Clinical review

Recent advances
Recent advances in rehabilitation
Derick T Wade, Barel A de Jong

In Western countries 13-14% of the population have some degree of disability. The demand for rehabilitation services will increase as evidence accrues for their effectiveness and as more people survive longer with substantial disability. Current evidence strongly supports the provision of well organized, coordinated, multidisciplinary rehabilitation services based on a problem oriented approach. In future, specific interventions will be more evidence based, leading to more appropriate use of interventions and more appropriate referrals to specialist services.

Rehabilitation has recently seen many practical innovations and new evidence for specific interventions, but the major advances in rehabilitation are conceptual rather than practical. Firstly, the approach to patients has moved from a predominantly medical one to one in which psychological and sociocultural aspects are equally important. Secondly, the need for organized specialist rehabilitation services—for example, for neurological disabilities—is being recognised.

Methods
This review concentrates on the conceptual basis of rehabilitation and some emerging principles; the scope of rehabilitation is too large to cover all major advances. We chose topics and papers on the basis of our experience.

Nature and context of rehabilitation
Models of illness are important. They form the basis for all decisions on the allocation of resources. They can help in the analysis and understanding of clinical cases and can form a framework for the research and planning of interventions, the construction of services, and the design of research. For effective disability services, doctors, healthcare professionals, politicians, and the general public need to understand the models.

The international classification of impairments, disabilities, and handicaps (ICIDH) was developed under the auspices of the World Health Organization and was first published in 1980. The development of this classification model and its worldwide acceptance is arguably the greatest single advance in the field of rehabilitation. There are many other models of disability and illness, but most are similar to the ICIDH model.

Recent advances
The World Health Organization has developed a coherent model of illness that helps to explain the origins and effects of disability and the nature of rehabilitation.

Specialist, coordinated, multiprofessional disability services have now been shown to be effective and efficient.

Rehabilitation has started to become an evidence based specialty.

The ICIDH has recently been revised. In the new version the emphasis on the personal, social, and physical context has been expanded. Some of the major terms have been changed to reflect the need for more neutral, less medically biased terminology: “disability” has become “activity,” and “handicap” has become “participation.” The outline of the revised model is shown in table 1; the basic model is described in more detail elsewhere.

The acceptance of this model has fostered more consistent communication among professionals from different disciplines. The model is useful for understanding and analysing patients’ problems, and it encourages a more systematic analysis of rehabilitation interventions. It also brings structure and order to research. Most importantly, it has facilitated the change of emphasis within rehabilitation from a mechanistic, medically driven process of “physical medicine” to a comprehensive, more socially driven form of rehabilitation. Finally, it has helped workers in rehabilitation to argue more coherently for an equitable share of health resources.

The model has some weaknesses, especially a failure to consider explicitly quality of life and to allow for patients’ subjective experiences. The model makes explicit, however, that quality of life is probably on a separate axis or forms a separate domain.

The use of the ICIDH model has also fostered discussion of the nature of rehabilitation. Although a definition of rehabilitation has still not been universally agreed, it is now recognised that definitions may refer to structure (the operational characteristics of a
rehabilitation service), process (how rehabilitation services work), and outcome (the aims of rehabilitation services) box. The core skills associated with rehabilitation are probably goal setting and teamwork.

Many people, in particular those with a disability, are concerned about the "medicalisation" of disability. One important consequence of adopting the revised model is that these concerns are acknowledged. The model emphasises the relation between disease and disability and sets the rehabilitation agenda clearly in a social context while still recognising that disease has an important influence on patients' levels of physical activity and social participation and on the process of rehabilitation.

The model shows that services and agencies must work together for rehabilitation to be effective. It also extends the boundaries of rehabilitation—from the few conditions where recovery is expected to any condition in which someone experiences disability or handicap secondary to (or as part of) illness. For example, people with multiple sclerosis, motor neurone disease, or rheumatoid arthritis are all potential clients of rehabilitation services.

### Research and measurement

A second important advance in disability medicine has been the growth in high quality research. The national clinical guidelines on stroke cite 80 or more randomised controlled trials specifically on stroke rehabilitation. Associated with this growth, the number of specialist rehabilitation journals has increased, and a Cochrane collaboration review group covering rehabilitation and disability has been founded. It is now accepted, particularly by the rehabilitation community, that the field is as amenable to scientific research as any other branch of medicine.

Research focused on disability requires special measurement tools. Techniques of clinical measurement in disability have greatly improved, and the ICIDH model has started to facilitate the development of even better measures. For example, the Barthel activities of daily living index is now widely used; mobility can be recorded by timing a 10 metre walk and using the Rivermead mobility index; and tests such as the "short orientation-memory-concentration" test and the motoricity index can detect and quantify impairment.

Rehabilitation, however, is a complex and multidisciplinary process. It is difficult to define the specific nature of interventions and to isolate the effects of specific interventions from other factors. When outcome is measured at the participation (handicap) level, factors such as employment status, housing, and social relationships are likely to be influential. Moreover, the measurement of participation is still a problem, especially as the nature and operational definition of participation is still debated. Handicap scales assess participation from an outsider's perspective; the need to assess perceived handicap has been recognised and is being addressed.

---

**Definitions of rehabilitation**

**Structure**
A rehabilitation service comprises a multidisciplinary team of people who:

- Work together towards common goals for each patient
- Involve and educate the patient and family
- Have relevant knowledge and skills
- Can resolve most of the common problems faced by their patients

**Process**
Rehabilitation is a therapeutic, active, educational, problem solving process focused on a patient's behaviour or disability, with the following components:

- Assessment—the identification of the nature and extent of the patient's problems and the factors relevant to their resolution
- Goal setting
- Intervention, which may include either or both of (a) treatments, which alter the process of change; (b) support, which maintains the patient's quality of life and his or her safety
- Evaluation—to check on the effects of any intervention

**Outcome**
The rehabilitation process aims to:

- Maximise the participation of the patient in his or her social setting
- Minimise the pain and distress experienced by the patient
- Minimise the distress of and stress on the patient's family and caregivers

---

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Evidence for rehabilitation

A meta-analysis of data from trials of rehabilitation in stroke units has shown that rehabilitation services in such units are effective at reducing both mortality and morbidity, possibly without any extra resources. Furthermore, these benefits can be achieved in routine practice, and they may last for many years. The meta-analysis was especially important because it helped to characterise the probable important ingredients of rehabilitation: coordination, expertise, and education.

Evidence in support of specialist coordinated rehabilitation services is less strong in other fields, but trials have shown benefits for patients with multiple sclerosis, mild or moderate head injury, and back pain.

Consequently, the presumption should now be that most patients with disability will benefit from being seen by a specialist, coordinated rehabilitation service. It is no longer tenable to depict rehabilitation as an expensive placebo service.

The evidence for each part of the process of rehabilitation is much more difficult to identify and evaluate. The evidence in favour of assessment and goal planning has been reviewed recently, and, although this evidence is not susceptible to meta-analysis and is difficult to review systematically, there is reasonable support for these aspects of the process.

Specific interventions

The evidence for specific interventions is extensive, but because it covers a huge range of treatments often not specifically tied to single diseases it is difficult to construct an analytic framework, let alone access and review it. However, recent research, again mostly related to stroke, does support various hypotheses.

Firstly, even quite small levels of intervention can have quite powerful and specific effects, and a dose-response relation may exist between intervention and outcome. After a stroke, for example, an additional two to three hours of therapy focused on the impaired leg each week can significantly improve mobility, whereas giving the same amount of attention to the arm does not alter mobility. No current evidence exists, however, to identify a minimum or maximum effective intervention.

Secondly, evidence is strong that assessment for and provision of simple equipment is extremely cost effective. In the study by Mann et al the health services paid for all aids that should have been provided, but weren’t, by other agencies, illustrating how budgetary borders may hinder effective rehabilitation; moreover, the costs to the health services were reduced.

Thirdly, some evidence suggests that even the provision of information may be effective.

Finally, high quality research in rehabilitation is possible using randomised controlled trial methodology. This finding and the recognition of it are two great advances.

Pharmacological treatment

Evidence now supports some specific pharmacological treatments for impairment. Injection of botulin toxin into muscle is a remarkably specific, safe method of denervating selected muscles for a limited time, and evidence strongly supports its use in dystonia and spasticity—for example, to help improve gait after stroke. This treatment will probably become much more widely used in musculoskeletal disorders of muscle tone following upper motor neurone damage, whatever the underlying disease. The full potential of the botulinum toxin will probably be known within the next five years, but as its injection into spastic muscles is a simple procedure, the intervention may well eventually be used in general practice.

Other pharmacological advances are less well supported but do hold hope. Anafetamine, for example, may facilitate motor recovery in the context of active rehabilitation, but the role of this intervention is still controversial and needs further research.

Therapy

In neurological rehabilitation, evidence is emerging to support a pragmatic, functional, or task-oriented approach in contrast with a theory-based, impairment-oriented approach. The first involves practising activities such as dressing, rather than trying to reverse the underlying impairment(s); gait training in a suspended harness after a stroke also seems to be effective. Evidence from other fields emphasises