

Critical care illness and rehabilitation

Critical care illness is often followed by protracted, slow and incomplete recovery. Survivors given access to specialized rehabilitation achieve a higher level of recovery, with greater independence and less need for social or health-care support long term.

Surviving a critical care illness is the start of a prolonged period of ill health. Some will experience generalized weakness and fatigue, cured by old-fashioned nurturing and convalescence. The less fortunate may have severe neurological impairment, paralysis, myopathic weakness, unhealed wounds, pressure ulcers or contractures, which can prevent them returning to an independent and fulfilling lifestyle. Increasing rehabilitation resources are needed to address these problems as more people survive a critical illness. Prospective and innovative studies are looking at how this may be achieved.

Outcome

The morbidity and mortality of those surviving more than 14 days' ventilation was found by Combes et al (2003) to be poor with only 197 survivors out of 347 achieving discharge from hospital. Of these 99 long-term survivors had impaired quality of life compared with a matched general population. Van der Schaaf et al (2000) reviewed the literature on rehabilitation outcome for people with critical illness polyneuropathy and found scant attention was given to rehabilitation aspects and long-term functional outcome. In 2004 a small prospective study found that most survivors of critical illness neuropathy had restricted functional abilities, reduced quality of life, autonomy and participation. Prolonged rehabilitation was recommended to improve functional outcome, participation and social integration (Van der Schaaf et al, 2004).

Evidence of the benefits of a rehabilitation programme is sparse but there are many positive case reports. The most severely affected will not get back home without an

intensive inpatient programme in a specialist facility. Stringent efforts are now being made to collect data to confirm the benefit of a range of rehabilitation interventions. Jones et al (2003) reported the effectiveness of a 6-week self-help rehabilitation manual in a randomized controlled trial, and Elliott et al (2006) have set up a randomized trial of an 8-week individualized physical and psychological programme for survivors of critical illness.

Critical illness impairments

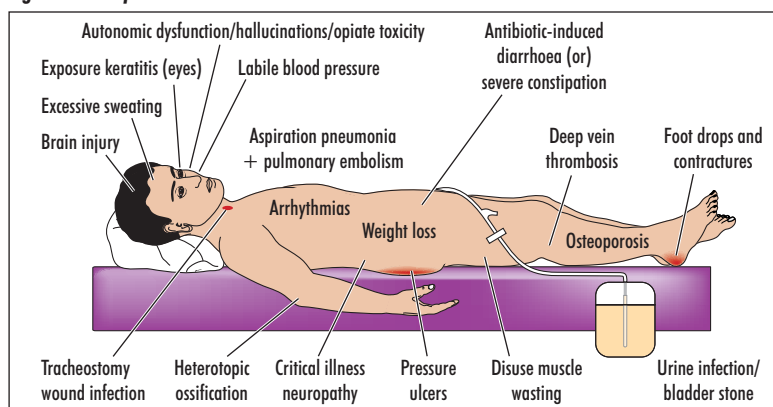
Critical illness impairments are multifactorial and include:

- Immobility – causing muscle and tendon structure changes within 7 days, producing soft tissue shortening and contractures; causing reduced bone density; which may compromise skin integrity and cause ulcer formation; and which predisposes the patient to further complications including deep vein thrombosis, pulmonary embolus, and respiratory infection
- Lung damage including pulmonary fibrosis caused by prolonged ventilation, adult respiratory distress syndrome, and pulmonary embolus
- Critical illness polyneuropathy and myopathy
- Hypoxic, ischaemic or embolic damage to the brain and spinal cord, causing the typical and easily recognized features of stroke, paraplegia or tetraplegia, and the less obvious cognitive, memory, and dysexecutive states, often a feature of watershed infarcts and severe hypotensive and hypoxic episodes. Vascular insults can also produce cauda equina syndrome, radiculopathies and peripheral nerve lesions
- Multiorgan failure
- Emotional and behavioural changes, sometimes linked to subtle cognitive changes, but can be part of a disabling post critical illness stress disorder.

Some patients are difficult to wean and this is an early indication of neurological impairment and neuromuscular breathing difficulties. Latronico et al (2005) found that critical illness polyneuropathy and myopathy delayed weaning by two to seven times and was associated with chronic long-term disability; 28% had severe disability with tetra- or paraplegia. Although 68% recovered functional independence, many had persisting mixed sensorimotor symptoms and signs, with foot-drop muscle atrophy, peripheral sensory loss and painful hyperaesthesiae.

Survivors of polytrauma often have a critical illness picture superimposed on their primary pathology that may include traumatic brain injury associated with chest and musculoskeletal injuries (Figure 1). Patients enduring complex surgery with bleeding complications requir-

Figure 1. Complications in critical care.



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ing large transfusions often experience a severe intensive care unit (ICU) illness, with typical and disabling critical illness sequelae, and their recovery may also be complicated by large wounds that fail to heal.

Other problems of the patient about to leave ICU that contribute to the overall picture of disability and dependence include tracheostomy which might preclude easy communication, damaged vocal chords which do the same, ongoing focal sepsis, a percutaneous endoscopically placed feeding tube might be in place, or worse there may still be a long-standing nasogastric tube causing discomfort. The bladder will have been catheterized, bowels may be incontinent, medications may require an intravenous catheter, and sleep pattern is likely to be severely disrupted.

The emotional consequences of a stay on ICU, which may include forms of sensory deprivation coupled with exposure to deeply traumatizing experiences, a 24-hour day and night experience of ceaseless acute illness-related activity, should not be underestimated. The patient and relatives have also usually become dependent on daily feedback and constant staff attention by the time of discharge from ICU to a general ward.

When should rehabilitation begin?

It is never too early to start rehabilitation and as well as the inevitable chest physiotherapy, every patient should begin a programme of daily stretches while on the ICU, in addition to using a positioning regimen to counteract the side effects of lying on a pressure-relieving mattress, which promotes abnormal posture. The body soon experiences problems if left lying supine on a yielding mattress for prolonged periods of time with loss of lumbar lordosis, and development of hip, shoulder and ankle contractures. Daily tilt would have significant resource implications but may shorten overall hospital stay. Use of ankle splints and early use of botulinum toxin to calf muscles reduces the development of ankle contractures.

Communication needs should be addressed as soon as the patient is conscious and aids provided early to facilitate asking questions, as well as providing answers. Evidence of significant impairment requires early referral to a specialist rehabilitation unit. Strahan and Brown (2005) draw attention to the early needs of patients transferred from ICU. It can be difficult to meet the needs of such patients on general medical wards where there may be little therapy and no equipment. Being discharged onto a general ward with a severe critical illness neuropathy, or a new paraplegia, can be distressing and depressing after the ICU experience. The patient is no longer the centre of attention, has to compete for staff time to receive basic care, feels abandoned (Strahan and Brown, 2005), may be highly dependent and frightened. Relatives are often similarly worried and initially often camp out on the ward with the patient to ensure their basic needs are met. Relatives are expected to transfer their trust without question to a new team, on a new ward, which may prove difficult. After the ICU experience patients often feel that staff on a general

ward have little time for them, because of the lower staff–patient ratios. The transition can be scary and is only eased as they see improvement taking place.

Moving into rehabilitation

Moving into rehabilitation should allow the patient to work on impairments, reduce disability and develop a discharge plan. It is a simple problem-solving process, depending on team work and clear thinking. Successful rehabilitation team members need good communication skills, expertise and flexibility. Each patient has a personalized rehabilitation plan ensuring that:

- Ongoing surgical and medical needs are assessed and met
 - Cognition, communication skills and emotional state are assessed and behaviour observed
 - Detailed assessment is made of physical impairments and functional deficits
 - There is appraisal of the social situation, home environment, and potential for later return to work.
- Knowledge of these permits development of a rehabilitation programme and discharge plan that should include:
- Expected outcome – this is the start of managing expectations
 - Identification of discharge destination
 - Expected date of discharge
 - Advice on work and driving
 - Referral on to community resources. This should be according to need but is often modified by availability.

Goal planning

This is the key to active, outcome-driven rehabilitation and can be used to bridge the gap between hospital and home, with the patient being an active driver of the process, and on discharge taking full responsibility to set goals to achieve continuing recovery after discharge. SMART (specific, measurable, appropriate, relevant, timely) goals are informed by experienced staff who have a reasonable knowledge of expected outcome, and by the patient and family, who understand the contextual factors, the influence of the patient's home and vocational environment, and the family situation. Either used as outcome measures with goal attainment scaling, or twinned with outcome measures, goal setting underpins the whole rehabilitation process, and is used to audit the effectiveness of the service, anticipate the discharge date, and predict care, rehabilitation and vocational needs after discharge.

Fatigue, pain and graded therapy

Initial attempts to work with the patient fresh out of ICU often stall; there may be problems with pain, low blood pressure, fatigue, balance disorders and a raft of emotional and behavioural problems, compounded by loss of diurnal sleep–wake pattern. There is a constant fine tuning initially as the therapist and patient work out a programme satisfactory to both. Equipment like graded power assisted pedals (e.g. MotoMed, Medimotion,

Carmarthenshire, Wales) (Figure 2) is invaluable in encouraging the patient to take some responsibility for independent exercise, although initially the pedals will do all the work and the patient's exposure to effort will be finely graded. Fatigue and pain remain the great limiters of recovery. They may prevent active rehabilitation, are associated with learned dependency, chronic fatigue states and secondary gain. It is, therefore, important to provide active rehabilitation soon after the illness to prevent negative behavioural traits becoming prevalent. The self-help programmes being developed for survivors of ICU illness should include a graded exercise regimen, compulsory rest periods, goal setting, and regular review. In the home the patient must select and prioritize the goals, tasks or activities they want to achieve. In the author's experience, being told that they will fluctuate and experience difficult days when they may not achieve targets appears to be helpful and keeps them engaged in their recovery.

Cognitive problems affecting outcome

Failure to motivate a self-directed recovery programme is usually the result of cognitive problems caused by hypoxic insult to the brain, embolic episodes or trauma, which can cause slowed information processing, short-term memory impairment, and reduced new learning and

executive skills. There may also be focal damage causing specific impairments. These cognitive problems can reduce insight, initiative, attention and concentration. Psychology input to the patient and the team can encourage the patient to follow new learning strategies and adapt rehabilitation to their needs and abilities.

The talking therapies

The well-known and often fashionable model treatments like cognitive behavioural treatment, person-centred therapy, solution-focussed brief therapy and rewind theory, all have their advocates. Their main disadvantage is the need for a specialist to give the treatment. Counselling treatments encourage adjustment using a range of methods that span reflective through to directive techniques. All these methods, apart from rewind therapy, appear to be based on frequent sessions, identifying negative patterns of behaviour and desired changes. Anxiety or depressive illness is a common complication of major illness and disability and may respond well to pharmacological therapy.

New ways to deliver home-based therapies

Traditional therapist-based services are likely to be supplemented by virtual environments, teletherapy, portable robotic devices using errorless learning systems and positive feedback. These methods are unlikely to be superior, but can enrich and vary the exercise environment and allow the patient greater control and application. Start-up costs are high and will delay their availability in the UK but in the long term they may be attractive because they could be cheaper than the traditional therapist.

Conclusions

Expert care in critical illness is producing more survivors. Investment in this care must be matched with investment in rehabilitation and vocational services to return people to optimal health and full participation in society. **BJHM**

Figure 2. Motomed – a wheelchair-accessible exercise bike.



KEY POINTS

- Timing and intensity of rehabilitation input is key to achieving best long-term outcome. Early input is essential to prevent avoidable complications. Later community-based services are required to maintain progress.
- Rehabilitation is underpinned by setting goals and monitoring outcomes.
- Physical recovery, independence, autonomy and quality of life are all improved by timely rehabilitation input.
- Home-based rehabilitation includes self-help regimens and therapy.
- Teletherapy, robotic devices and virtual reality systems will supplement home-based rehabilitation in the future.
- Access to vocational rehabilitation is vital but services are patchy.
- Epidemiological data and audit will demonstrate cost effectiveness and direct resource allocation.

Figure 1 is based on an illustration by Dr Peter Tun, Associate Specialist in Neurorehabilitation Medicine, Royal Berkshire Hospital, Reading. Figure 2 is reproduced by kind permission of Medimotion.

Conflict of interest: none.

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