

# Evidence-based stroke rehabilitation

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## Abstract

**Background:** evidence-based practice, the linking of research evidence with clinical decision-making, has been a major recent development. However there are many challenges to the development of evidence-based stroke rehabilitation. Before it can become a reality we need to establish a reliable evidence-base providing information which is relevant, reliable, accessible and understandable. This article describes some steps taken to develop such information based on common questions generated by clinicians.

**Conclusion:** stroke rehabilitation needs to establish and apply a solid evidence-base even though the challenges are formidable.

**Keywords:** *evidence-based practice, stroke rehabilitation, randomized trial, systematic review*

## Introduction

Evidence-based practice (EBP), the explicit linking of evidence from clinical research to clinical decision-making [1], has been a major recent development in the delivery of healthcare. When faced with a clinical problem, a clinician using an EBP approach would formulate key questions, search for the best external evidence, critically appraise the reliability and relevance of that evidence to their problem and then apply it to help solve a clinical problem (Figure 1).

The potential advantages of such an approach have been discussed extensively elsewhere [1]. When done well, EBP can improve the quality of clinical decision-making and encourage lifelong professional learning. The EBP approach (Figure 1) can be tailored to very specific questions about individual patient care or used to develop more general advice; the process of clinical guideline development is very similar to that of evidence-based practice, and the same principles apply to both [2].

The most appropriate and reliable form of evidence will vary according to the clinical question. When the clinical question concerns the effectiveness of a treatment, randomized controlled trials are generally accepted as providing the most reliable evidence [3]. However, individual randomized trials are often small and subject to random error and so there is an increasing trend to producing rigorous summaries (termed 'systematic reviews') of the relevant trials [4]. This process has now been extended by the Cochrane Collaboration, which has developed methods whereby systematic reviews can be

prepared, maintained, disseminated and regularly updated in an electronic publishing format [5].

This article will focus on the challenges facing evidence-based stroke rehabilitation with a particular emphasis on evidence about rehabilitation interventions. However, it is important to recognize that the principles of evidence-based practice apply to decisions about diagnosis, prognosis, and causation as well as treatment.

## Challenges for evidence-based practice in stroke rehabilitation

Before evidence-based practice in stroke rehabilitation can become a reality, a reliable evidence base must

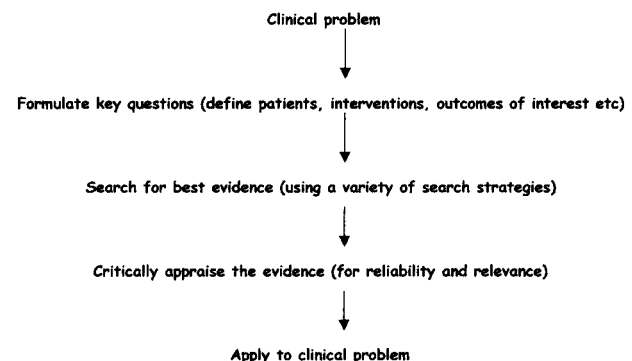


Figure 1. Process of evidence-based practice.

first be established. Most randomized trials in stroke rehabilitation are too small to provide a reliable answer in their own right [6] and so we need to include all relevant trials in rigorous systematic reviews. Such reviews of the evidence can also help counter concerns that individual rehabilitation trials are only relevant to their local area or specific circumstances (i.e. have poor generalizability). If these reviews are to usefully inform both current clinical practice and future research, they must be relevant and accessible to rehabilitation clinicians and healthcare users: i.e. they must be relevant, reliable, accessible and understandable;

- i. Relevant – there are very many clinical questions which could form the basis of stroke rehabilitation trials or systematic reviews but only limited resources to do this research. Therefore, we need to focus on priority areas which reflect the views of clinicians who deliver stroke rehabilitation and also of healthcare users [7] such as stroke patients and carers.
- ii. Reliable – reliable systematic reviews must include all relevant information and analyse it in a methodologically rigorous way.
  - (a) *Trial identification* – it is very difficult to identify all relevant trials, especially in stroke rehabilitation where trials may have to be sought from a wide range of journals and databases. Failure to identify trials raises the possibility of publication bias [8] which compromises the reliability of the review.
  - (b) *Methodological rigour* – systematic reviews in this field are particularly difficult to carry out because rehabilitation interventions are often complex and poorly defined [9, 10]. There is an increasing recognition that systematic reviews of rehabilitation interventions require a somewhat different methodology to the more simple reviews of drug treatments. In particular, more effort needs to be devoted to describing and interpreting the interventions. This requires a mixture of skills covering both the subject matter of the review and methodological aspects of its conduct. This combination of skills is rarely present in one individual [9, 10].
  - (c) *Accessible and understandable* – the skills required to rapidly evaluate the reliability of research evidence are not widely distributed among healthcare professionals. There is an increasing recognition [11] that most clinicians will require research evidence to be provided in a more accessible format than the original publications.

## **Defining and evaluating stroke rehabilitation interventions**

Conducting methodologically rigorous randomized trials and systematic reviews of specific rehabilitation interventions is complex. Rehabilitation entails a range of activities aimed at promoting activity and participation. Precise evaluation of rehabilitation interventions that

are traditionally tailored by a therapist or nurse to meet the identified needs of an individual patient can be very difficult to achieve within a randomized trial. Particular problems include achieving consistency of intervention by different staff to different patients on different days, and documentation of the intervention in a manner that would allow reproduction of the treatments evaluated. While a key strength of the randomized trial can be that patients and health professionals are blind to the treatment given, it is often impossible to achieve blinding when a therapist is applying a manual treatment technique to a patient. Many rehabilitation interventions are aimed at ameliorating a specific body function or promoting a specific activity and it can be difficult to find a clinically meaningful, reliable, valid measure of outcome which is sensitive to changes occurring as a result of the intervention. It could be argued that the particular strengths of randomized trials lie, not with the evaluation of specific treatments, but with the evaluation of more general rehabilitation policies (e.g. policies for preventing shoulder pain or bed sores).

One of the first challenges in creating a framework of evidence for stroke rehabilitation is having a mechanism for describing and discussing rehabilitation interventions. One simple approach to considering stroke rehabilitation interventions is to classify them according to their levels of complexity. For example:

- i. Service level – these are typically provided by more than one individual, each providing a complex package of care in a specific context and interacting with others in a complex way. Examples, might include stroke unit interventions [12] or early supported discharge teams [13]. It is interesting to note that some of the most robust stroke rehabilitation evidence comes from trials of such complex interventions. However, there is often difficulty in interpreting and implementing such evidence.
- ii. Operator level – these interventions are typically provided by a single operator such as the therapist or nurse, who provides a complex package of care that could incorporate both the personal interaction between the therapist and patient plus the therapy they provide. A good example of this level of intervention is occupational therapy for stroke patients living at home [14, 15] or stroke family support workers [16].
- iii. Treatment level – at this level of complexity, the impact of an individual intervention is evaluated. This may arguably provide the most useful evidence for a clinician. Ideally the potential impact of the therapist should be removed from the evaluation of an individual reproducible intervention but in practice this can be difficult to achieve. Examples of such treatment decisions include functional electrical stimulation for upper limb recovery [17] and treadmill gait retraining [18].

## Making progress towards evidence-based stroke rehabilitation

Even if a reliable evidence base is available, it will only be used if clinicians believe that EBP is a useful and relevant approach to care. The experience of the Stroke Therapy Evaluation Programme (STEP), a project funded by Chest, Heart & Stroke Scotland to promote evidence-based stroke rehabilitation, is interesting in this context. We found that rehabilitation clinicians in Scotland were interested in EBP but felt they did not have the time, resources, or support to carry it out [19]. We established, through a variety of qualitative approaches [20], a series of priorities for important clinical questions to be addressed by systematic reviews and future research. This exercise involved rehabilitation staff, stroke patients and carers [21] and has resulted in the development of a topic list covering agreed areas of importance. We are now matching this topic list to the available trials and systematic reviews. The ultimate aim of this process is to make readily available the best quality evidence addressing agreed topics of importance in stroke rehabilitation.

## Examples of stroke rehabilitation evidence currently available

Detailed searching of trials register of the Cochrane Stroke Group (Western General Hospital, Edinburgh) has identified 660 trials potentially relevant to stroke rehabilitation and a substantial number of systematic reviews. The process of matching clinical questions to the available evidence has identified several levels of information currently available. A few examples are provided in Table 1.

## Future developments in evidence-based stroke rehabilitation

For evidence-based stroke rehabilitation to become truly widespread and feasible, it is important that several conditions are met. Firstly it is apparent that many stroke rehabilitation trials exist. Before embarking on major new trials we need to assimilate existing evidence in systematic reviews. Secondly, more reliable research must be carried out in key areas of stroke rehabilitation. Thirdly, this research must be clinically relevant and focus on more specific treatment issues. Finally, clinicians must have access to reliable summaries of this information.

It is important to recognize that even if all these conditions are met and high quality evidence is available, individual practitioners will still be faced with specific individual problems, which will require interpretation and extrapolation from the available evidence. However, if stroke rehabilitation practice nationally could be based on a series of general policies for which there was reliable evidence of benefit, this would represent a major clinical advance.

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### Key points

- Evidence-based practice has been a major development in healthcare.
  - There are major challenges to evidence-based stroke rehabilitation.
  - We need easy access to relevant, reliable and understandable evidence-base for stroke rehabilitation.
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### Acknowledgements

The Stroke Therapy Evaluation Programme is funded by Chest, Heart and Stroke Scotland and has been greatly

**Table 1.** Levels of evidence for stroke rehabilitation

Evidence available	Type of intervention		
	Service level	Operator level	Treatment level
Several trials available (reasonable statistical power to guide decision-making).	SRUs have better outcomes than general medical wards [12]	OT input effective for patients not admitted to hospital [14].	
Several trials available (but inconsistent results or inadequate statistical power to guide decision-making).	Hospital at home services for acute stroke [22, 23]. Day hospital or domiciliary input [24]. Specialist SRU or generic rehabilitation unit [12].	OT input for stroke patients returning home [15, 25]. Information provision after stroke [26]. Routine SFSW input after stroke [16]. SALT for aphasia [27].	FES for shoulder pain [28]. Acupuncture (29)
Little or no trial evidence available	Stroke rehabilitation in community hospitals.	Pre-discharge OT home visits. SALT for dysarthria [30]. Early mobilisation in acute stroke.	Early wheelchair use.

SRU=Stroke rehabilitation unit; ESD=Early supported discharge; OT=Occupational therapy; SFSW=Stroke family support worker; SALT=Speech and language therapy; FES=Functional electrical stimulation.

supported by the Cochrane Stroke Group which is funded by the Chief Scientists Office, Scottish Office.

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