently in the management of the rehabilitation of conditions, such as musculoskeletal and neurological disorders, trauma, amputations, pelvic organ dysfunction, cardio-respiratory insufficiency and the disability due to chronic pain and cancer.
- 6.3. The competencies of PRM specialists include, amongst others:
 - Medical assessment in determining the underlying diagnosis
 - Assessment of functional capacity and the ability to change
 - Assessment of activity and participation as well as contextual factors
 - Devising a rehabilitation plan
 - Knowledge, experience and application of medical and physical treatments
 - Evaluation and measurement of outcome
 - Prevention and management of complications
 - Prognostication of disease/condition and rehabilitation outcomes
 - Knowledge of rehabilitations technology

- Team dynamics and leadership skills
- Teaching skills
- Knowledge of social system and legislation on disablement

PRM specialists promote undergraduate medical education in the principles of rehabilitation. This should be taught to all medical students to better care for all those with disabilities.

They are also available to help in the planning of services and the promulgation of policies, which relate to their patients. All these matters relate to the needs of the population and to clinical governance of the services provided. There should be regular audit of these services and regular feedback from users.

7. Research in PRM

PRM has fully endorsed the principles of evidence-based medicine and promotes an active research programme aiming to understand the basic processes of rehabilitation and identify the determinants both of recovery and of peoples' capacity to acquire new skills and learn. To continue to provide this evidence requires that such research be better funded.

8. Future Developments for PRM

- 8.1. The future goals for the specialty cover the development of a "culture of rehabilitation" as a fundamental right for people with disabilities and one of the roles of PRM specialists is to realise that. This can only be achieved if comprehensive facilities are ensured and that PRM specialists play a central role in establishing these to gain equity of access for all people in Europe who require them. The specialty of PRM is well equipped to ensure excellent clinical standards through evidence-based practice and through the utilisation of newer research technologies. Its benefit has been demonstrated by scientific research and especially the rapidly increasing knowledge of medicine. The role of this book is to promote greater awareness of the benefits of rehabilitation and of PRM's contribution to the lives of people with disabilities.
- 8.2. One of the most important aims of the specialty must be to work with others to the position where people in all countries of Europe have access to a full range of rehabilitation services of the highest calibre. This the specialty regards as a fundamental human right. It is hoped that this book will provide readers with the information to engage with the specialty to achieve this end.

1. INTRODUCTION

- 1.1.** This book sets out the nature, area of work and parameters of Physical and Rehabilitation Medicine (PRM) in Europe. Definitions of the specialty and the competencies expected of fully trained specialists in the field are given. It describes the clinical context of the work and the nature of education and specialist training. The book builds on the original White Book, which appeared in 1989 (1). This was important in the development of the specialty throughout Europe and was translated into many languages for local use. Twenty years on, the enlargement of the European Union makes it an opportune time to update information about the specialty across Europe, as the specialty assumes greater importance and advances in medicine and technology occur.
- 1.2.** The book is primarily aimed at three groups:
- policy makers in healthcare, rehabilitation and disability issues;
 - the general public and, in particular, people with disabilities and representatives of their organisations; and
 - health care professionals in other medical specialties and professions allied to medicine.
- 1.3.** The medical community in Europe has recently been strengthened by the enlargement of the European Union, offering further opportunities and challenges. This publication seeks to assist the process of harmonisation of specialist PRM activity to help ensure that people with disabilities are well served by the specialty irrespective of where they live in our enlarged community.
- 1.4.** Health care is undergoing great changes both at European and at national levels. There are increasing expectations of medical care from the general public, which mirror the philosophical debate about human rights and responsibilities across society particularly in relation to the full participation of people with disabilities. Medical practice is continually evolving, with the raising of clinical standards and the need for excellence through continuing professional development, revalidation and enhancement of specialist training. As the need for greater competency increases, it is important for PRM to redefine what it is, what it can offer, how it can best provide its services and expertise, and what standards of training should be demanded from entrants into the specialty. This book aims to respond to these requirements.

2. DEFINITIONS

2.1. Rehabilitation

Rehabilitation has been defined by the WHO as "The use of all means aimed at reducing the impact of disabling and handicapping conditions and at enabling people with disabilities to achieve optimal social integration" (2).

This definition incorporates clinical rehabilitation but also, importantly, endorses the concept of social participation as requiring a matching of the social environment to the needs of people with disabilities, so as to remove societal barriers to participation, be they social or vocational.

Within a health context, rehabilitation specifically has been defined as "a process of active change by which a person who has become disabled acquires the knowledge and skills needed for optimal physical, psychological and social function" (3). This definition provides a more explicit indication of the process that is undertaken by people with disabilities in developing their own capacities, which is the area most effectively promoted by medical rehabilitation.

2.2. Physical and Rehabilitation Medicine

Physical and Rehabilitation Medicine in Europe is a single medical specialty and has been defined by the UEMS Section of PRM as follows:

PRM is an independent medical specialty concerned with the promotion of physical and cognitive functioning, activities (including behaviour), participation (including quality of life) and modifying personal and environmental factors. It is thus responsible for the prevention, diagnosis, treatment and rehabilitation management of people with disabling medical conditions and co-morbidity across all ages.

Specialists in PRM have a holistic approach to people with acute and chronic conditions, examples of which are musculoskeletal and neurological disorders, amputations, pelvic organ dysfunction, cardio-respiratory insufficiency and the disability due to chronic pain and cancer.

PRM specialists work in various facilities from acute care units to community settings. They use specific diagnostic assessment tools and carry out treatments including pharmacological, physical, technical, educational and vocational interventions. Because of their comprehensive training, they are best placed to be responsible for the activities of multi-professional teams in order to achieve optimal outcomes (4).

A comprehensive modular description of Physical and Rehabilitation Medicine within the framework of the ICF is in the discussion phase at an international level and describes in Appendix Ia.

An explanation of the two parts of the name of the specialty for Physical and Rehabilitation Medicine can be found in Appendix Ib.

3. RELEVANCE OF REHABILITATION FOR PEOPLE WITH DISABLING CONDITIONS AND TO SOCIETY

3.1. Epidemiological Aspects

3.1.1. Demographic Change in Europe

About 10% of Western Europe's population experience a disability, as described in a British survey (5, 6). Life expectancy is increasing among Europe's 700 million inhabitants, of whom 450 million live in European Union countries. For instance, life expectancy in Germany rose by almost 3 years between 1990 and 2000, but by 2030, one person in four will be aged 65 or over (7, 8).

As populations age, there is an increased level of disability, which is reflected by an increased burden of care, increased costs for health and social care and the impact of co-morbidities. Two important factors have to be considered:

- Survival from serious disease and trauma leaves an increasing number of people with complex problems and functional deficits. Many of these people are young at the time of their event/injury and will survive for many decades. Examples are numerous, e.g. stroke, traumatic brain injury, polytrauma and childhood cancer, where better-organised acute care and rehabilitation have led to greater survival and better outcomes (9–18);
- There is also an expectation of good health in today's society. This places further demands on all health care, including PRM specialists.

Dealing with the consequence of disease and trauma, such as spasticity following an insult to the brain or spinal cord, means that not only do patients' lives improve, but there is also a benefit to the health economy by reducing the expenditure of treating these complications. This will have a direct effect on care provision, working lives and pensions (15–17). In particular, problems, such as immobility, pain, nutrition, incontinence, communication disorders, mood and behavioural disturbance become important in addition to systemic illness and the complications of the predisposing disabling conditions.

Rehabilitation is effective in reducing the burden of disability and in enhancing opportunities for people with disabilities. There is evidence that it may be less expensive than providing no such service (14). Certainly, preventing complications of immobility (e.g. pressure sores and contractures), of brain injury (e.g. behavioural problems) and of pain (e.g. mood changes) can lead to many benefits, for which there is good evidence (19).

3.1.2. Epidemiology of Functioning and Disability

Epidemiological studies have traditionally based their methodology on aetiological diagnoses. They have now started to address chronic disease as an entity, but have not yet properly tackled the concepts of functioning, participation and quality of life among people with disabilities as a population.

A modern approach is to deal with these problems by focusing on Healthy Life Expectancy (HALE) and Disability-Adjusted Life-Years (DALYs). These are summary measures of population health that combine information on mortality and non-fatal health outcomes to represent population health in a single number.

In addition to the incidence and prevalence of the most frequent pathologies in the field (strokes, spinal cord lesions, traumatic brain injuries, amputations, rheumatic diseases, other neurological or musculoskeletal conditions, chronic pain, etc.), epidemiology in PRM should consider the:

- resultant loss of functioning in terms of the ICF parameters;
- natural history of functions, activity and participation;
- need for and access to resources for use in rehabilitation (human resources, facilities, equipment, materials);
- access to the available PRM resources.

Such information aids the planning and prioritisation of regional, national and European services, in the funding of research and in the development of training by giving information on the effectiveness and cost-effectiveness of PRM interventions.

There are many reports giving the incidence and prevalence of the major disabling conditions seen in PRM practice. Some examples are given in Appendix II. PRM is particularly concerned with their impact and a recent survey in Portugal reported that 0.7% of the entire population is restricted to bed; 0.4% are restricted to sitting (require wheelchairs); 1.9% do not live in their own homes; 9.0% do not walk or have a significant limitation in walking; 8.5% are limited in transferring to and from bed; 6.2% cannot use the toilet without help; 8.6% need help dressing or undressing; 3.6% of men and 5.3% of women have urinary incontinence; around 2.3% have speech difficulties. The overall prevalence of all disabilities in the community is 10% (2).

In summary, the epidemiological data support the need for rehabilitation in Europe. Therefore

the medical specialty of PRM has a significant contribution to make in the reduction of the burden of disease and in the empowerment of people with disabilities.

3.2. The World Health Organization Model of Functioning, Disability and Health in Rehabilitation

The WHO published its International Classification of Functioning, Disability and Health in 2001 (20). This has been fundamental to the better analysis of the consequences of disease and to the practice of Physical and Rehabilitation Medicine.

The assessment of the impact of a disease on an individual differs when viewed from the medical or from the rehabilitation perspective. From the medical or disease perspective, patients' functioning, disability and health are seen primarily as the consequences or the impact of a disease or health condition. Medical interventions are targeted towards the disease process and the ultimate goal of these interventions is to avoid the consequences on the individual. Both functioning and health must be measured to evaluate the patient-relevant outcomes of an intervention (21).

From the PRM perspective, patients' functioning and health is seen as associated with and not merely a consequence of a health condition or disease. In addition, functioning represents not only an outcome, but also the starting point of the clinical assessment and the intervention. It is also important for quality management. Moreover, functioning has to be seen as having a close interaction with the person's characteristics and environment (22). Thus, the rehabilitative process targets functioning, the environment, and modifiable personal factors (11). Rehabilitation, therefore, begins with an in-depth understanding of the determinants of functioning and of its interactions with personal and environmental factors regardless of the health condition. The components of the biopsychosocial model of functioning and disability (23, 24) as well as the understanding of the interactions between them can be seen in Fig. 1.

A useful basis for this understanding is the bio-psycho-social model of functioning, disability and health of the World Health Organisation (WHO) (20). Based on this model, functioning with its components, *Body Functions and Structures* and *Activities and Participation*, is seen in relation to the health condition under consideration, as well as *personal* and *environmental factors* (Fig. 1) (25, 26). "Functioning" is more positive than "disability" in describing the interaction between an indi-

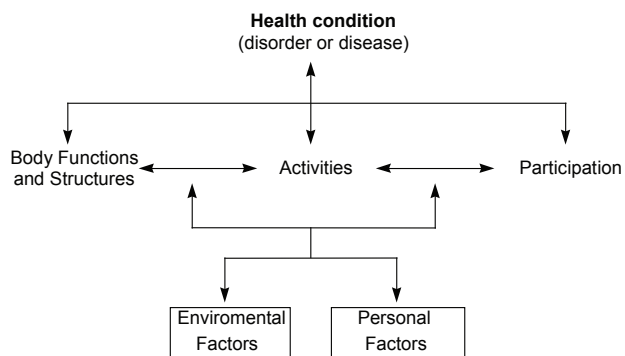


Fig. 1. The current framework of functioning and disability – the WHO International Classification of Functioning, Disability and Health (ICF) (20)

vidual with a health condition and the contextual factors (environment and personal factors) of that individual. Disability is often used as an umbrella term for impairments, limitations in activities and restrictions in participation. Recognising this can help when reading the literature. From the bio-psycho-social perspective presented here, functioning is implicitly addressed when disability is studied and vice versa. (An example for patients with musculoskeletal conditions is given in Fig. 2).

- A health condition is an umbrella term for disease, disorder, injury or trauma and may also include other circumstances, such as ageing, stress, congenital anomaly, or genetic predisposition. It may also include information about pathogenesis and/or aetiology. There are possible interactions with all components of functioning, body functions and structures, activity and participation.
- Body functions are defined as the physiological functions of body systems, including mental, cognitive and psychological functions. Body structures are the anatomical parts of the body, such as organs, limbs and their components. Abnormalities of function, as well as abnormalities of structure, are referred to as impairments, which are defined as a significant deviation or loss (e.g. deformity) of structures (e.g. joints) or/and functions (e.g. reduced range of motion, muscle weakness, pain and fatigue).
- Activity is the execution of a task or action by an individual and represents the individual perspective of functioning.
- Participation refers to the involvement of an individual in a life situation and represents the societal perspective of functioning. Difficulties at the activity level are referred to as activity limitation (e.g. limitations in mobility such as walking, climbing steps, grasping or carrying). Problems

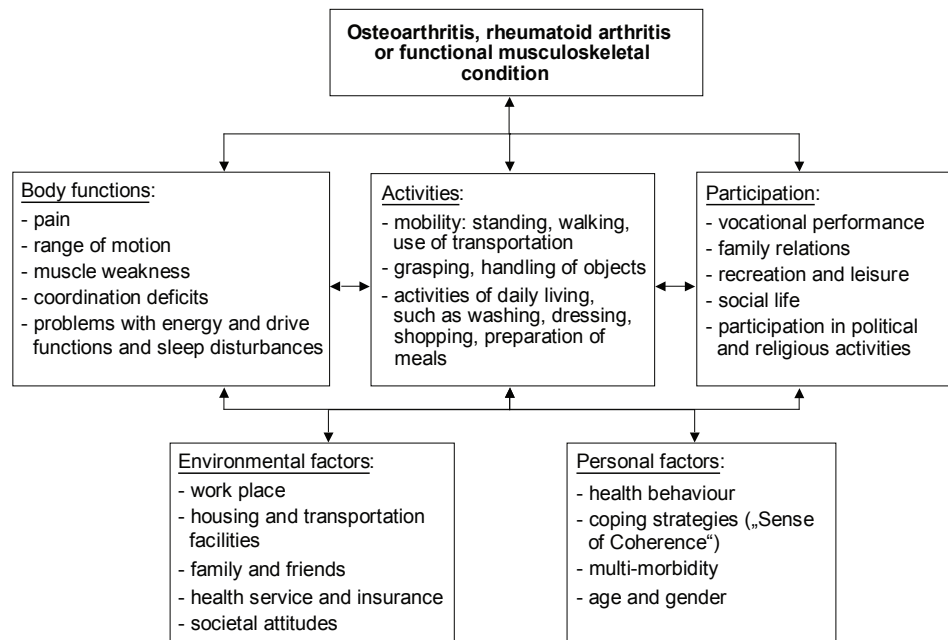


Fig. 2. Example for applying the ICF-model in musculoskeletal conditions

an individual may experience in his/her involvement in life situations are denoted as participation restriction (e.g. restrictions in community life, recreation and leisure, but may be in walking too, if walking is an aspect of participation in terms of life situation).

- Environmental factors represent the complete background of an individual's life and living situation. Within the contextual factors, the environmental factors make up the physical, social and attitudinal environment, in which people live and conduct their lives. These factors are external to individuals and can have a positive or negative influence, i.e., they can represent a facilitator or a barrier for the individual.
- Personal factors are the particular background of an individual's life and living situation and comprise features that are not part of a health condition, i.e. gender, age, race, fitness, lifestyle, habits, and social background. Risk factors could thus be described in both personal factors (e.g. lifestyle, genetic make-up) and environmental factors (e.g. architectural barriers, living and work conditions). Risk factors are not only associated with the onset, but interact with the disabling process at each stage.

PRM is concerned with the multi-professional promotion of a person's functioning (27, 28). It depends upon a full assessment and understanding of a person's functioning.

ICF Core Sets for different health conditions have been internationally agreed (29–31). They include as few ICF domains as possible to be practical, but as many as necessary to be sufficiently comprehensive to describe the typical spectrum of problems in functioning among patients with a particular condition. They are used in comprehensive, multi-disciplinary assessments or in clinical studies. Thus, an ICF sheet can be used in combination with the ICF Core Sets to improve internal reporting and documentation and to structure multidisciplinary care (32, 33).

3.3. Ethical Aspects and Human Rights

3.3.1. Disability and Human Rights

Historically, it was thought sufficient to provide care for people with disabilities. However, in the past 20 years there has been a philosophical shift in Europe, so that people with disabilities are regarded as citizens with full autonomy and human rights. This is in the spirit of the UN Standard for Human Rights and has led to legislation to prevent discrimination on the grounds of disability.

The UN Declaration of Human Rights (34) states that a person with disabilities should not be an object of care (a "patient") throughout life. He or she is a citizen with special needs related to a specific disability. These needs should be catered in the society but in a "normal" context. Participation is fundamental and a central aspect of this is access

to society. This includes physical access e.g. into public and private areas and buildings, as well as to public transport, information etc. Regulations on accessibility have been established in several European countries for the construction of public buildings. The UN General Assembly approved the development of UN Standards in December 1993 and is currently being developed into a convention to provide persons with disabilities full participation and equality. This has been important in laying down fundamental principles.

The Council of Europe has also published a series of reports and documents on human rights for people with disabilities. In particular, it facilitated a declaration of European Ministers responsible for the Integration Policies for People with Disabilities, which met in Malaga in 2003 (35). Its aims are to:

- improve the quality of life of people with disabilities and their families over the next decade;
- adopt measures aimed at improving quality of life of people with disabilities, which should be based on a sound assessment of their situation, potential and needs;
- develop an action plan in order to achieve these goals;
- allow equity of access to employment as a key element for social participation;
- adopt innovative approaches, as persons with physical, psychological and intellectual impairments live longer;
- create activities to enable a good state of physical and mental health in the later stages of life;
- strengthen supportive structures around people with disabilities in need of extensive support;
- promote the provision of quality of services;
- develop programmes and resources to meet the needs of persons with disabilities.

In 2005, the World Health Assembly adopted a Resolution on “Disability, including Prevention, Management and Rehabilitation” (World Health Assembly Resolution 58.23). It declared that, amongst other things, member states should:

- participate in disability prevention activities;
- promote and strengthen community-based rehabilitation programmes linked to primary health care and integrated in the health systems;
- facilitate access to appropriate assistive technology and to promote its development and other means that encourage the inclusion of persons with disabilities in society;

- investigate and put into practice the most effective actions to prevent disabilities;
- ensure provision of adequate and effective medical care for people with special needs and to facilitate their access to such care including prostheses, wheelchairs, driving aids and other devices;
- research and implement the most effective measures to prevent disabilities in collaboration with communities and other sectors.

Additionally it requested the Director-General to:

- intensify collaboration within the organization towards enhancing quality of life and promoting rights and dignity of persons with disabilities;
- provide support to Member States in strengthening national rehabilitation programmes;
- support member states in collecting more reliable data on all relevant aspects, including cost-effectiveness of interventions for disability prevention, rehabilitation and care;
- further strengthen collaborative work within the United Nations and with Member States, non-governmental organizations (NGOs), including organizations of people with disabilities;
- promote studies of incidence and prevalence of disabilities as a basis for the formulation of strategies for prevention, treatment and rehabilitation.

Disability Rights legislation has also been created in several European countries (36, 37). Some have had longstanding legislation with a general policy on the rehabilitation of people with disabilities (e.g. France has Disabled Persons Act since 1975), but the majority of countries have passed anti-discrimination legislation only during the last 15 years, e.g. Act of Equal Opportunities for Disabled Persons (Germany), Framework Law (Italy), Constitution Act (Finland), Act on Provision of Rights of Persons with Disabilities (Hungary 1998), Health for All 2004 (Slovenia), Disability Discrimination Act 1996 (UK), Toward Inclusion 2001 (UK) etc. All of these are enshrined in PRM practice and are supported by PRM specialists.

3.3.2. Gender, Race, Culture, Religion and Sexual Orientation Issues

Equity of access to rehabilitation and social participation without regard to discrimination of any kind are fundamental to the provision and practice of rehabilitation. PRM specialists are aware of the pressures put on individuals by differences in gender, race, culture, religion and sexual orienta-

tion. These pressures may impinge upon adaptive capacity by affecting body image, psychological state and well-being. Rehabilitation has a holistic approach to support peoples' independent living and, for many, religion and spirituality are important in the rehabilitation process.

Programmes already exist in rehabilitation facilities to encourage equity of access, e.g. to help mothers participate in rehabilitation programmes.

3.3.3. Right to Rehabilitation

Access to rehabilitation is a basic human right. European legislation makes it clear that people with disabilities should have access to appropriate rehabilitation. Thus an appropriate level of skills and training is required amongst all rehabilitation professionals, including the specialist in PRM. PRM plays an important role in this provision in advising on service development and in participating with governmental bodies and non-governmental organisations. PRM also has a responsibility to support organisations of and for people with disabilities in order to achieve this equity of access to rehabilitation and societal integration. This is important because the achievement of full human rights and the prevention of discrimination require further activity and development. This is addressed by the Union Européenne des Médecins Spécialistes (UEMS) Section of PRM (see chapter 6.4).

The Council of Europe proposed disability rights legislation, which essentially covers the following (37):

- disability prevention and health education;
- identification and diagnosis;
- treatment and therapeutic aids;
- education;
- vocational guidance and training;
- employment;
- social integration and environment;
- social, economic and legal protection;
- training for people involved in rehabilitation and in social integration of people with disabilities;
- information;
- statistics and research.

Rule 3 of the UN Standard (38) states that “governments should develop their own rehabilitation programmes for all groups of persons with disabilities”. Such programmes should be based on the needs of people with disabilities and on the principles of full participation and equality. All those needing rehabilitation should have access to it. This holds also for those with extensive or multiple dis-

abilities. Governments should utilise the expertise of the organizations for the people with disabilities when such rehabilitation programmes are developed or evaluated”. Unfortunately, this standard is only partly adhered to in most European countries, which represents a challenge both for PRM physicians and for society in general. PRM practice is not based on a monolithic medical model but takes into account social aspects and has a holistic view. It is founded on a bio-psycho-social model within a continuum of care, taking into account both personal and environmental factors. It provides personal empowerment for the users, contributing to full participation in all aspects of life.

Despite its confirmation of human rights by both the International Year for Disabled People (1981) and the European Year for People with Disabilities (2003), access to rehabilitation after injury or illness remains a problem. This is in part due to a lack of resources, of information to people with disabilities and to poor organisation of services resulting in a mismatch of provision to needs. The participation of many people with disabilities is hampered by traditional attitudes in Society, but improving the health and education of people with disabilities to enhance their participation needs further attention and PRM has a considerable role here.

3.3.4. Ethical Issues of Health-related Rehabilitation

People with disabilities should be active participants in the creation and development of rehabilitation services. An example of their inclusion into rehabilitation team working was seen in the EU HELIOS program (1990–96) whose aim was to improve the possibilities for “Handicapped People in Europe Living Independently in an Open Society”. One of its working parties gave the following recommendations for good practice in rehabilitation:

- the person with disabilities should be at the centre of a multi-professional approach and should be able to make informed choices of treatment. He or she should participate fully in the process and have the right to receive services regardless of type of disability, age, gender, religion, ethnic origin, domicile and financial resources;
- family involvement should be included where appropriate;
- continuous and coordinated measures should enable a return to usual environment and chosen social and professional life;
- rehabilitation strategies should be subject to user-based evaluation.

All rehabilitation departments, programmes and practices should formulate clear operational plans taking into account ethics and human rights, in order to:

- treat patients with dignity and respect at all times;
- provide accessible information to patients to facilitate decision making;
- obtain informed consent and how to allow informed refusal;
- determine the ability of the patient to make competent decisions;
- protect patient privacy and confidentiality;
- prohibit physical or psychological abuse;
- be sensitive to cultural, religious and other beliefs and to different treatment practices;
- remove architectural, attitudinal, communication, employment and other barriers to such persons.

3.4. Rehabilitation and Health Systems

Access to and funding of rehabilitation services vary from state to state and depends on the health care and social systems. Stakeholders in these systems include politicians, planners and organisations, which fund health and social care, self-help groups and others in the community.

Locally determined funding accounts for differences in access to acute and to maintenance rehabilitation and, in some countries, insurance companies' medical services decide about access to rehabilitation, especially in the field of maintenance rehabilitation. In others and in acute rehabilitation the general practitioner and other medical specialists send their patient to rehabilitation centres. In yet other countries, the patient can go directly to inpatient rehabilitation hospitals. Primary care practitioners may authorise specialist outpatient services in some states, but, in others, self-referral by the patient is acceptable. Europe's diverse national systems prevent a detailed description of each and each member state can provide the necessary information.

The structure of rehabilitation services varies across Europe and provision is patchy. Specialists in PRM are few in number in many countries. Although the specialty is well regarded across Europe, there are large differences in the number of specialists by country, in their role in the health system and in their conditions of work. Appendix III shows the variation in numbers of specialists by country and, while an optimal number of PRM specialists per unit of population has yet to be set

across Europe, there clearly remains a disparity between states.

3.5. Aims and Outcomes of Rehabilitation

A person's rehabilitation potential (i.e. capacity to benefit from rehabilitation) cannot be formulated without knowing the natural history of his or her condition. Some recover spontaneously, so that early intervention may give the false impression that treatment has been efficacious (39–41). On the other hand, for many, a lack of rehabilitation will reduce their eventual level of independence and quality of life (41). Controlled studies, in which these factors have been taken into account, have shown that early intervention tends to be associated with an improved eventual outcome whether or not full recovery occurs and even delayed or late intervention may confer useful benefit (42, 43).

The overall aim of rehabilitation is to enable people with disabilities to lead the life that they would wish, given any inevitable restrictions imposed on their activities by impairments resulting from illness or injury. In practice, this is often best achieved by a combination of measures to:

- overcome or to work around their impairments;
- remove or reduce the barriers to participation in the person's chosen environments;
- support their reintegration into society.

As a patient-centred process, it is appropriate to optimise both activity and participation.

A rehabilitation plan, therefore, has to account for the wishes and resources of the individual, the prognosis of their disabling medical condition, the nature of their physical and cognitive impairments and their capacity to acquire the new knowledge and skills, which would enable them to enhance their levels of activity and participation. In addition, it is necessary to assess the extent to which environmental barriers to participation (whether resulting from the physical environment itself, or from the behaviour of other people) could be lowered. Finally, a judgement has to be made about whether the resources are available to implement the plan. Demonstrating a person's well-being and social participation is an important feature of the fundamental outcome of patient-centred rehabilitation (43).

Well-being is probably a more secure indicator of success than quality of life since the objectives espoused in rehabilitation must reflect the unique wishes of the individual person although different people facing broadly similar situations may

have different objectives. Many current quality of life measures implicitly make judgements about the relevance of specific objective factors, such as the ability to climb stairs, which may not be perceived as equally important by all people with disabilities.

Rehabilitation has the ability to reduce the burden consequent on disability both for individuals and for society. It is shown to be effective in enhancing individual functioning and independent living by achieving greater activity, better health and by reducing complications and the effects of co-morbidities. This benefits the individual and society to include greater personal autonomy, improved opportunities for employment and other occupational activity. While many societal factors are involved in return to independent living and work, PRM can prepare the individual and families/carers to take maximal advantage of the opportunities that are available.

Rehabilitation has been shown to be effective not only in enhancing individual functioning and

independent living but in reducing the costs of dependency (44). It has been shown that the money spent on rehabilitation is recovered with estimates of savings of up to seventeen fold (45–47).

At an individual level it is essential to measure outcomes to evaluate the effectiveness of particular rehabilitation interventions and services. These outcome measures have to relate directly to the specific objectives addressed in the rehabilitation plan. The evaluation of rehabilitation has fundamental differences from the evaluation of disease-orientated medical treatments aimed at limiting pathology or curing disease. Rehabilitation can be successfully achieved in conditions where there is no biological recovery and indeed in conditions that are intermittently or steadily deteriorating. In the latter, rehabilitation may need to be delivered in a continuing programme that enables the patient to maintain levels of participation and well-being that would otherwise not have been achieved. It should be standard practice to audit services.

4. PRINCIPLES OF PHYSICAL AND REHABILITATION MEDICINE

4.1. Learning Processes as a Basic Principle of Physical and Rehabilitation Medicine

Learning is a modern part of the rehabilitation process. The PRM specialist is a teacher, especially when new concepts of adaptation (e.g. plasticity) and motor learning have to support rehabilitation programmes. PRM specialists have to know the principles of adaptation and plasticity and to understand the theoretical background of the principles of teaching and learning (48).

Knowledge of these principles may help to design strategies to enhance outcomes and avoid mal-adaptation. Effective modern concepts of motor learning and recovery are developed with the aim of inducing skill-acquisition relevant to the patient daily's life. Such an approach is beneficial in preventing a learned non-use phenomenon and to restore function. However, too intensive a programme could be deleterious (49). Commonly learning involves instructions concerning "how to do" or "how to perform a task". However, even without any explicit instruction a person has the capacity to understand how to do, simply using implicit learning.

Explicit and implicit learning are thought to tap into different neural pathways. The implicit learning process is more robust to neurological injuries, especially when memory has been severely impaired. Even though the first approach is currently more often used, explicit and implicit learning procedures have potential in all aspects of PRM (50).

4.2. Aims of Physical and Rehabilitation Medicine

The principal aims of PRM are to optimise social participation and quality of life. This normally involves helping to empower the individual to decide upon and to achieve the levels and pattern of autonomy and independence that they wish to have, including participation in vocational, social and recreational activity, consistent with their human rights (50).

PRM is effective in five ways.

- treating the underlying pathology;
- reducing the impairment and/or disability;
- preventing and treating complications;
- improving functioning and activity;
- enabling participation.

All these activities take into account the individual's personal, cultural and environmental

context, following the principles of the ICF (see chapter 3.2).

Rehabilitation is a continuous and coordinated process, which starts with the onset of an illness or injury and goes on right through to the individual achieving a role in society consistent with his or her lifelong aspirations and wishes.

4.3. The Rehabilitation Team

4.3.1. Rehabilitation Teamwork

Rehabilitation is a multi-professional activity (4), which depends upon good communication between staff and the individual skills of the professionals involved. For it to work, the team must have clear rehabilitation objectives for the patient, in which the patient and his/her significant others should be full participants. The value of teamwork in this setting is that the output of the team is greater than the sum of the individual professional inputs. Where teamwork scores is in the sharing of expertise and workload. There are fairly blurred margins between the roles of the team members and successful teams thrive on everyone contributing despite professional boundaries. Most rehabilitation teams for physical disability will comprise a basic core of professionals as well as others responding to particular needs.

4.3.2. Multi-Professional Rehabilitation Team

Specialised medical rehabilitation teams are led by a specialist in PRM. They are more than a collection of different health professionals and individuals work within them as part of a multi-professional team understanding the roles and values of their colleagues. The team works with the person with disabilities and family to set appropriate, realistic and timely treatment goals within an overall coordinated rehabilitation programme. The goals are adjusted over time and according to progress. They are patient-centred and are not set on a discipline-by-discipline basis. The team should not be asking, 'What are the goals for the occupational therapist this week?' but should be asking 'What are the goals for the patient this week and how can the O.T. help to achieve them?' In this way, rehabilitation is able to enhance patient functioning and participation by providing a coordinated source of information, advice and treatment for the person with disabilities and the family, with the team acting as provider and catalyst.

Cooperation within the rehabilitation team is ensured by structured team communication and regular team conferences. The diagnosis, the functional impact on functioning and activities as well as the ability of the patient to participate in the society are discussed systematically, while communicating the possible risks and the prognosis of the disease. Short and long-term goals of the rehabilitation process are agreed and the appropriate interventions planned. The team members' assessments are incorporated into the written rehabilitation plan. The rehabilitation plan will be reviewed regularly.

4.3.3. Multi-Disciplinary Rehabilitation Cooperation

Close cooperation between medical specialties may be required in specialised rehabilitation where several impairments and their consequent functional losses have to be addressed. The specialists need to agree a common strategy, which incorporates all their interventions at the right times rather than address isolated treatments in an ad-hoc way. Regular face-to-face contact between the medical specialists is required to achieve a common approach to the overall treatment strategy.

PRM specialists should be involved as soon as possible in acute rehabilitation, even participating in the intensive care unit (51). Similarly, continued input may be required from other medical specialists in acute rehabilitation wards, who will contribute to the rehabilitation process by their own specialist interventions (e.g. tracheotomy closure in patients recovering from ventilatory assistance). In later rehabilitation and in the rehabilitation of people with longstanding disabilities, cooperation with the primary care physician and other medical specialists is also required.

A decision is needed early on in the patient's care as to who leads the process of care. This will change as the patient progresses from one phase to another, but, where the emphasis is on rehabilitation rather than resuscitation or acute medical/surgical treatment, the PRM specialist should lead the decision-making process.

4.4. Physical and Rehabilitation Medicine in Different Phases of the Rehabilitation Process

4.4.1. Physical and Rehabilitation Medicine in the Acute and Post-Acute Phase

Rehabilitation in the early stages of recovery after a severe illness or injury is greatly helped by an

appropriate environment, in which the patient's fears and anxieties can be addressed. In the early weeks, the ability to give sustained attention to a training programme or to undertake physical exertion may be relatively limited. Nevertheless, it has been observed that the simple act of transferring a brain-injured patient from a busy surgical or neurosurgical ward to the calmer, quieter atmosphere of a rehabilitation ward often has a therapeutic effect, consisting of improvement in attention and cognition and a reduction in agitation. These are important benefits in themselves as well as being essential pre-requisites for an optimal response to rehabilitation (52). The pressures of acute general wards may render it difficult for multi-professional rehabilitation teams to treat patients with complex needs and, in the absence of such treatment, attempts to alleviate symptoms such as anxiety and restlessness with medication may produce short-term blunting of symptoms whilst delaying the recovery of the cognitive functions needed for rehabilitation.

Illustrative examples of the types of problem dealt with by PRM specialists are given below. Early interventions can prevent the development of secondary complications following disease or trauma.

Case History 1: A 25-year-old man suffered a very severe traumatic brain injury following a road traffic accident. His impairments included confusion, disorientation, agitation and an inability to swallow. He was therefore at serious risk of developing a life-threatening aspiration pneumonia, which could impair the recovery of his cerebral functioning further. In addition, he quickly developed lower limb contractures as a result of immobilisation and muscular overactivity (spasticity).

Appropriate, coordinated rehabilitation ensured that he was provided with a quiet environment and helped to communicate and understand his situation. Treatment was aimed at lowering his anxiety through a behaviour management approach. He was fitted with a percutaneous endoscopic gastrostomy (PEG) feeding tube to prevent aspiration pneumonia and ensure adequate nutrition. The treatment of his contractures included the reduction of his spasticity, physical therapy and serial splinting. After many months of intensive rehabilitation, he was able to return home with improving behaviour. His swallowing recovered so that he could eat normally and his PEG was removed. He began to walk and he was later able to return to paid employment.

Case History 2: A 52-year-old man with Type 2 diabetes mellitus and a gangrenous foot had a trans-tibial amputation. He was given preoperative counselling to allow him to cope with the coming changes to his body and lifestyle. This included measures to prepare him for dealing with sensory changes, body image and balance alterations and enable him to engage in rehabilitation.

Physiotherapy started in the early postoperative phase with respiration therapy and prevention of thrombosis and contractures. Attention was given to the production of an adequate stump with bandaging and reduction of stump oedema. He began walking with a temporary prosthesis and was measured for a permanent one. This was done with discussion with the patient on the level and nature of his physical requirements and goals. Consideration was given to the possible need for home, workplace or car adaptations. His journey to work parking, distance walked at work and other relevant factors such as leisure and family activities were explored. The patient was taught how to manage the stump and the prostheses. Three months after the amputation, he was independent in self-care, including monitoring of his residual limb. He was able to return to work and will be followed up for the rest of his life.

Case history 3: A 70-year-old woman with OA of the hip underwent total hip replacement. At this time she was unable to walk, to bath or shower, or to put on her shoes. She was not able to drive. Post-operative management by the Dept of PRM consisted of intensive physiotherapy as well as later home exercises, so that she became able to walk both inside and outside the house. She was allowed to return to driving within weeks; occupational therapy successfully addressed her activities of daily living. She was advised about her post-operative programme so she could continue this at home. After her home environment was checked and adaptations made, she was able to live independently.

4.4.2. Maintenance Rehabilitation in Stable, Chronic Disabling and Progressively Deteriorating Conditions

The other major strands of the work of PRM specialists are the maintenance and improvement of function and the avoidance of predictable and preventable complications in stable, chronic disabling and progressive deteriorating conditions. In some European countries (e.g. Austria, Germany, Italy, Poland), inpatient or day-clinic rehabilitation plays an important role in the management of chronic conditions, e.g. chronic musculoskeletal

or neuromuscular disorders, chronic circulatory, respiratory and metabolic diseases as well as skin diseases and urological or gynaecologic conditions. Intermittent bursts of intensive rehabilitation may also be used to combat decline in function even several years after an acute event (17).

The main goals of maintenance rehabilitation measures in chronic conditions are improvements in affected body functions and an increase in activities. Such measures also encompass participation issues, such as return to work or avoidance of early retirement caused by health problems. Methods used include physical therapies, training, diet, psychological interventions and health education. The clinical efficacy and positive socio-economical effects are shown in open follow-up-studies as well as in controlled trials (52). Systematic multi-professional health education programmes have shown to be effective too.

4.5. Effects of Lack of Rehabilitation

A person's rehabilitation potential cannot be considered in isolation from what would have been the outcome without rehabilitation. The question that specialist rehabilitation attempts to address is "Will the patient benefit from the rehabilitation programme in a way that would not have occurred, had the recovery been left to chance?" The natural history of the impairment and the consequent disabilities and disadvantages play a major role in the eventual outcome following rehabilitation. Some conditions recover spontaneously and early intervention may give the false impression that therapy has been efficacious (40, 41). On the other hand, early intervention may be associated with an improved outcome even where full recovery does not occur (54).

The lives of people with persisting disabilities and their families can be enhanced by rehabilitation, but, more importantly, the consequence of them not having rehabilitation may be to reduce independent functioning and quality of life (55). In the acute hospital many correctable problems, such as nutrition, swallowing, mobility and equipment issues may not be addressed as the focus is inevitably on treating the primary impairment. This is where PRM specialists can assist in preventing complications and in ensuring an optimal level of functioning (56). In the absence of rehabilitation complications and loss of function may occur and discharge may be delayed. Yet health services have a statutory duty to provide rehabilitation services to meet health needs of all patients (57, 58).

The following may be found in the absence of rehabilitation for a variety of conditions:

- immobility including weakness, cardio-respiratory impairment, muscle wasting, pressure sores, spasticity, contractures and osteoporosis;
- pain;
- nutritional problems;
- swallowing problems;
- bladder and bowel problems (constipation and incontinence);
- communication problems;
- cognitive problems and an inability to benefit from learning;
- mood and behavioural problems;
- ill-health and systemic illness from a variety of causes, e.g. urinary tract and, cardio-respiratory problems, diabetes mellitus;
- complications of underlying conditions.

PRM should continue to be involved with following patients up as they move into living in the community, in order to prevent:

- secondary health problems and social isolation
- carers becoming exhausted by the burden of care and thus break down of the domestic situation
- general practitioners or social workers being called on unnecessarily;
- emergency admissions back to hospital;
- unnecessary placements in residential or nursing home care (8);
- inappropriate and untimely prescription of disability equipment;
- inability to update disability equipment in the light of advancing technology, e.g. neuroprostheses.

The overall result of the lack of rehabilitation may be that the person is left with a poorer functional capacity and quality of life. In community settings, there will be a wastage of resources.

4.6. Prevention

4.6.1. Health Promotion

Health promotion is an underlying principle of all health care systems and thus prevention of disease and its impact and complications is an essential element of the work of the medical profession. In a rehabilitation context, disease prevention does not just stop at preventing the onset and impact of the condition, but looks at the wider aspect of reducing the impact of the disease on all aspects of the person's life. Disease prevention is thus classified as primary, secondary or tertiary and the principles are shown in Table I.

PRM specialists may be involved in disease or injury prevention at all levels. The general principles of physical training including cardiovascular, musculoskeletal and coordinative performance should be considered. This may contribute e.g. in the prevention of hypertension, myocardial infarction, low back pain and falls.

4.6.2. Prevention of Secondary Complications

There are generic secondary complications following disease or trauma. These include pneumonia, thrombosis, pressure sores, circulatory and muscular deconditioning, osteoporosis and poor nutritional status. In addition there are complications specific to various conditions, such as dysphagia

Table I: Principles of Prevention

Prevention	Characteristics	Setting in which preventive measures are undertaken	Examples
Primary	Avoid disease or injury	Political and societal arenas Primary care	Speed reduction to prevent traffic accidents Reduction of risk factors for myocardial and cerebrovascular disease
Secondary	Avoid effect and complications of disease or injury itself	Acute hospital and early rehabilitation department	Prevention of intracranial hypertension in brain injury Prevention of stroke after myocardial infarction Prevention of immobility, tissue viability problems Prevention of contractures
Tertiary prevention	Avoid the effect of disease or injury on the person's life, i.e. limitation of activities and/or restriction of participation	Post-acute and maintenance rehabilitation departments	Treatment of behavioural problems following brain injury Prevention of avoidable financial difficulties and unemployment after disease or injury

following stroke, and urinary dysfunction in spinal cord injury. All these will be addressed by the PRM-service with good effect.

4.6.3. Effects of Tertiary Prevention

There is now considerable evidence that rehabilitation produces real benefits (59-62) and improved functional performance and participation outcomes and that it, even later on, still produces benefits (63). Those who have had rehabilitation are less likely to die and be living in institutions after disease or injury. This effect is found in many disease groups and at all ages, although the young tend to do better. Most studies confirm the value of two different aspects of rehabilitation. Firstly, most documented improvements are in functional outcome and, secondly, people with disabilities going through rehabilitation units have less avoidable complica-

tions. There are less physical problems (such as those associated with immobility, contractures and pressure sores) and fewer psychological problems, such as untreated depression. Although there is clear evidence that an intensive period of rehabilitation after an acute event, such as head injury or spinal cord injury produces clear, short-term functional gains (44), there is also evidence that short-term gains are lost unless longer-term support is available (51, 64). Even where the effectiveness of individual therapeutic modalities is lacking, the evidence supports the effectiveness of multi-professional rehabilitation (65, 66). Thus, longer-term contact with the person with disabilities is important in order to provide rehabilitation until natural recovery is complete and to prevent the later development of avoidable complications.

5. THE SPECIALTY OF PHYSICAL AND REHABILITATION MEDICINE

5.1. Contribution of the Specialist in Physical and Rehabilitation Medicine to the Rehabilitation Process

PRM provides the setting for organised rehabilitative care. This has been shown to be more effective and no more expensive than that provided on an ad-hoc basis (19). PRM specialists also recognise the importance of longer-term follow-up. Improvements in physical and cognitive functioning, e.g. after brain injury, may take many years to develop and not only do PRM specialists ensure that patients are optimally placed to benefit from functional improvement, but they work over prolonged periods, if indicated, to enhance personal functioning and societal participation.

The PRM specialist has a particularly important role in rehabilitation when:

- there is a complex combination of impairments, e.g. cognitive, behavioural and physical impairments, in which medical practitioners are trained to provide an overall analysis of the situation and to bring together the assessments provided by non-medical colleagues;
- there has been a significant impairment resulting in loss of activity and/or participation following a sudden event, for example a stroke, spinal cord injury or trauma;
- the underlying condition is likely to relapse or recur, such as multiple sclerosis, rheumatoid arthritis;
- medical measures are available that can directly improve impairments or enhance well-being and activity, for example in medication for spasticity, incontinence or pain;
- medical treatment of the underlying condition and its complications itself carries risks of disabling effects that require monitoring;
- the medical risks of a disabling condition have been enhanced by changes in a patient's lifestyle, for example in the transition from adolescence to adulthood, in the transition from education to employment and in the processes of ageing in later life.

Specialists in PRM work exclusively in this field so that their work is not compromised by the demands of acute medical care. The existence of a separate specialty of PRM is known to benefit patients (18). Patients deserve competent specialists, who are

specially trained and wholly dedicated to the task. Patients with major disabling physical conditions and particularly those with complex needs require the attention of a multi-professional team led by a specialist in PRM. Chapter 4 defines the nature of the work, which requires a medical rehabilitation approach and not solely a therapy input.

5.2. The Specialty of Physical and Rehabilitation Medicine in Europe

PRM specialists are doctors trained in their discipline for four or more years (67) according to the national training regulations of postgraduate medical training. They are not specialised in the management of a particular organ or medical condition but focus on functional problems resulting from a variety of diseases rather than specialising in the management of a specific organ or medical condition. They provide medical help for people with disabilities arising from chronic disease and trauma as well as other severe health conditions. The main goal of PRM interventions is the improvement of physical and mental functioning to enable patients to be active and improve their quality of life, so that they can engage in social life. However, being doctors, they treat the underlying disease, when required. If persistent symptoms and problems arise, functioning, activity and participation can still be promoted by specialised rehabilitation methods and techniques. They are thus able to empower those with medical conditions, which lead to functional deficits, e.g. neurological conditions, other musculoskeletal diseases, amputations as well as heart and lung diseases, etc.

5.3. Pathologies and Conditions in Physical and Rehabilitation Medicine Practice

PRM specialists deal with the management of patients with a multitude of different pathologies (Appendix II). They are concerned with the impact of these on personal functioning and participation. PRM doctors aim to bring benefits no matter what the underlying diagnosis. However, diagnosis serves to assist with prognostication of outcome and the potential for improvement.

There are a number of general problems across the many health conditions, which PRM doctors face on a daily basis. These may include:

- prolonged bed rest and immobilisation, deconditioning patients and causing loss of physical and psychological functioning;
- motor deficits producing weakness and loss of personal functioning;
- spasticity leading to limb deformity and self-image problems;
- bladder and bowel dysfunctions commonly found in disabled patients;
- pressure ulcers as a risk of immobility in spinal cord injured, diabetic, deconditioned and elderly patients;
- dysphagia – people with swallowing disorders losing the enjoyment of eating and are at risk of aspiration pneumonia and malnutrition;
- pain syndromes;
- communication difficulties;
- sexuality and sexual dysfunction covering identity and self-image issues as well as organ functioning;
- mood, behaviour and personality changes;
- changes to family dynamics, personal relations, career opportunities and financial security.

Additionally, PMR specialists may be involved in the rehabilitation of patients with psychosomatic, gynaecological and dermatological conditions.

5.4. Diagnostics, Assessment and Evaluation

PRM doctors recognise the need for a definitive diagnosis prior to treatment and problem-oriented rehabilitation. In addition, they are concerned with aspects of functioning and participation that contribute to the full evaluation of the patient in determining the treatment goals (68). These are reached in conjunction with the person with disability, his or her family and members of the rehabilitation team.

Diagnostics and assessment in PRM comprise all dimensions of body functions and structures, activities and participation issues relevant for the rehabilitation process. Additionally relevant contextual factors are assessed. History taking in PRM should include analysing problems in all the ICF dimensions.

In order to obtain a diagnosis of structural deficits relevant to the disease and the rehabilitation process standard investigations and techniques are used in addition to clinical examination. These include laboratory analysis of blood samples, imaging, etc.

Clinical evaluation and measurement of functional restrictions and functional potential with

respect to the rehabilitation process constitute a major part of diagnostics in PRM. These include the clinical evaluation of muscle power, range of motion, circulatory and respiratory functions. Technical measurements may include muscle testing (strength, electrical activity and others), testing of circulatory functions (blood pressure, heart frequency, EMG while resting and under strain), lung function and others. PRM specialists may use standardised measurements of performance such as gait analysis, isokinetic muscle testing and other movement functions. In rehabilitation of patients with certain conditions specialised diagnostic measures will be required, e.g. dysphagia evaluation in patients with stroke, urodynamic measurements in patients with spinal cord injury, or executive function analysis in patients with brain injury (69–70).

Patients' activities can be assessed in many ways. Examples of two important methods are:

- Standardised activities of single functions performed by the patient (e.g. walking test, grip tests or handling of instruments, performance in standardised occupational settings). These tests can be evaluated qualitatively (assessed by PRM-doctors or specialised therapists) or quantitatively (performance time, capacity to lift loads, and others).
- Assessments of more complex activities, such as the activities of daily living (washing oneself, dressing, toileting and others) and performance in day-to-day living (walking, sitting, etc.). These assessments may be performed by rehabilitation professionals or may be as self-rated using standardised questionnaires.

Participation is mainly analysed in interviews with the patient through standardised questionnaires. Socio-economic parameters (e.g. days of sick leave) are used in order to evaluate social or occupational participation problems.

Many assessment instruments in PRM combine parameters of body functions, activities and participation. These may be used to decide on the indication for rehabilitation measures (assignment) or to assess the result of the intervention (evaluation). The appropriate instruments have to be chosen in accordance with the individual functional problem and the phase of the rehabilitation process (71).

The relevant contextual factors with respect to the social and physical environment are evaluated by interviews or standardised ICF-based checklists. For the diagnosis of personal factors, e.g. coping strategies of the patients' standardised questionnaires are available.

Many tools can be used to evaluate both global and specific functional capacity as well as the rehabilitation process (72). Some cross the individual ICF components. For instance, the Functional Independence Measure (FIM) (73) and the Barthel-Index (74) incorporate aspects of body functions and activities as well as relevant co-morbidities and the extent of external support needed. The choice of measures will depend on the phase and aims of the rehabilitation process and the functional capacity of the individual.

A list of diagnostic methods can be found in Appendix IV.

5.5. Rehabilitation Plan

PRM devise and employ a rehabilitation plan for each individual to direct his or her future problem-orientated rehabilitation (Table II). Patients actively participate in its development along with the other members of the patient-centred rehabilitation team. The emphasis of the plan varies depending on the particular problems encountered, but the essential

elements have a similar basic format. The plan must be regularly reviewed and updated by the rehabilitation team and forms the basis of team members' regular communication on patients' progress during rehabilitation.

PRM specialists are responsible for the development of a rehabilitation plan and for identifying the time frame in which it should be delivered. The plan should include the following information:

- diagnosis;
- presenting problems and preserved functions (according to the ICF framework; see chapter 3.2);
- the individual's goals;
- carer/family goals;
- the professionals' goals;
- actions to take

5.6. Interventions in Physical and Rehabilitation Medicine

PRM uses diverse interventions. PRM specialists develop an intervention plan based on the diagnosis

Table II: *An Example of Some of the Problems Addressed in a Rehabilitation Plan*

Problem	Goals	Possible Interventions
<i>Body functions and activities</i>		
Physical activity	Achieve safe transfers Increase indoor and outdoor mobility (achieve/improve walking, climbing stairs, using private and public transportation)	Posture and movement training using equipment as necessary Posture and movement training Explore and train in use of mobility aids
Communication	Improve communication, speaking and comprehending	Training directed by speech and language therapy to improve language and articulation Exploration and training in the use of assistive technology, as required
Behaviour & mMood,	Improve behaviour Normalise mood	Medication, psychotherapy, behavioural therapy and cognitive behavioural therapy Reduce depression and anxiety by counselling and medication
Pain	Reduce pain	Analgesic drugs, physical therapies, stress management, use of coping and other strategies
Incontinence	Promote bowel and bladder continence	Bladder retraining, pelvic floor exercise, medication, use of catheters and stomas
Inability to care for self	Achieve ability to wash, groom, dress and toilet self	Analysis of component parts of activity, restoration of ability using alternative methods and/or equipment and/or retraining
<i>Participation</i>		
Inability to manage independently at home	Teach to prepare and cook meals and manage household activities	Analysis of component parts of activity, restoration of ability using alternative methods or sources of help and/or equipment and/or retraining
Loss of employment	Return to work	Analysis of component parts of activity and of getting to work, restoration of abilities, job adaptation, work retraining, workplace adaptations and equipment, improvement in access to and support at work

and disability of the patient. Thereafter, the specialist either performs the intervention aiming at solving the given problems or another team member may do so. In other settings the PRM specialists will prescribe the therapy. Interventions include:

1. Medical interventions

- Medication aiming at restoration or improvement of body structures and/or function, e.g. pain therapy, inflammation therapy, regulation of muscle tone, improvement of cognition, improvement of physical performance, treatment of depression.
- Practical procedures, including injections and other techniques of drug administration;
- Assessment and review of interventions;
- Prognostication.

2. Physical Treatments

- Manual therapy techniques for reversible stiff joints and related soft tissue dysfunctions;
- Kinesiotherapy and exercise therapy;
- Electrotherapy;
- Others including ultrasound, heat and cold applications, phototherapy (e.g. Laser therapy), hydrotherapy and balneotherapy, diathermy, massage therapy and lymph therapy (manual lymphatic drainage);

3. Occupational therapy to

- analyse activities, such as those of daily living and occupation, support impaired body structures (e.g. splints),
- teach the patient skills to overcome barriers to activity of daily living (e.g. adjusting private facilities),
- train in the presence of impaired function and cognition
- enhance motivation;

4. Speech and language therapy within the framework of complex specialized rehabilitation programmes;

5. Dysphagia management;

6. Neuropsychological interventions;

7. Psychological assessment and interventions, including counselling;

8. Nutritional therapy;

9. Disability equipment, assistive technology, prosthetics, orthotics, technical supports and aids;

10. Patient education;

11. Rehabilitation nursing.

5.7. Physical and Rehabilitation Medicine Practice – Clinical Activities and Settings

PRM specialists are involved in all stages of the rehabilitation and recovery processes, as well as in the care of patients with chronic conditions. They practise in a variety of clinical settings ranging from acute care facilities, stand alone rehabilitation centres, hospital based rehabilitation departments to community settings and independent specialist practice. Their activities vary according to the clinical settings, but they adopt the same general principles of PRM in all.

Specialised rehabilitation facilities are essential in acute hospitals. There should be dedicated beds under the responsibility of a PRM specialist together with a peripatetic rehabilitation team providing advice and treatments to patients in intensive care units and other acute wards. PRM provides the diagnostics and assessments as well as the interventions both for patients in their dedicated facilities as well as for patients in other wards. The consultative role of the PRM specialist helps to ensure that rehabilitation, functional restoration and prevention of secondary loss of function e.g. from immobilisation (such as contracture, pneumonia or thrombosis) start as soon as possible. Early specialised rehabilitation prevents and or reduces long-term restrictions of functioning (61–63).

In the immediate period following injury, it is known that the simple act of transferring a brain-injured patient from a busy surgical or neurosurgical ward to the calmer, quieter atmosphere of a rehabilitation ward has a therapeutic effect in itself and improvement in attention, irritability and cognition is observed (55). Acute general wards are not conducive to the practice of multi-professional rehabilitation for patients with complex needs.

In rehabilitation centres (including day-hospital care) and rehabilitation departments of acute hospitals all patients are seen by a PRM specialists. He or she investigates the patient, performs functional assessments and explores the influence of contextual factors on functioning. The necessary interventions are selected, e.g. physical therapies, psychotherapy, occupational therapy, speech therapy, neuropsychological training, drugs or social interventions. Therapists also evaluate the patient prior to applying their intervention techniques. The results of the PRM specialists investigations and therapists' functional assessments form the basis for the rehabilitation plan and further decisions made by the rehabilitation team.

Decisions on discharging patients are the responsibility of the PRM specialists on the basis of team conference, in which the person with disability and the family members actively participate. PRM specialists provide a comprehensive discharge report on the basis of the investigations and the information provided by the team members. This report covers information on the presenting conditions, the patient's functional state, activity capacity and participation at discharge as well as on the prognosis and recommendations for further care, treatment and rehabilitation.

In out-patient departments and private practice, there is a different emphasis on PRM practice. The emphasis here is on diagnostic assessment and initiation of treatment. After an investigation and functional assessment, patients are prescribed either a single series of therapy (PT, OT, or others)

or, if multi-professional rehabilitation is required, a team approach is adopted. Following treatment, the PRM specialist reassesses the patient and decides on further interventions or discharge back to the primary physician, as appropriate.

PMR specialists cooperate closely with the patient and family and aim to communicate well with the patients' general practitioner and with other specialists, particularly, when diagnostics or therapies are needed in other medical fields, e.g. neurology, cardiology, orthopaedic surgery, etc.

PMR specialists may in addition work with specialised community rehabilitation teams (such as those for acquired brain injury, for chronic neurological disease, for transitional problems or for musculoskeletal disorders) and also provide advice to general community teams.

6. STANDARDS IN PHYSICAL AND REHABILITATION MEDICINE

6.1. Education and Training

6.1.1. Specialist Training

PRM is an independent medical speciality in all European countries, except Denmark and Malta, but its name and focus varies somewhat according to different national traditions and laws. Training usually lasts for between four and six years depending on the country (67) (see Table III) (UEMS Charter on Training, EC Directive 93/16/EEC, 5 April 1993). Specialists in PRM have freedom of mobility across UEMS member states, but require certification from their national training authorities. Those with the latter are eligible to be recognised by the European Board of PRM, which has developed a comprehensive system of postgraduate education for PRM specialists (details see appendix V). This consists of:

- a curriculum for postgraduate education containing basic knowledge and the application of PRM in specific health conditions;
- a standardised training course of at least four years in a PRM department and registered in detail in a uniform official logbook;
- a single written annual examination throughout Europe;
- a system of national managers for training and accreditation to foster good contacts with trainees in their country;
- standard rules for the accreditation of trainers and a process of certification;
- quality control of training sites performed by site visits of accredited specialists;
- continuing professional development within the

Table III: Name of the Specialty in UEMS Member States

Country	Name of Specialty
Austria	Physikalische Medizin und allgemeine Rehabilitation
Belgium	Fysiche Geneeskunde en Revalidatie Médecine Physique et de Réadaptation
Croatia	Fizikalna medicina i rehabilitacija
Cyprus	ΦΥΣΙΚΗ ΙΑΤΡΙΚΗ και ΑΠΟΚΑΤΑΣΤΑΣΗ (Fisiki Iatriki & Apokatastasi)
Czech Republic	Rehabilitační a fyzikální lékařství
Denmark	Fysiurgi
Estonia	Taastusravi ja füsiaatria
Finland	Fysiatria
France	Médecine Physique et de Réadaptation
Germany	Physikalische und Rehabilitative Medizin
Greece	ΦΥΣΙΚΗ ΙΑΤΡΙΚΗ και ΑΠΟΚΑΤΑΣΤΑΣΗ (Fisiki Iatriki & Apokatastasi)
Hungary	Fizioterápia és Rehabilitáció
Iceland	Orku- og Endurhæfingarlækningar
Ireland	Rehabilitation Medicine
Italy	Medicina Fisica e Riabilitativa
Latvia	Medicīniskā Rehabilitācija
Lithuania	Fizine medicina ir reabilitacija
Luxembourg	Médecine Physique et de Réadaptation
Malta	---
The Netherlands	Revalidatie Geneeskunde
Norway	Fysikalsk medisin og rehabilitering
Poland	Medycyna fizykalna i rehabilitacja
Portugal	Medicina Fisica e de Reabilitação
Romania	Medicină Fizică și de Recuperare
Serbia and Montenegro	Fizikalna Medicina I Rehabilitacija
Slovakia	Fyziatria, balneológia & liečebná rehabilitácia
Slovenia	Fizikalna in rehabilitacijska medicina
Spain	Medicina Fisica y Rehabilitación
Sweden	Rehabiliteringsmedicin
Switzerland	Médecine Physique et de Réadaptation Physikalische Medizin und Rehabilitation
Turkey	Fiziksel Tip ve Rehabilitasyon
United Kingdom	Rehabilitation Medicine

UEMS covers the continuing medical education system for the purpose of ten yearly revalidation. (See paragraph 6.3 below.)

Further information on the regulations of this education and training system are available on the Section's website, www.euro-prm.org, where application forms are also available.

There are currently 10,280 PRM specialists in Europe, of whom 2,000 are European Board certified and 2,800 are trainees. Seventy training sites are recognised by the PRM Board and a list of these is available on the website (76).

6.1.2. Undergraduate Training

The UEMS Section is gathering data on undergraduate training in PRM (i.e. for medical students) and will report in the near future. The following principles are important in providing a systematic approach:

Anyone may require rehabilitation in any health setting (e.g. hospitals, general practice, nursing institutions). As a result, all physicians need to gain a basic knowledge of rehabilitation, recognising that most will not practise as specialists in the field or carry out specific rehabilitation measures. It is thus important that well-trained PRM specialists teach PRM in all undergraduate medical faculties and the following topics are required as a minimum:

- The principles of rehabilitation and the biopsychosocial model of the international classification of functioning, disability and health;
- The organisation and practice of rehabilitation system (acute and post-acute rehabilitation, as well as rehabilitation programmes for patients with chronic conditions);
- The principles and potential of physiotherapy, occupational therapy and other rehabilitation therapies;
- Comprehensive rehabilitation programmes and their main indications;
- The rehabilitative needs of patients with special conditions (e.g. stroke, multiple trauma, low back pain, arthritis, cancer, etc.);
- Knowledge of the social system and legislation concerning disability and rehabilitation at national level, as well as ethical and human rights issues in rehabilitation.

These concepts already form part of obligatory training in PRM in some European countries (Belgium, France, Germany, Spain, UK) and some universities (e.g. Vienna) (75–76).

6.2. Clinical Governance and Competencies

Not only is it important that everyone has equitable access to rehabilitation, but this should be competently and sensitively delivered. Feedback from service users must be available to those responsible for these services.

PRM specialists acquire a number of skills as part of their training. Their basic medical training gives them certain competencies, which are enhanced by knowledge and experience acquired during their common trunk training in internal medicine, surgery, psychiatry, etc. The core specialty competencies of PRM are provided during their specialist training and these are further enhanced by knowledge and experience of subspecialty work (Fig. 3). Subspecialty competencies are under development in some European countries.

Those competencies include:

- medical assessment in determining the underlying diagnosis;
- assessment of functional capacity and the ability to change;
- assessment of activity and participation as well as contextual factors (personal characteristics and environment (see paragraph 3.2);
- knowledge of core rehabilitation processes and their evidence base; (see paragraphs 4.1 and 4.4)
- devising a rehabilitation plan (see paragraph 5.5);
- knowledge, experience and application of medical and physical treatments (including physical modalities, natural factors and others; see paragraph 5.6);
- evaluation and measurement of outcome;
- prevention and management of complications;

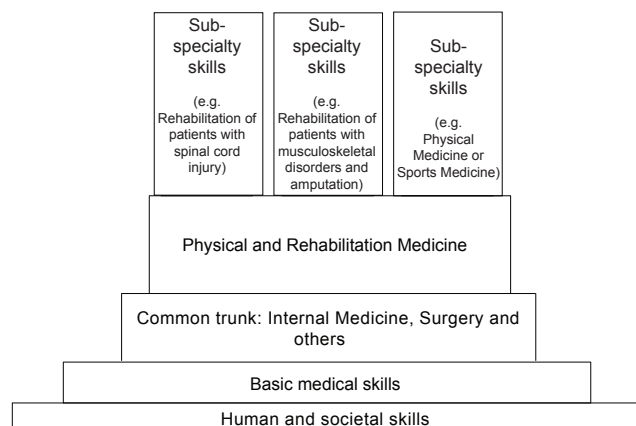


Fig. 3. Competency principles

- prognostication of disease/condition and rehabilitation outcomes;
- knowledge of rehabilitations technology (orthotics, prosthetics, technical aids and others);
- team dynamics and leadership skills;
- teaching skills (patients, carer, tem members and others);
- knowledge of social system and legislation on disablement;
- basic knowledge of economic (and financial) aspects of rehabilitation.

PRM specialists routinely use a number of other aptitudes. They need good communication and interpersonal skills and the ability to educate and manage their patients and their families. They will adopt strategies to allow patients to develop their own coping skills. They will communicate with other agencies (health and social-services and self-help groups) to get the best for their patients. They also have a role in the development of services for people with disabilities for which they will need relevant abilities.

6.3. Continuing Professional Development (CPD) and Medical Education (CME)

CPD and CME are an integral part of medical specialists' professional practice and PRM specialists need to demonstrate their continued competence like all other doctors. CPD covers all aspects of updating medical practitioners, of which CME is one component. The specialty has set up various teaching programmes across Europe, which serve to educate PRM specialists and their colleagues in rehabilitation teams. These cover basic science and clinical teaching topics, as well as investigational and technical programmes.

A CME and CPD program is organised on European level for accreditation of international PRM congresses and events. The programme is based on the provisions of the mutual agreement signed between the UEMS European Accreditation Council of CME (EACCME) and the UEMS-PRM Section and Board (Chapter 6.4). The European provisions are the same for all specialities. The PRM Board has created the CPD/CME Committee, which is responsible for the relevant continuing programs within our speciality, for the accreditation of the several scientific events on European level and the scientific status of the Board Certified PRM specialists.

EACCME is responsible for coordinating this activity for all medical specialties and the UEMS

website gives details of the CME requirements for all specialists in Europe (www.uems.org). Each Board-recognised PRM specialist is required to gain 250 educational credits over a five-year period for the purposes of revalidation (www.euro-prm.org). Doctors are required to fulfil their CME requirements before they can be validated and this is becoming an essential part of national as well as European life. Obligatory CPD/CME is established in certain countries of Europe and is becoming increasingly required in medical practice. The rules are given in Appendix VI.

The first European Board-sponsored event has been the European School in Marseille on Posture and Movement Analysis, which was established in 2000. This is an annual two-week course, which attracts doctors, engineers and other rehabilitation professionals from all over Europe. Other courses have also been set up under the Board and more will follow.

6.4. The Section of Physical and Rehabilitation Medicine of the Union Européenne des Médecins Spécialistes (UEMS)

6.4.1. History

The UEMS was created in 1958 as the only statutory medical body in the European Union to have a responsibility for hospital-based specialties. It is composed of specialist sections for each specialty in Europe and Physical and Rehabilitation Medicine was among the first specialties to be recognised as a distinct discipline. The PRM section was created 1971 and the European Board of PRM in 1991 as a part of the specialist Section. It has, in particular, developed its training and continuing professional development base. As a statutory body of the European Commission, the UEMS is accountable to the Standing Committee of Doctors, to which national responsible medical organisations contribute. Specialties recognised in two-thirds of each UEMS member state are entitled to form a specialist section. PRM is recognised as a core service in each of the 28 member states of the Greater European space and the newer associate members also adopt the same principles. PRM is one of the few to be recognised right across Europe and is represented on the Council of the UEMS.

6.4.2. Structure and Role of the Organisation

The specialty in Europe is therefore organised through the PRM section of the UEMS (Fig. 4). This is a statutory body responsible to the European Commissioner of Health and is the only official

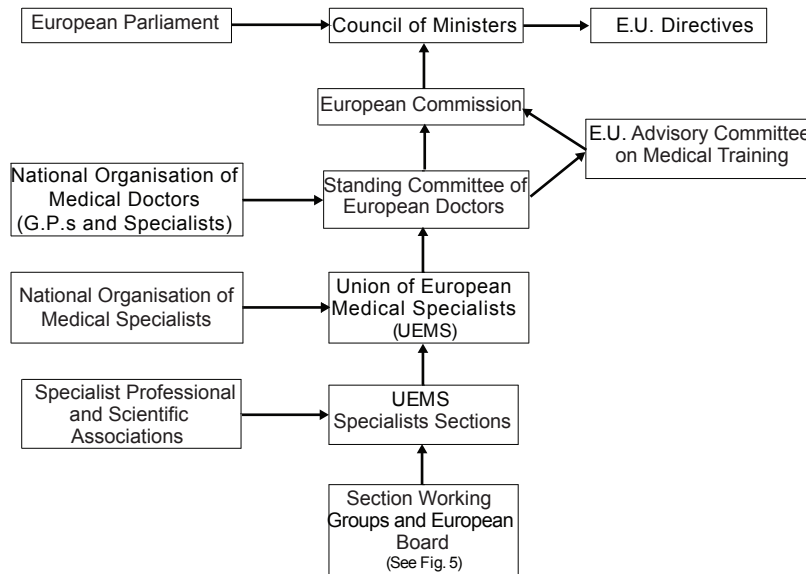


Fig. 4. European Union Medical Organisations

medical body recognised by the European Union. The Section’s aim is to promote the specialty in a professional capacity and to harmonise the specialty at a European level through specialist training and continuing professional development through revalidation. It works to develop clinical standards in practice and to facilitate the specialty to undertake the required research to develop it further. To this end, it is accountable (as with other specialties) to the UEMS and has started to work closely now with the European Commission and the Council of Europe. It has active liaison with many bodies, such

as the International Society for Physical Medicine and Rehabilitation, the American Academy of PMR and the Bone and Joint Decade. It has three main committees under an Executive Committee and Fig. 5 demonstrates its tasks. The Section works closely with other European PRM bodies, such as the Académie Européenne de Médecine de Réadaptation and the European Society of PRM.

The Committees of the Section are (Fig. 5):

- Training and Education Committee (a statutory committee - the European Board of PRM);

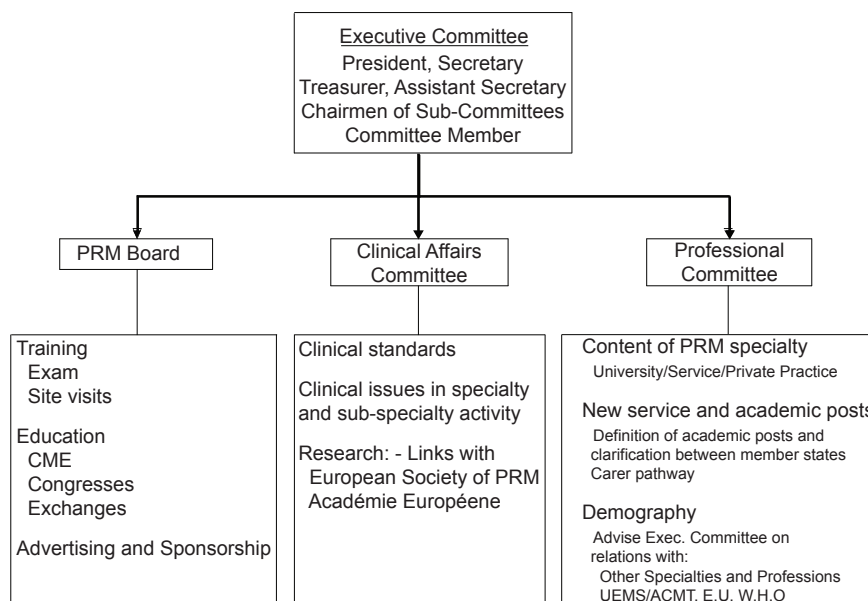


Fig. 5. Structure of the UEMS Section of PRM

- Clinical Affairs Committee;
- Professional Practice Committee

6.4.3. Members

Following the accession of ten new member states into the European Union on 1st May 2004, there are now 28 European Union full members along with Switzerland, Norway and Iceland. Romania, Bulgaria, Croatia and Turkey are observers. Within these countries, there are over 10,280 trained specialists with 2,800 trainees (76). The UEMS therefore has a major task to make a relevant link between all these countries at a European level. The numbers of specialists in PRM across Europe varies considerably and Appendix III (p. 41) shows the demographic details.

The general structure of PRM services across Europe is similar despite the differences between health care systems. Proposals for clinical standards are being put together during this process in the form of practice based round health-related groups.

6.4.4. Training in PRM

Specialist training is described in paragraph 6.4.1. The route to start training is slightly different in each country, but, despite different entry points to the specialist training programme, the curriculum has much similarity across the continent and is consistent with that of the American Board. The European Board of PRM has the task of harmonising specialist training across Europe and has taken on the following roles (76):

- European examination for recognition of specialist training;
- Continuing professional development and medical education with ten-yearly revalidation;
- Recognition of European trainers and training units through site visits.

The eventual aim of this harmonisation is to produce specialists who can work across European health care systems and allow national medical authorities/employers to recognise the knowledge and expertise of the specialists who have been trained in another part of Europe. All aspects of the Section and Board, including the specialty's curriculum can be obtained through the Section's website at www.euro-prm.org (Appendix V).

6.5. The Académie Européenne de Médecine de Réadaptation

This body of up to 50 senior doctors in the specialty across Europe was created in 1969. Academicians are invited on the basis of their distinguished contribution to the specialty, particularly its humanitarian aspects. The aim of the Académie is to improve all areas of rehabilitation for the benefit of those who need it. It thus promotes education and research across Europe, acting as a reference point in scientific, educational and research matters, exchanging ideas and information, facilitating the exchange of PRM doctors between different countries and engaging in moral and ethical debate.

Its motto is: '*Societas vir origo ac finis*' which can be translated as 'Man is both the source and the goal of Society'

The Académie is entirely independent. Its publications support education and further research. It is responsible for a series of 'state of the art' monographs which include:

- La Plasticité de la Fonction Motrice. Ed. J-P. Didier (Springer 2004). This is to be produced in Italian in 2007;
- Assessment in Physical Medicine and Rehabilitation. Eds. M. Barat and F. Franchignoni (Maugeri Foundation Books 2004);
- Vocational Rehabilitation. Ed. C. Gobelet and F. Franchignoni (Springer 2006);
- Les Fonctions Sphinctériennes. Ed. A. Chantraine (Springer 2006).

Further publications are due, such as in the field of oncological and pain rehabilitation.

The Académie debates ethical matters and in this acts as a guardian of the specialty's views. A recent debate was summarized and published as a brief communication, entitled 'Violence and Handicap' (77).

Several courses are supported by the Académie, including the European School on Posture and Movement Analysis in the University of Marseille which is supported by Erasmus funding. To encourage original research in the field of PRM by young researchers, the Académie gives an annual prize, supported by the Swiss Paraplegic Association. Details may be obtained from the Secretary.

6.6. The European Society of Physical and Rehabilitation Medicine

The European Society of PRM was founded in 2003 and is concerned with research and teaching in PRM in Europe. It succeeded the European Federation of Physical Medicine and Rehabilitation (established in 1963) and aims to coordinate European activities and be a vehicle for scientific exchange. The society offers individual membership to all eligible PRM specialists and federated membership members of the national PRM societies in Europe. Individual membership is free of charge. The ESPRM is establishing an interactive electronic platform (www.esprm.org), where information can be found on research projects, on grants and funding and offers updated information about courses, congresses, exchange funding, etc.

The ESPRM organizes biennial scientific congresses in the field. The main topics of the last three were:

- State of the Art in Rehabilitation Medicine – Clinical Standards, Measurement of Outcomes and Effective Interventions in Neurological Rehabilitation, Musculoskeletal Rehabilitation and

Amputee Rehabilitation: 13th European Congress of Rehabilitation, Brighton, UK, 2002;

- “Advances in PMR – Traditional and Modern Concepts”: 14th European Congress of Rehabilitation, Vienna, Austria, 2004;
- Evidence Based Rehabilitation, Physical and Rehabilitation Medicine in lung transplant and in diabetes mellitus, 15th European Congress of Rehabilitation, Madrid, Spain, 2006.

Future European Congresses for PRM will comply with standards set by the ESPRM for their organization and course. Accordingly, congresses will have a standardised programme with half a day each for:

- functioning biology (basic sciences);
- functioning technology (rehabilitation technology);
- clinical sciences (PRM in special health conditions);
- human functioning sciences (including epidemiology, social functioning and related topics).

The vitality of PRM does not depend on government, insurance companies, politicians or other professionals, but on the activities of practitioners within the field.

7. RESEARCH IN PHYSICAL AND REHABILITATION MEDICINE

7.1. Importance of Research in Establishing Needs and the Value of Both Current and New Approaches

PRM has fully endorsed the principles of evidence-based medicine and research in PRM has made great progress during the last two decades. Whereas the physiological mechanisms of action of physical modalities of function have traditionally been central to scientific interest during the last 15 years, an increasing number of prospective trials have been performed, in which the clinical efficacy of rehabilitation in many diseases, such as low back pain, stroke, brain and spinal cord injury (78–80), rheumatoid arthritis, cardiovascular, pulmonary and metabolic disorders, has been tested. For some conditions, meta-analyses of controlled trials are already available.

7.1.1. Relevance of Research

The specialty aims to foster an increased interest and involvement in research in rehabilitation. Its vision is that research is necessary to understand the basic processes of rehabilitation such as how individuals acquire new skills, and how the tissues of the body (for example, the muscles, or neuronal pathways in the central nervous system) can recover from or adapt to the effects of trauma or disease. Research can also delineate the incidence and prevalence of disabilities, and identify the determinants both of recovery and of the capacity to change, to acquire new skills, and to respond to rehabilitation.

New technologies emerge and should be adapted for use by people with disabilities. Rehabilitation technology is one of the most important and promising research fields today and in the future. Tissue engineering and other modern technologies are contributing to this field. The costs of health care and of rehabilitation services will increase and politicians will force health care providers to restrict their expenses and to show that they organize this care efficiently. PRM is a reliable partner in the discussion with patients, politicians, ministries of health and insurance companies, as it has the capacity to base its arguments on sound evidence in the public arena, which only research can provide.

7.1.2. Challenges to Research in Physical and Rehabilitation Medicine

Rehabilitation research does not sit comfortably with standard approaches to basic science and

medical practice research interventions. Progress in clinimetrics has been considerable. Therefore randomised controlled studies are possible in many areas, but are less effective when the objectives sought and worked for in a group of subjects differ between individuals, especially when this occurs for personal or social rather than for biological reasons. The clinical trial designs that have been developed in the field of clinical psychology are often more fruitful and scientifically appropriate than designs developed for the assessment of drug effects. A combination of qualitative and quantitative methods often provides a scientifically sounder analysis of effectiveness in rehabilitation.

Government agencies and providers often seek evidence of the cost-effectiveness of rehabilitation and usually require the service as a whole to be evaluated because a wide range of different techniques has to be available to the treating team in order to meet the differing needs of individuals in any group of patients.

This really is the nub of the problem, as PRM practice produces results through a series of, or the interplay between, a number of interventions. Demonstrating the impact of a single rehabilitation intervention is not 'real life' and while essential for identifying effective individual procedures to be included in a programme, cannot in itself effectively evaluate the programme as a whole. There are currently a number of initiatives in addressing these technical and scientific problems, so as to enable effectiveness and cost-utility to be regularly monitored in rehabilitation practice.

7.2. Research Facilities and Resources

The most important step that has to be made to improve the level and amount of research in PRM is to organize a platform for communication for all participants in research activities in Europe. Information about future and current projects, about funding and grants, about protocols, questionnaires, measuring devices and exchange-programmes must become available and easily accessible for clinicians, researchers and managers. To answer pressing questions on the effectiveness of rehabilitation interventions will necessitate considerable funding for research.

To answer these relevant questions will necessitate considerable increase of funding for research in the field of PRM. On a European level as well as

on a national level, research planning is necessary and cooperation with other research field is needed. This will help to reduce the impact of disabilities at a personal and a community level.

7.3. Research Training

The above technical requirements of rehabilitation research need to be understood by all those practising rehabilitation. Since so much in rehabilitation requires a multi-professional and multi-disciplinary effort, multi-professional research groupings and departments provide the most fertile ground for training in the various rehabilitation professions including medicine. It makes little sense for clinicians to implement rehabilitation holistically and in a multi-professional fashion, but to undertake research exclusively in uni-professional research teams that are isolated from each other. Every effort is made to expose trainees in PRM to the benefits of such multi-professional and multi-

disciplinary research teams. Although the current resources in many countries are still inadequate to meet the research training needs of all but the most gifted trainees in PRM, the situation is gradually improving. The cadre of trainees, who hold a PhD or equivalent level qualification in addition to their professional qualification, will be the bedrock upon which future research and academic activity depend.

7.4. Publication of Research Findings

The results of scientific research in PRM are published in general professional journals within each country. At a European level, specialists read a variety of scientific journals which include “Journal of Rehabilitation Medicine” (which currently has the highest impact factor worldwide), “Disability and Rehabilitation”, “Clinical Rehabilitation”, “Archives of Physical Medicine and Rehabilitation” and “Europa Medicophysica” and all of them publish multidisciplinary research.

8. FUTURE DEVELOPMENTS

8.1. Philosophy

Life expectancy is increasing in both developed and developing countries. More importantly, improvements in survival following injury and illness, as well as an ageing population will result in an increased need for rehabilitation services in all European countries, where the expectation of a high quality of life will also increase (81). As a result, rehabilitation systems have to be developed continuously considering the following principles:

- Rehabilitation following injury or illness and in chronic conditions is a basic human right (82);
- Equitable and easy access to all aspects of rehabilitation including specialist rehabilitation medicine, assistive technology and social support for the entire population in Europe;
- Uniformly high standards of care in rehabilitation, including quality assurance and treatments based on scientific evidence;
- A scientific basis to develop rehabilitation models and standards of care to guide clinical practice.

8.2. Goals

In order to reach these goals in PRM, the following measures are required:

- to improve the general understanding and awareness of the needs of people with disabilities;
- to publicise the benefits of rehabilitation. This will lead to a culture in which access to adequate rehabilitation is seen as a basic human right;
- to deepen the understanding and cooperation between non-governmental organisations of people with and the specialty of PRM;

- to establish comprehensive rehabilitation facilities across Europe with specialized and well-trained rehabilitation teams and well resourced rehabilitation facilities. Additionally, community-based rehabilitation structures should be in place for the management of chronic disabling diseases;
- to set up systems to ensure that PRM has sufficiently well-trained and competent PRM specialists available in all European countries;
- to establish common high standards of care on the basis of current evidence. These should take into account quality control and access to assistive technology.
- to incorporate new technical developments into PRM practice. This has a great deal to offer in assisting rehabilitation to produce better outcomes. Increasing technology should contribute significantly to independent living and quality of life of people with disabilities in Europe;
- to promote scientific activities and research in the field of rehabilitation with adequate funding to improve the outcomes for those experiencing disabilities;
- to support an environment where people with disabilities can fully participate in society. The PRM specialist will work with people with disabilities in furthering this aim.

All these measures will better enable people with disabilities in Europe to contribute substantially to society.

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APPENDIX IA

Proposal for a New Definition Based on the ICF Model

[Courtesy: G. Stucki and J. Melvin in cooperation with the professional Practice Committee of the UEMS-PRM-Section]

Based on the WHO's integrative model of human functioning, PRM is the medical specialty with rehabilitation as its core health strategy. It applies and integrates the biomedical and engineering approach to capitalise on a person's capacity through an approach, which builds on and strengthens the resources of the person, provides for a facilitating environment and develops the person's performance in interacting with the environment. This includes the diagnosis and treatment of health conditions. PRM's effectiveness is through:

- 1) assessing functioning in relation to health conditions, personal and environmental factors including prognosis; the potential to change the prognosis; identification of long-term goals, intervention programme goals, rehabilitation cycle goals and intervention goals, as well as the evaluation of legal disability;
- 2) performing or applying biomedical and engineering interventions to optimize capacity, including physical modalities, pain relieving techniques; neuropsychological interventions; nutritional and pharmacological interventions; engineering interventions including e.g. implants, prosthesis and orthoses, aids and devices designed to stabilize, improve or restore impaired body functions and structures. These will minimise pain, fatigue and other symptoms, prevent impairments, medical complications and risks (including e.g. depression, skin ulcers, thrombosis, joint contractures, osteoporosis and falls) and compensate for the absence or loss of body functions and structures;
- 3) leading and coordinating intervention programmes to gain optimal performance in a multi-professional iterative problem-solving process; performing, applying and integrating biomedical and engineering interventions; psychological and behavioral; educational and counseling; occupational and vocational; social and architectural interventions;
- 4) providing guidance to patients and their immediate environment, service providers and payers along the continuum of care in all situations from the acute hospital to the community;
- 5) managing rehabilitation in health and multi-agency services;
- 6) advising the public to request and decision makers to adopt and implement policies and programmes in health – This (a) extends to sectors providing a facilitating wider physical, social and economic environment; (b) ensures access to rehabilitation services as a human right; and (c) empowers PRM specialists to provide timely and effective care to enable people experiencing/or at risk of disability to achieve and maintain optimal functioning in the interaction with the wider physical, social and economic environment.

APPENDIX IB:

Description of the Specialty of Physical and Rehabilitation Medicine

Physical Medicine is the medical discipline that covers, on a scientific basis, interventions aimed at improving physiological and mental functioning, using physiological mechanisms (such as reflexes, functional adaptation and neuroplasticity), as well as physical and mental training. These are possible after an accurate functional diagnosis has been made through functional testing, which is a specialised PRM competence. Physical Medicine is frequently provided through multi-professional teamwork, including physiotherapists, occupational therapists and other appropriate health professionals, social workers, educational staff and engineers. (See Chapter 5).

Rehabilitation Medicine focuses not only on physical functioning, but also on enabling people to participate

actively in society. This is over and above the established definition of Rehabilitation, which is “*an active process by which those disabled by injury or disease achieve full recovery, or, if full recovery is not possible, realize their optimal physical, mental and social potential and are integrated into their most appropriate environment*” (2). Both are relevant to people with chronic illnesses, after trauma and with congenital disabilities. To achieve this, activities such as self-care, walking, driving, shopping, learning and many others will be trained in rehabilitation settings. An overview of all possible activities is listed in the International Classification of Functioning, Disabilities and Health (ICF) (9) (see Chapter 3).

APPENDIX II

Examples of Disabling Conditions Commonly Encountered by Physical and Rehabilitation Medicine Specialists

The consequence of

Trauma

Traumatic brain injury;
Spinal cord injury;
Multiple and complex trauma;
Brachial plexus and peripheral nerve injuries;
Sports injuries;
Injuries associated with chronic disabling disease;
Occupational injuries.

Neurological Conditions

Stroke - including subarachnoid haemorrhage;
Chronic disabling neurological conditions, e.g. multiple sclerosis, Parkinson's disease;
Central nervous system infections and abscesses;
Central nervous system tumours;
Spinal paralysis;
Neuromuscular disorders and myopathies;
Post-polio syndrome;
Peripheral neuropathies, including Guillain-Barré disease and nerve entrapment syndromes;
Alzheimer's Disease
Congenital conditions – cerebral palsy, spina bifida, etc.;
Rare congenital problems.

Acute and Chronic Pain Conditions

Amputation (as consequence of posttraumatic, vascular and in malignant diseases);
Conditions after surgery (including organ transplantation), ICU treatment (including critical illness polyneuropathy and immobilisation syndromes (deconditioning) and multi organ failure).

Musculoskeletal Conditions

Spinal disorders
Acute and chronic low back pain;
Cervical spine syndromes;
Thoracic spinal disease;

Degenerative and inflammatory joint disease;
Other mono- and poly-arthritis;
Soft tissue rheumatism, (including fibromyalgia);
Complex hand and foot problems;
Osteoporosis;
Chronic (musculoskeletal) pain syndromes;
Work-related pain syndromes;
Chronic fatigue syndromes and fibromyalgia.

Cardiovascular Disorders

Coronary heart disease;
Cardiac insufficiency;
Valvular disease;
Cardiomyopathies;
Peripheral vascular disease, including amputations;
Arterial hypertension.

Respiratory Conditions

Asthma;
Chronic obstructive pulmonary disease;
Pulmonary fibrosis;
Pneumoconiosis, including asbestosis and other industrial injuries.

Obesity and Metabolic Conditions

Diabetes mellitus;
Metabolic syndromes, hyperlipidaemia and hyperuricaemia.

Urinary Tract Conditions

Chronic renal failure;
Urinary tract tumours, including prostatic cancer;
Prostatism (prostatic hypertrophy);
Incontinence – e.g. stress incontinence and post-surgical incontinence.

Gastrointestinal Tract Conditions

Crohn's disease, Ulcerative colitis;
Functional gastrointestinal disorders.

Sexual Dysfunction (other than neurological)

Sexuality issues;
Erectile dysfunction.

Infectious and Immunological Diseases

Bone marrow transplantation;
Consequence of HIV infection.

Cancer and its Consequences, including Treatment Sequelae and Palliation

Age-related conditions

Paediatric conditions, incl. congenital deformities, idiopathic scoliosis, Perthes disease, spina bifida, etc.;
Old age problems.

APPENDIX III

Physical and Rehabilitation Medicine Specialists in Europe by UEMS Member States

Country	Total No. of Doctors	Total No. of Specialists	No. of Specialties	Practising PRM Specialists	No. of PRM Trainees	No. of PRM specialists/100,000 population	Population
Austria	29,100	13,150	44	134	85	1.85	7,300,000
Belgium	38,700	16,365	24	450	80	4.40	10,240,000
Croatia*	15,600	8,200	43	299	40	6.80	4,600,000
Cyprus	2,000	1,850	41	9	-	0.90	1,000,000
Czech Republic	35,000	27,000	80	483	130	4.67	10,300,000
Denmark	15,000	6,000	23	120	0	2.18	5,500,000
Estonia	8,968	4,312	40	158	-	11.70	1,351,000
Finland	19,000	10,500	35	152	30	2.92	5,200,000
France	183,700	95,000	38	1,760	125	2.97	61,300,000
Germany	394,432	261,437	43	1,571	65	1.96	80,000,000
Greece	60,700	15,200	37	164	33	1.49	11,000,000
Hungary	40,829	29,280	92	140	27	1.38	10,117,000
Iceland*	900	-	33	10	3	3.72	270,000
Ireland	6,050	4,650	51	5	2	0.13	4,000,000
Italy	307,600	160,000	45	2,200	350	3.85	59,000,000
Latvia	8,588	7,437	46	120	7	5.42	2,300,000
Lithuania	No information available						
Luxembourg	810	520		8	0	2.00	400,000
Malta				1	0	0.25	400,000
The Netherlands	39,800	16,500	27	248	78	1.65	15,000,000
Norway*	18,404	13,982	30	183	58	3.00	4,300,000
Poland	109,000	65,000	58	900	120	2.30	39,000,000
Portugal	29,950	14,530	46	325	100	3.25	10,000,000
Romania*	44,630	37,670	58	690	164	3.14	22,000,000
Serbia & Montenegro	25,000	20,000	41	610	120	5.80	10,500,000
Slovakia	No information available						
Slovenia	4,547	3,362	39	68	19	3.40	2,000,000
Spain	157,900	70,000	51	2,150	292	4.89	44,000,000
Sweden	27,000	17,600	60	160	20	1.88	8,500,000
Switzerland*	25,251	23,170	44	269	50	3.59	7,502,000
Turkey*	91,000	33,000	36	1,300	200	1.86	70,000,000
United Kingdom	150,000	21,000	58	129	57	0.27	58,000,000

* = Not Member of EU

APPENDIX IV

Diagnostic Tools and Assessments in Physical and Rehabilitation Medicine

Diagnosis and evaluation in PRM includes the following list.:

Diagnosis of the disease

History;
Clinical examination;
Clinical diagnostic tools, e.g. imaging, etc.

Functional assessments

Clinical functional examinations (e.g. muscle testing, range of motion, coordination, dexterity);
Standardised/clinical tests (timed up and go; functional reach, sit to stand and others);
Technical tests (dynamometry: muscle endurance and strength; electrophysiologic testing, etc.);
Rating scales and questionnaires, outcome measures;
Somato-sensory testing (touch, temperature, pressure, pain, etc.);
Posture; mobility; reach, grasp and manipulation;
Testing of sensation and special senses;
Swallowing and nutrition;
Sexuality;
Continence;
Tissue viability (skin problems and pressure sores);
Bowel/bladder functioning;
Communication (speech, language and non-verbal);
Mood, behaviour, personality;
General health parameters, etc.;
Neuropsychological testing (perception, memory, executive functions, attention and others).

Activity and participation assessments

History/anamnesis, check-lists and questionnaires;
Relevant environmental factors;
social situation, family and friends, community;
occupation and employer, financial and other assets etc.;
Care needs;
Equipment needs (e.g. wheelchairs);
Environmental adaptations (e.g. accommodation).

Special functional assessments

Gait analysis laboratories, which contain instrumentation for
kinematic measures – patterns of motion including temporal and spatial parameters (goniometry/electrogoniometry, accelerometry, optoelectronic systems, digital videocamera with dedicated software, etc.);
kinetic measures – ground reaction forces (dynamometric platforms, pedobarography platforms, insole sensory systems, portable walkway systems, etc.);
surface EMG activity in targeted muscles energetics.

Quantification of other balance and mobility tasks (static and dynamic posturography, long-term activity monitoring, etc.).

Occupational performance: activities of daily living and home management, work and productive activities (including functional capacity evaluation and job site analysis), therapeutic driving evaluation, leisure activities.

APPENDIX V

Curriculum of Studies and Theoretical Knowledge for the European Board Diploma in Physical and Rehabilitation Medicine (Version 2005)

A. SPECIFIC BASIC KNOWLEDGE OF THE SPECIALTY

INTRODUCTION: Philosophy, Objectives and Methodology of Physical and Rehabilitation Medicine.

1. Historical aspects of the specialty.
2. Disability and the Rehabilitation Process.
 - a. Traditional medicine model,
 - b. Physical and Rehabilitation Medicine model,
 - c. Rehabilitation process.
3. Physical and Rehabilitation Medicine: an autonomous specialty.
 - a. Criteria for an autonomous specialty,
 - b. Philosophy,
 - c. Objectives,
 - d. Methodology.
4. Role of a Specialist in Physical and Rehabilitation Medicine.
 - a. Medical tasks,
 - b. Medicosocial tasks,
 - c. Objectives and standards of the specialty,
 - d. Interdisciplinary work.

Chapter 1. The Fundamentals of PRM

1. Principles of general biomechanics, both kinetic and kinematic. Forces, couples of forces, levers, moments, power, work, inertia, acceleration.
2. Principles of behaviour and resistance of materials under force. A general understanding of strain and the effects of strain. Characteristics of homogeneous and composite materials. An elementary knowledge of the measurement of strain and deformity of various materials.
3. Biomechanics: a general understanding of the applications of the above paragraphs to living tissue. The biomechanics of the different tissues in the human body (particularly of the locomotor system). An elementary knowledge of biomechanics of fluids and its application to fluids in the human body.
4. Study of human movement (kinesiology).

a. General

Application to the human body of systems of levers; the different constituents of levers with relation to the locomotor system.

Knowledge of joint structure, classification and characteristics of movements of joints.

Muscle contractions, internal and external resistance, shortening of muscles and range of joint movement. Factors limiting the range of movement. Different types of muscles. Different mechanical types of muscle contraction, mono and polyarticular muscles. Static or isometric contractions, dynamic or isokinetic contractions.

Plyometric contractions. Agonists, antagonists, synergic muscle systems. Kinetic chains.

b. Specific

Physiology of joint and muscle function: spine and limbs. This part of the programme assumes a prerequisite detailed knowledge of the anatomy of the locomotor system.

c. Applied

Application of previous data to the analysis of posture and movement in elementary activities of human life: fundamental positions and various postures, gestures, prehension, dexterity, walking, running and jumping.

5. The biochemical effects of exercise. Energy expenditure, thermal regulation. Physiological costs, cardiovascular and pulmonary effects of exercise.
6. Clinical epidemiology, methodology for clinical research. Statistics.
7. Evidence-based Medicine in the Specialty of Physical and Rehabilitation Medicine.
8. ICF.
9. Assessment of cognitive function.

Chapter 2. Physiology and basic physiopathology

1. Central nervous system.
2. Peripheral nervous system
3. Autonomic nervous system
4. Muscle
5. Neuromuscular junction
6. Neurophysiology of posture and movement.
7. Pain mechanisms; interaction of pain and movement.

Chapter 3. Clinical and functional assessment in PRM

1. Clinical and functional assessment of joints and muscles; motor and sensory function.

2. Assessment of cognition, speech and language, memory, behaviour, etc.
3. Laboratory tests and imaging techniques. Rational use of modern medical imaging in physical and rehabilitation medicine.
4. Quantitative evaluation by computerised recording of mechanical or kinetic phenomena (force plates) as well as movement or kinematic(s) (different modern forms of recording displacement of body segments).
5. Electrodiagnosis: electromyography, nerve conduction studies and evoked potentials.
6. Pulmonary function tests.
7. Cardiovascular function tests, oxygen saturation, graded exercise tests, physiological cost of energy.
8. Biochemical and pathological tests in current use in physical medicine and rehabilitation.
9. Functional assessment: use and application of the ICF. Various scales, instruments, tests, and indices, utilised in conditions relevant to physical and rehabilitation medicine.
10. Analysis of posture and movement (including posturography and gait).

Chapter 4. Therapies in PRM

1. Physiotherapy.
 - a) Knowledge of the elementary techniques of passive and active physiotherapy. Different techniques of manual and instrumental massage. Techniques of functional rehabilitation of joint problems (manual and instrumental). Muscle (re)training, stimulation of muscle activity, functional training. Techniques of muscle strengthening, endurance training, retraining of abilities;
 - b) Methods specific to physiotherapy in different pathologies. Techniques such as Cyriax, Mennell, etc... Neuromuscular facilitation-inhibition techniques, eg. Kabat, Bobath, Brunström, Votja, etc. Management of lymphoedema;
 - c) Indications, prescriptions, controls on physiotherapy: a general knowledge of technique, and the choice of techniques with regard to results of clinical and functional assessment, type of pathology and the individual characteristics of each patient;
2. Physical Therapy modalities: utilisation of physical therapy techniques, basic knowledge, the effects of treatment, indications and contra indications.
 - a) Electrotherapy: galvanic currents; low, medium and high frequency treatment.
 - b) Mechanical vibration,
 - c) Biofeedback,
 - d) Thermotherapy: cold and heat treatment,
 - e) Balneotherapy.
3. Occupational therapy.

Fundamental ergonomics.

Principles and methods of occupational therapy.

Materials, equipment, technology and assessment in occupational therapy.

The applications of occupational therapy: in joint/muscle training, endurance training, in functional rehabilitation and in reintegration into the community (socio-familial, domestic, professional and employment training).

Vocational assessment, guidance and training.
- 4* Equipment and technical aids
 - a) Materials used,
 - b) Bandages,
 - c) Orthoses (spine, limbs),
 - d) Prostheses: surgical indications for amputation. Equipment for and rehabilitation of amputees,
 - e) Stomatherapy,
 - f) Technical aids and appliance: facilities, tools, ADL equipment, means of transfers and of communication, environmental control, household equipment; whether they are simple or sophisticated but likely to aid people with disabilities in acquiring greater independence and improving their quality of life,
 - g) Wheelchair advice and management.
- 5 Manual therapy.

Pathophysiology of manual medicine. Anatomical knowledge. Clinical examination of the spine and limbs. Dysfunction of intervertebral segments. Principles of manual techniques. Indications and contra indications. Potential dangers of the manipulative acts. Clinical examination and assessment.
6. Re-education in speech and language disorders, principles of and equipment and technology used in speech and language therapy. Language development in childhood. Assessment in speech therapy and its application to the rehabilitation of problems in articulation, language (expression, comprehension, reading and writing).

Assessment and management of swallowing disorders.

*PRM specialists should have a general knowledge of materials used in orthoses and prostheses and of their mechanical properties. In addition, in those most commonly used, further knowledge is expected of the process of their manufacture, additional extras, spare parts, and their application in clinical practice; he or she should have a detailed knowledge of how to prescribe them and adapt them, to check on their application and to assess their therapeutic effects.

7. Reintegration of people with disabilities into society. Principles and methods of clinical psychology and of social assistance (social work). Cognitive assessment (intellect, memory, concentration, behaviour) and learning potential. Its application to cognitive and psychological and social abilities: memory and concentration, the patient's understanding and acceptance of his problem, motivation for rehabilitation, mood, difficulties in interpersonal relationships; vocational training and methods to ensure financial security.
Environmental implications.
8. Neuropsychological rehabilitation: assessment and management
9. Pharmacology: pharmacokinetics of drugs used in rehabilitation medicine; possible interactions with the rehabilitation programme and with therapeutic exercise.
10. Infiltration and injection techniques; acupuncture
11. ECSWT: Extra-corporeal shock wave therapy in tendonitis.
12. Multidisciplinary pain management.

B. APPLICATIONS TO PATHOLOGY

For each of the following chapters, there has been no need to enter all the diverse descriptions of diseases incumbent on doctors in the specialty. It is sufficient to establish that specialists in Physical and Rehabilitation Medicine should know, for each group the clinical signs and symptoms, diagnostic tools, appropriate types of assessment and current therapy. It is particularly important to know therapeutic effects of rehabilitation, the indications and contraindications.

Chapter 5. The Immobile Patient

1. Physiopathology of immobilisation. Consequences on the
 - a) Cardiovascular system,
 - b) Respiratory system,
 - c) Nutritional system,
 - d) Metabolic system (osteoporosis),
 - e) Nephrological and urological system,
 - f) Cutaneous system (skin-pressure sores),
 - g) Muscular system,
 - h) Musculoskeletal system,
 - i) Neuropsychological system.
2. Prevention and treatment of the above-mentioned disorders.

Chapter 6. Adult Locomotor System Pathology in PRM

1. Non traumatic conditions
 - a) Inflammatory joint disease, polymyalgia rheumatica, connective tissue disorders,
 - b) Crystal arthropathies, gout, chondrocalcinosis,
 - c) Osteomalacia, osteoporosis,
 - d) Paget's disease,
 - e) Primary and secondary malignant tumours of bone,
 - f) Extra-articular rheumatism,
 - g) Neuromuscular diseases,
 - h) Osteoarthritis,
 - i) Spinal pathology,
 - j) Arthroplasty,
 - l) Hand and foot disorders,
 - m) An elementary knowledge of joint surgery: arthroscopy, arthrotomy, arthrodesis,
 - n) Chronic fatigue syndrome and fibromyalgia,
 - o) Myofascial pain syndrome.
2. Traumatic conditions in adults
 - a) Physiology and pathophysiology of tissue repair in the locomotor system,
 - b) Sprains and strains,
 - c) Dislocations. Traumatic and recurrent dislocations,
 - d) Fractures: spinal (without neurological complications), limbs: principles of specific treatment, repair time including surgery eg. osteotomy,
 - e) Specific disorders of the hand and foot.
3. Burns:
 - a) classification,
 - b) treatment procedures,
 - c) prevention and rehabilitation of complications.

Chapter 7. PRM and Sport

Physical and rehabilitation medicine related to sports activities.

Sports for people with disabilities.

Chapter 8. PRM. Nervous System Pathology

1. Central nervous system.
 - a) Vascular, neoplastic, traumatic, inflammatory, infective and degenerative conditions of brain and spinal cord,
 - b) Spinal cord lesions: traumatic, neoplastic, others. Assessment and management of spinal cord lesions,
 - c) Spinocerebellar degenerative conditions: Friedreich's disease, Strumpell Lorain, etc,
 - d) Neuropsychological dysfunction.
2. Peripheral nervous system.
3. Special Sensory Impairments.

Chapter 9. PRM and Respiratory Pathology

1. A fundamental appreciation of acute and chronic obstructive and restrictive syndromes. Aetiology and therapeutic principles.
2. Principles of rehabilitation: functional assessment through pulmonary function tests.
 - a) Active and passive techniques of bronchial and postural drainage, manual clapping, instrumental techniques,
 - b) Patient education and training,
 - c) Artificial ventilation, assisted respiration, domiciliary assisted respiration. Tracheostomy management,
 - d) Equipment for assisted respiration,
 - e) Surveillance and monitoring of treatment.
3. Their application.

Chapter 10. PRM and Cardiovascular Pathology

1. *Cardiac disorders*
 - a) Cardiac rehabilitation in valvulopathy,
 - b) Cardiac rehabilitation after myocardial infarction,
 - c) Cardiomyopathies,
 - d) Cardiac surgery.
2. Vascular disorders
3. Arterial system
 - a) Arterial occlusive disease of the legs: investigation, the place of and technology of the rehabilitation at the various stages of the condition,
 - b) The rehabilitation of amputees, care of the stump, prosthetics.
4. Venous system
 - a) Prevention and treatment of deep venous thrombosis,
 - b) Venous problems ulcers, varicose ulcers.
5. Lymphatic system

Chapter 11. Physical and Rehabilitation Medicine in Children

1. Assessment of child development: psychomotor development, movement, sensory and cognitive development. Testing and evaluation of the stages of development.
2. Pathophysiology in the developing locomotor system. Interaction between growth and anomalies in the musculoskeletal and joint structures.
3. Neuropaediatrics: cerebral palsy spina bifida and myelomeningocele. Infantile spinal amyotrophies. The neuro-orthopaedic consequences of neurological disorders, prevention, treatment and monitoring.
4. Congenital malformation of musculoskeletal system (spine, limbs, skeletal agenesis, congenital aplasias

and dysplasias; hip dysplasia, club foot, other foot malformations.

5. Growth disturbances.
6. Lower limb discrepancy.
7. Idiopathic, congenital, secondary. scolioses
8. Infantile trauma: a general appreciation of trauma and rehabilitation in children, notably bums and amputations in children.

Chapter 12. PRM in Urological and Sexual Problems

1. Assessment of physiology of continence of bladder/sphincter control and anal sphincter functioning.
2. Bladder/sphincter pathological conditions: neurological and other. Urodynamics. Assessment and treatment.
3. Assessment and treatment. of ano-rectal sphincter pathology and overactive bladder and bowel.
4. Sexual consequences of neurological dysfunction including pregnancy in spinal paralysis.

Chapter 13. PRM in Elderly People

1. The process of ageing in different systems:
 - a) Central and peripheral nervous system: neuronal ageing, influences on mood, cerebral functioning and feedback mechanisms,
 - b) Musculoskeletal system,
 - c) Cardiovascular and respiratory system.
2. An appreciation of the fundamentals of geriatric pathology: epidemiology, pathology, evolution of ageing and therapy.
3. Indications for geriatric patients for staying at home or in an institutional placement.

Chapter 14. Oncological Rehabilitation**Chapter 15. Reintegration and Maintenance of Disabled and Elderly People at Home**

1. A general idea on the health and medicosocial agencies in the different countries of the European Community:
 - a) Health Insurance Systems Social Security,
 - b) Hospitalisation, private and public,
 - c) Hospitalisation at home,
 - d) Domiciliary care, health workers, home helps, etc,
 - e) Assistance and surveillance by telephone and other telecommunication methods.
2. Knowledge of the general organisation of rehabilitation, the place and role of the specialist in PRM within these structures.

APPENDIX VI

Rules for Continuing Medical Education (CME) and Continuing Professional Development (CPD) of Physical and Rehabilitation Medicine Specialists

Every Board-certified specialist in PRM is expected to collect annually 50 credits. This is not mandatory, but specialists should have a total of 250 credits over 5 years. Revalidation of Board-certified PRM specialists takes place ten years after certification and is based on CME credits. These may be:

1. *Participation in scientific events:*
 - 1 credit per academic hour attended (not more than 6 credits per day), or
 - 3 credits per half-day event, or
 - 6 credits per full day event.
2. *Presenting scientific work* (Giving lectures/presenting posters):
 - 5 credits, for each lecture, given by an individual during an accredited scientific event,
 - 3 credits, for each poster presented by an individual during an accredited scientific event.
3. *Publications in:*
 - a) Journals: 10 credits to each author.
 - b) Books: 10 credits for each chapter.
4. *Academic activities* (e.g. Ph.D. - copy submitted – 50 credits).
5. *Self-education:*
 - a) Personal subscriber to journals of PRM:
 - 5 credits/ indexed journal, up to 2 journals.
 - 3 credits, if subscriber to one non-indexed journal.
 - b) Internet PRM teaching lessons: if proof submitted:
 - 1 credit/lesson or the credits provided for the lesson and are written at the electronic program.

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