

Interdisciplinary inpatient rehabilitation of acquired brain injury - Part-1: impairment based assessment and rehabilitation

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Abstract

The objective of this review is to describe the major impairments resulting from acquired brain injury (ABI) and their rehabilitation interventions resulting in better functional outcomes. Because of the nature of deficits and treatment cost, these patients may be lost to follow up. Comprehensive rehabilitation services integrated with neurosciences units are scarce in Pakistan. Keeping in view the diversity and chronicity of impairments, the follow up needs to be well planned in terms of duration and patient convenience. The rehabilitation needs of these patients go beyond physiotherapy alone, which is considered as the only form of rehabilitation in Pakistan. We focus only on the major impairments most seen after ABI. The rehabilitation team members providing their services and the possibilities are comprehensively explained in the review. These types of services need to be run by government and funded by government, with parallel efforts to make national guidelines and registry to keep a track of patients suffering from ABI. The proposed ABI rehabilitation pathway will not only improve the clinical care and continued support delivered by health services to adults with ABI but will also facilitate community reintegration and support their families and care givers.

Keywords: Brain injury, rehabilitation, clinical pathway, community reintegration.

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Introduction

Acquired brain injury (ABI) is an inclusive category that includes rapid-onset brain injury of any cause, including trauma, vascular accident, cerebral anoxia, toxic or metabolic insult, infection or inflammation. It is a global health issue and can lead to varying degrees of disability.¹ Because of the wide range of conditions that make up the ABI population, exact estimates of prevalence are difficult. Most of the ABI in the UK are due to stroke and traumatic brain injuries (TBI).¹ Due to the absence of central disease

registries in Pakistan, reliable data on ABI is not available. However, few studies have documented the prevalence of brain injuries and causes in some neurosurgical departments across the country.² ABI rehabilitation services in developed countries and lower middle-income countries (LMIC), like Pakistan differ in their scope, quality and availability of trained rehabilitation professionals. There is a growing awareness about comprehensive rehabilitation of a person with ABI including cognitive, neuro-behavioural and neuropsychological aspects. However, in majority of LMICs the focus is still on physical deficits and physiotherapy management alone instead of a comprehensive holistic rehabilitation involving a multidisciplinary team.

We will describe different impairments associated with ABI and a rehabilitation pathway relevant to the needs of the country.

Impairment based assessment and rehabilitation

The complexity of impairments varies depending upon the severity of ABI, which ultimately contributes to activity limitations and participation restrictions.³ We will discuss the most commonly encountered impairments in ABI and their rehabilitation management options.

1. Motor function and control

A variety of motor deficits may arise following ABI, including weakness of isolated muscle groups, a single limb, or combinations of limbs. In addition, critical illness polyneuropathy and myopathy may complicate the recovery process.⁴ A physiotherapist with expertise in recognizing and handling associated cognitive and behavioural deficits alongside the skills in the physical management of neurological deficits implements therapy to improve motor function through the facilitation of motor control and skills.⁵

In addition, balance and coordination disorders, tremors, and parkinsonism may be seen, which are difficult to treat. Some patients, despite good muscle strength, may be unable to ambulate or sit independently because of profound ataxia. The detailed function-based evaluation and treatment of movement disorders is performed by the rehabilitation medicine physician, physical therapist, and occupational therapist as a team.⁶

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Supportive seating and standing helps in postural re-training, which is an essential pre-requisite for gait training. Provision of appropriate orthoses, including ankle-foot orthoses Wrist-hand orthoses and wheelchair/seating systems and appropriate standing aid, should be provided to maintain normal posture and avoid any delays in functional independence.⁷

2. Spasticity and Contractures

Increased muscle tone, dystonia, posturing in response to head position and cutaneous stimulation, and extrapyramidal syndromes are also common after ABI. The management of spasticity is planned after detailed evaluation and interdisciplinary goal settings by the consultant-lead rehabilitation team.⁶ It follows a step ladder approach starting with positioning, regular stretching, use of anti-spasticity medications, splints, injections and surgery reserved for resistant cases only.

3. Sensory impairment

Disorders of somesthetic sensation can result from damage to a variety of brain structures (including thalamus) or deranged neurotransmission between the thalamus and cerebral cortex. It may distort touch, pain, temperature, and position sense. Other well documented sequelae of ABI include audio vestibular disorders (hearing loss, hyperacusis, and tinnitus), balance deficits and vertigo.⁸

Loss of hearing or vision should be assessed and treated by an interdisciplinary team with experience in managing these conditions. It may involve ophthalmologists, audiologists, and Otolaryngologist. Patients with visual neglect or field defects should be taught retraining strategies. Inability to identify these impairments earlier may exacerbate disorientation and confusional states and affect higher cognitive function. Neuropsychological assessment can help to differentiate among object-naming disorders, visual agnosia, scanning disorders, and disorders of complex visual perception.⁹ There is no uniform strategy to manage these complex issues; instead, interdisciplinary rehabilitation team members should be involved in the planning at all stages of recovery.

4. Pain Disorders

Pain is a complex phenomenon that can complicate the rehabilitation process regardless of injury severity. It can interfere with physical activity, cognitive performance, sleep, as well as contribute to behavioral disturbances. There are numerous etiologies for pain in this population, requiring careful evaluation and prompt treatment. In cases of polytrauma accompanying ABI, fractures, nerve injuries, and traumatic plexopathies must be considered and evaluated. Other causes of pain may include heterotopic

ossification, complex regional pain syndrome, spasticity and contractures. The management depends upon identifying the source of pain and treated by medications, exercises, physical modalities or various nerve blocks.⁶

5. Bowel and bladder dysfunction

Urinary and faecal incontinence are common following severe ABI. Frontal lobe lesions can impair inhibitory control over bowel and bladder evacuation, leading to urgency and incontinence. Detrusor hyperreflexia is the most common type of bladder dysfunction.¹⁰ Impaired mobility, inability to communicate toileting needs, impaired initiation, cognition or behavioural deficits also contribute indirectly to incontinence, making this issue a significant one in persons with brain injury.

Management and re-training of bladder and bowel continence are supervised by a professional trained in continence management. The bladder management includes regular monitoring with a 24-hour bladder diary, fluid intake output record, timed voiding, anticholinergic medicines, intermittent catheterization, or long-term catheters depending on the patient assessment and needs.

An active bowel management regimen should be instituted to establish the patient's regular pattern as soon as possible.¹¹ Patients should be supported to sit up for defecation on a toilet or commode at the earliest safe opportunity and at a regular interval each day. Daily rectal stimulation can be used when the rectum is full, without spontaneous evacuation. If the rectum is empty for three continuous days, despite adequate oral intake, the use of an osmotic laxative or a stimulant should be considered. It is crucial to ensure maximum privacy and comfort during all stages of bladder and bowel management.¹¹

6. Communication and language

The classic language disorders found in stroke (i.e., aphasia) are relatively uncommon because of the diffuse nature of ABI unless there is a focal dominant hemisphere lesion. In such cases, the apparent language and communication disorders may be related to varying cognitive impairments. Language and communication deficits after ABI are related to the everyday uses of language, like a conversation, narrative speech, and pragmatics. These impairments impact community participation and contribute to social isolation.⁶ Therefore, detailed evaluations by interdisciplinary rehabilitation team should be coordinated by neuropsychologist and speech and language pathologist.

7. Neurocognitive and Neurobehavioural Deficits

Deficits in arousal and attention are among the most widespread after ABI.⁶ Attention deficits can lead to

secondary decreases in language comprehension or visuospatial function because the patient's information processing is interrupted and disorganized. Arousal and attention are assessed best by combining formal neuropsychological tests and behavioural observation by all the disciplines.¹² Agitated, aggressive, and disinhibited Behavioral Problems are common in variable severity after ABI and may appear as patients emerge from coma and post traumatic amnesia. Rehabilitation of reduced initiation and awareness deficits is quite challenging for both the family and team members. If there is a persistent cognitive deficit, cognitive rehabilitation should be implemented, including management in a structured and distraction-free environment to improve attention and information processing skills.¹³

Memory impairment is the most common and disabling cognitive complaint after brain injury with relative sparing of implicit learning than explicit memory. In the clinical setting, evaluation of memory impairment should not rely solely on commercially available tests and test batteries. Instead, a functional assessment by the interdisciplinary team and careful interviewing of the family or caretakers are required to identify the frequency of the problem, environmental factors and the cues that facilitate memory performance. Compensatory techniques and the use of external memory aids enhances independence in the presence of memory deficits.

Anxiety, depression and other disturbances of affect are common after brain injury and are likely to increase over time if not identified and treated. Depression is often accompanied by other emotional disturbances, particularly anxiety, which coexists in over 73% of cases. It has a significant impact on functional and psychosocial outcome.¹⁴ The management of these disorders require detailed neuropsychological assessment using evidence-based methods and tools and usually require the application of more than one therapeutic modality. Comprehensive rehabilitation programmes, including medication, psychotherapy, and community reintegration programmes, may all be effective, especially in combination.¹⁵

8. Self-Care Skills

The aim of interventions undertaken by the interdisciplinary rehabilitation team is to minimise impairments and maximise performance in activities of daily living (ADLs). These tasks include basic self-care and more extended activities of daily living, work and leisure activities. To maximise new learning and relearning of old skills, activities should be practiced ideally in the patient's own home and local environment.¹⁶

ADL independence may be limited by a combination of physical and cognitive impairments. Hence the interdisciplinary physical and cognitive assessment helps to identify the deficit. In addition, the occupational therapist with expertise in brain injury helps assess these individuals for basic ADL skills such as dressing, bathing, and feeding and provides a treatment programme to improve these skills.⁶ As each patient with ABI is unique, an individually tailored interdisciplinary rehabilitation process is essential that considers the complex interactions of the physical, cognitive, and behavioral deficits.

Conclusion

ABI are a diverse range of disorders resulting in long term neuropsychological and physical impairments. There is a need for early and timely identification and documentation of these impairments. It will allow provision of a comprehensive multidisciplinary rehabilitation which will be addressed in detail in the next part of the review.

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