2: Rehabilitation of patients after stroke

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Achieving a good quality of life is the ultimate goal

Abstract

- Stroke is the third highest cause of death and the leading cause of chronic disability in adults in Australia.
- Studies show clear advantages of treatment of patients in the acute phase of stroke in a dedicated stroke unit.
- Rehabilitation after stroke is a continuum, starting within days of stroke onset and ending only when it no longer produces any positive effect. More than half the 75% of patients who survive the first month after a stroke will require specialised rehabilitation.
- Effective rehabilitation relies on a coordinated, multidisciplinary team approach. Regular team meetings, as well as meetings with the patient, his or her family and carers, are essential.
- Improvements in function after stroke are the result of recovery within the ischaemic penumbra, resolution of cerebral oedema, neuroplasticity, and compensatory strategies learnt by the patient.
- Evidence supporting rehabilitation programs is based on evaluation of the multidisciplinary approach, or on the effect of a particular discipline (eg, speech therapy), rather than on individual components of treatment.
- When the patient is discharged from a formal rehabilitation program, the general practitioner's role becomes paramount. GPs can help patients deal with the consequences of stroke, such as depression, and any comorbidities. GPs may also provide counselling on issues ranging from interpersonal and sexual relationships, through ability to drive again, and vocational and recreational activities.

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ALTHOUGH STROKE WAS DESCRIBED by Hippocrates, it is only in the last few decades that it has become the focus of academic investigation. Currently, it is the third highest cause of death (behind coronary artery disease and cancer) and the leading cause of chronic disability in adults in Australia. Recent years, however, have seen prolific research into stroke, and we can now call on a large body of knowledge not only about aetiological factors and acute treatment, but also attesting to the benefit that patients derive from rehabilitation processes and philosophies.

In this article, we aim to provide an overview of the role of rehabilitation in the management of stroke. For convenience, we will discuss rehabilitation sequentially as it occurs in three main settings — the acute hospital, specialised rehabilitation units, and the community — but this should not be seen to imply that rehabilitation is anything but a continuum. Rehabilitation starts soon after a stroke and ends only when it is no longer producing any positive effect.

Rehabilitation and other management in the acute hospital

Clinical scenario 1

A 59-year-old male school teacher (Mr X) with poorly controlled hypertension, who smokes 15 cigarettes a day and does no physical exercise, develops weakness on the right side of the body and difficulty speaking. His wife immediately calls their general practitioner. There are two hospitals in the vicinity — a small private hospital dealing mainly with surgical cases, and a large academic hospital, with an established stroke unit. She requests that her husband be sent to the private hospital, as he wants a private room, and this hospital is closer to their home.

General medical ward v stroke unit

Where should the GP send this patient? The literature would strongly support transfer, without further delay, to a stroke unit, where he can be appropriately investigated (a computed tomography [CT] or magnetic resonance imaging [MRI] scan is essential) and treated. The positive value of stroke units was confirmed by the meta-analysis of the Stroke Unit Trialists Collaboration,[1] reported as part of the Cochrane database. Comparing patients treated in a stroke unit with those treated in a general medical ward, after a median follow-up of one year, these researchers found that, with the former, there was a median reduction in the odds of mortality of 17%, a 31% lower odds of "death or dependency", and a 25% lower odds of "death and institutionalisation". Interestingly, more recent work suggests that the difference in mortality persists for 5 years,[2] and even 10 years,[3] after the acute event.

Unfortunately, despite the clear advantages of treatment in a dedicated stroke unit, we do not know which specific aspect makes the critical difference. In the meta-analysis, the definition of "dedicated stroke unit" was broad and

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included units that concentrated on acute management and generally discharged patients within 7 days (early rehabilitation being an important component of the care), units which accepted patients after about 7 days and whose main emphasis was rehabilitation, and combinations of the above. Rehabilitation was therefore one common component of all units, with key elements being a coordinated, multidisciplinary team with specific expertise in stroke, a physician with a special interest or dedication to stroke, agreed protocols for best practice and outcome audits, and educational programs for staff, patients and carers.[4]

Rehabilitation assessment

It is strongly recommended that a rehabilitation assessment is undertaken within 24–48 hours of admission to a stroke unit.[4] Early evaluation of swallowing and the establishment of safe feeding is critical, as aspiration (which is silent in up to 40% of patients) may lead to pneumonia and increased mortality.[5,6] Secondary physical injury can be avoided by proper handling of flaccid or hypertonic limbs, and precautions to prevent falls are essential, particularly in patients with non-dominant-hemisphere strokes with associated neglect (loss of the ability to respond to objects or sensory stimuli located on the side of the body affected by the stroke).

Key issues in the acute phase of stroke

- Patients should be admitted (if possible) to specialised stroke units
- A comprehensive interdisciplinary rehabilitation assessment should take place within 24–48 hours
- Establishment of safe feeding lowers the risk of aspiration pneumonia and decreases mortality rate

Management in a specialised rehabilitation program

Clinical scenario 2

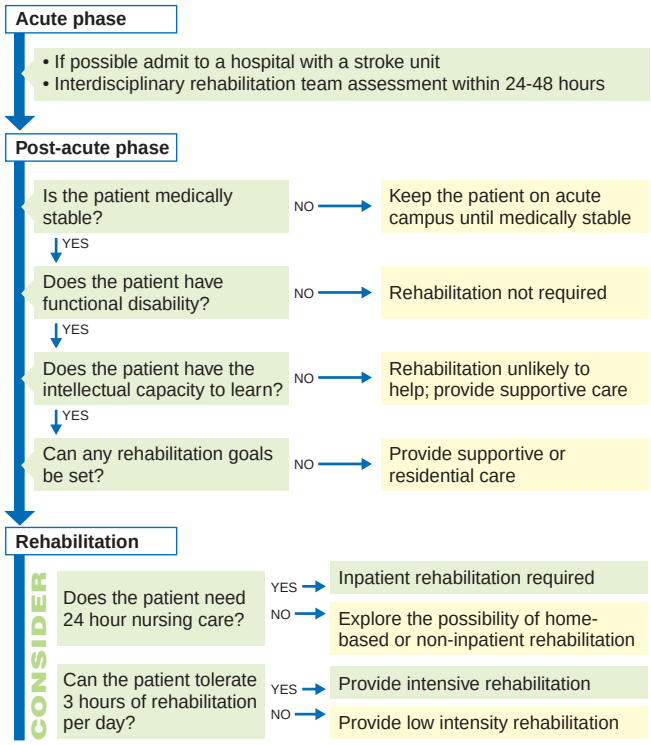
Mr X is admitted to a stroke unit under the care of a neurologist. A CT scan shows an infarction in the distribution of the middle cerebral cranial artery. Within 24 hours he is assessed by a rehabilitation specialist, a physiotherapist, an occupational therapist and a speech therapist. His hypertension is controlled. Five days after admission his condition is considered medically stable, but he requires help with personal care, and is transferred to a nearby rehabilitation hospital for a period of interdisciplinary inpatient rehabilitation.

Selection of patients for rehabilitation

About 20% of patients die in the first month after stroke, and more than half of the survivors will require specialist rehabilitation.[7] Once the patient's condition stabilises medically, there is less need for the facilities of the acute hospital, and the focus of the rehabilitation program moves to improving function and independence, and preparing the stroke survivor and his or her carers for life after discharge in the context of their previous health, home and family situation, avocational and vocational needs.

Rehabilitation is, however, an expensive and limited resource, and its success depends on careful selection of patients. There are thus vital questions to answer while the patient is in the acute ward (see Flow Diagram). Firstly, is the patient medically stable and fit for a rehabilitation program,

Flow diagram — rehabilitation of patients with stroke



and is it possible to set realistic rehabilitation goals? If the answer to these is no, then it is better to look at other options for the patient. For example, medical instability is best managed by a longer stay in a medical ward, and, if the patient is assessed as unlikely to make any functional improvement, residential placement may be the best option. In the latter case, close liaison with the geriatric team is essential, particularly for older patients with severe dementia. Neither of these options, of course, excludes later rehabilitation (there is some evidence, for example, that rehabilitation may still be beneficial several years after a stroke[8]) and regular monitoring by the rehabilitation physician is often appropriate to select those patients who may require intermittent therapy to maintain or improve function.

Where should rehabilitation be provided

Once the decision has been made to offer rehabilitation, the second question to be answered is where should it be provided? Options include specialist inpatient, outpatient or home-based services, and all of these can provide high quality rehabilitation programs. Important factors to take into account include the dependence of the patient (the need for 24-hour nursing care or supervision usually precludes home management), and how much support is available at home.

The wish of the patient and family must also always be respected; patients who live in extended families often prefer to be in the home environment, particularly (in the Australian context) if they speak limited English.

Several randomised controlled trials have been published in the past five years comparing home-based rehabilitation programs with rehabilitation in hospital, and these have been the subject of a systematic review[9] that showed no statistically significant difference between the two approaches, either in terms of patient and carer outcomes or resource utilisation.

Nevertheless, some of the individual studies reviewed by the Cochrane Collaboration did show change: three studies suggested higher levels of patient satisfaction, and specifically reported that patients felt more involved in planning their rehabilitation programs if they were treated at home.[10-12] In addition, one study[13] reported the important finding that carers at home developed more "stress" at 6 months, but this was detected only by one of the three tools used (the 36-item Short-form Health Status survey [SF-36]), and the difference was not present at the 12-month follow up.[14]

Careful assessment of swallowing can prevent aspiration, a common complication after stroke.

Safe ambulation is checked in the indoor and outdoor environments.

Of concern in this regard is a recent British study[15] that found a higher mortality rate at 3, 6 and 12 months in patients receiving home-based rehabilitation than in those admitted to a stroke unit. However, patients in that study were transferred to home care shortly after admission to the acute hospital, whereas most Australian units provide inpatient and home-based rehabilitation sequentially. Another important aspect of that study was the definite difference in functional outcome found between the stroke unit, general ward and home therapy groups, with the greatest improvement occurring in patients treated in the stroke unit. Moreover, the groups also differed markedly in the median amount of therapy received during similar lengths of stay (eg, a total of 21.5 hours of physiotherapy in the stroke unit versus only 7.3 hours at home). Perhaps it is the amount of therapy that makes the difference, not where it is delivered?

Attempts to compare community-based (non-inpatient) programs with inpatient programs have been beset by wide variation in program definition, and the poor performance of standard outcome measures in this context.[16] Any rehabilitation professional knows from experience that many carefully selected patients do well as outpatients.

Cooperation of multidisciplinary team, patient and carers

Many issues need to be addressed in rehabilitation programs, whatever the environment. Rehabilitation will only be successful if the team, patient and carers cooperate to set interdisciplinary goals. Regular team and family meetings are thus mandatory. Cohesion is often aided by the appointment of a "key person", one member of the team who liaises with the family; this is also often less intimidating to family members.

Individual team members then bring their specific expertise to the rehabilitation goals.

■ ***Physiotherapists*** may focus on limb weakness, abnormal tone (flaccid or spastic) and balance, to meet the agreed aim of independent mobility, but need to work closely with occupational therapists to achieve this.

■ ***Occupational therapists*** may take the lead in teaching independence in activities of daily living, guiding the patient (if improvement allows) through personal hygiene to domestic and community activities, but success in these domains will demand input from physiotherapists as well.

■ ***Speech therapists*** deal with communication and motor production of speech, as well as chewing and swallowing.

■ ***Nurses*** have specific expertise in bladder and bowel function, and have a critical role in consolidating rehabilitation gains. They spend many more hours with the patients and family than any other team members.

■ ***A neuropsychologist*** is an important member of a specialised stroke rehabilitation team, as cognitive deficits are common. These often include impaired memory and concentration, as well as difficulties in planning and problem solving. Personality changes are frequent. Damage to specific areas of the brain can lead to distinctive clinical syndromes, and their accurate definition is helpful to the team (eg, a frontal haemorrhage will often affect learned social inhibitions, emotional responses and control, while lesions of the parietal lobe, particularly in the non-dominant hemisphere, tend to impair perception and planning). A particularly formidable task, often delegated to neuropsychologists, is assessment of a patient's capacity to make a will, and there are few guidelines on which to base this difficult decision.

■ ***All team members*** work together to deal with other important sequelae of stroke, often ignored by those without rehabilitation expertise. These include perceptual impairment, reduced attention and awareness of body parts or the environment, and visual field loss.

■ ***Social workers*** play an important role in evaluating a patient's premorbid state within his or her social network and society as a whole, and in determining what aspects

were previously determinants of the patient's quality of life. Social workers often take on a critically important counselling role with the patient and next-of-kin, and link professionals in arranging and coordinating community resources before and after discharge. This task can be a complex nightmare for uninitiated family members.

■ ***A rehabilitation physician*** usually leads the team and works closely with the nurses to deal with comorbidities, such as hypertension and diabetes, and to treat or prevent secondary complications, such as pressure areas and seizures (about 5% of patients will have a seizure in the first year after stroke). A further important complication is post-stroke depression, with a high incidence of more than 60% noted by Robinson et al[17] nearly two decades ago. More recently, depression has been shown to affect the functional outcome of a stroke, perhaps providing a reason for more aggressive treatment of depression after a stroke.[18] Anxiety may be even more common, but prescribing anxiolytics and hypnotics is rarely of benefit to these patients, even if they have a poor sleep pattern. The rehabilitation specialist also has an important role in the pharmacological treatment of spasticity, using drugs such as baclofen or dantrolene, or through nerve blocks, motor point injections or botulinum toxin injections. Various pain syndromes (which may include musculoskeletal trauma or complex regional pain syndrome) are common after stroke and require careful medical assessment and medical assessment and management.

Most of the evidence in favour of rehabilitation in the post-acute phase is based, as in the acute phase, on evaluation of a multidisciplinary program as a whole, or a particular discipline (eg, speech or occupational therapy) as an entity, rather than on the individual components or the philosophy of rehabilitation. For example, the Cochrane Collaboration[19] is currently reviewing the large body of research comparing specific physiotherapy techniques (eg, the neurophysiological paradigms of Bobath and Brunnstrom and the "motor relearning" approach). Preliminary reports suggest that none is clearly superior for lower-limb function, but in many instances high-quality research is just not available. Lack of an evidence base should not stop us persevering with a technique that apparently helps while we await conclusive evidence.

Improvements in function after stroke are the result of a number of processes, including recovery of parts of the ischaemic penumbra (the potentially viable zone surrounding areas of cerebral infarction), resolution of cerebral oedema, neuroplasticity (parts of the brain on the same or opposite side may take on the functions of the damaged area), and the patient learning to compensate by using the unaffected parts of the body. Recovery is affected by the size of the stroke, and by any pre-existing comorbidities or dementia, and is likely to be maximal within the first three months. Determining the prognosis is always difficult, but is usually possible by six months after the stroke, and often much earlier. The Oxfordshire Classification of Stroke is a clinically based classification which can assist in prognostication for survival and dependence, but it is important not to provide a too-confident prediction.[20]

Key issues in the specialised rehabilitation phase

- Rehabilitation is a limited resource and needs to be offered to selected patients
- Comorbidities such as depression and obstructive sleep apnoea may affect the outcome
- A spectrum of inpatient, home-based and non-inpatient resources should be available

Discharge from rehabilitation into the community and the role of the general practitioner

Clinical scenario 3

After 4 weeks of rehabilitation, Mr X has improved substantially. He is now eating a normal diet and can walk safely with help from one person. He also needs some assistance with personal activities of daily living. He appears able to understand most simple instructions, and can construct three-word sentences. He is being treated with aspirin, antihypertensive medications, and a lipid-lowering drug. He has had an episode of severe depression and is taking an antidepressant agent. Several meetings have been held with his wife and children. His wife does not work and is very keen for him to be discharged to his home as soon as possible.

The end of the formal rehabilitation program is usually signalled by a functional plateau after which little or no recovery occurs. This may be hard to pinpoint, but if no improvement occurs over a period of more than 3 weeks then further significant improvement of brain function is unlikely, although patients may still learn further compensatory techniques. However (as mentioned above), some patients show "late" functional improvement, even two years after the initial stroke.

In recent years, clinicians have been pressured (militated by a combination of political, financial and clinical determinants) towards discharging stroke patients from the hospital environment as early as possible. However, this is only possible, or safe, when community resources and infrastructure are adequate, and the timing depends as much on such resources as the patient's degree of functional recovery. Successful discharge depends on accurate assessment of the domestic environment, and the establishment of networks to meet critical needs (eg, personal care, domestic help, home modifications and carer respite).

General practitioner's role

The GP is always a critical member of the team, and in rural hospitals may be the treating doctor during the inpatient stay. The GP's role becomes paramount as discharge approaches. Many discharged patients face reduced mobility and loss of independence, which may lead to anger, frustration, changes in body image and feelings of reduced self-worth. Immobility may lead to constipation, incontinence and weight gain, which may have significant adverse effects on comorbidities such as diabetes and osteoporosis. The GP must deal with all of these, as well as reinforcing and monitoring secondary prevention, including promoting healthy lifestyle changes, and answering the perennial question "Will it happen again?".

Evidence-based recommendations

Acute care – Rehabilitation priorities and principles should be integrated into the acute care of patients (E1).[1]

Home v hospital – There is no evidence that rehabilitation at home leads to better patient or carer outcomes than hospital-based stroke rehabilitation, or consumes fewer resources (E1).[9]

Assessment – It is strongly recommended that a rehabilitation assessment is undertaken within 24–48 hours of admission to hospital (E1).[4]

Reassessment – There is evidence that rehabilitation may still be beneficial several years after a stroke; therefore, regular reassessment, even of patients in nursing homes with stroke, is often appropriate (E4).[8]

The GP is also the trusted person, called on to counsel patients and partners about private issues, such as interpersonal and sexual relationships. Advice will also be sought about vocational and recreational activities, shopping and social outings, and driving is often a source of contention. Australian guidelines suggest that, unless a patient's condition is complicated by epilepsy, driving can be permitted after 3 months, but the attending doctor must be convinced that this is safe for both the patient and the public, and, if there is any doubt, should have recourse to an assessment of driving ability by a trained occupational therapist. Thus, the GP holds the key to patients achieving a good quality of life — the ultimate goal of any rehabilitation program.

Carers

Specific mention must also be made of carers, who often bear more of the burden than the patient. This is particularly true when there are cognitive and behavioural problems, or dementia is unmasked, and the quality of life of the patient may only improve at the cost of the carer's own. This may be offset during rehabilitation by involvement of the carer in goal setting, and educational programs and counselling. However, pride may prevent carers calling for help, as many fear that this will result in the patient's placement (even if appropriate) in residential care. This has been aggravated by the wide press coverage given to poor-quality nursing homes in the last few years, with little attention being given to the many excellent facilities. Again, it is the GP who is in the best position to monitor the situation, and to advise the family when such difficult decisions have to be made.

Future developments

The challenge for the future is to develop new approaches that will enhance stroke outcome. Management of comorbidities may be an important aspect of this. Depression has been discussed above, but another topical condition is sleep apnoea, which affects more than 60% of stroke survivors,[21] and is associated with increased mortality[22] and worse functional outcome at 3 and 12 months.[23]

Specific rehabilitation approaches are increasingly being subjected to scientific scrutiny, and studies now attest to the value of biofeedback,[24] and newer techniques such as treadmill training with bodyweight support,[25] and the use of robotics.[26] One approach that has had extensive publicity is intensive therapy (six hours per day) on the paralysed arm, with splinting of the unaffected arm.[27] Time will show whether all or none of the above techniques are of practical and lasting importance.

More randomised controlled trials comparing rehabilitation approaches are thus urgently required. Only through high quality research can we hope to successfully apply rehabilitation principles to improve the outcome of patients affected by this common and severely disabling condition.

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