

# Multidisciplinary Approach in the Management of Neurotrauma and its Sequelae

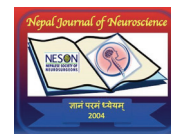
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Dear Editor,

Traumatic brain injury (TBI) is an event caused by an external force that results in altered brain function or evidence of brain pathology.<sup>1</sup> It is well known that traumatic brain injury (TBI) can have long-term consequences as a primary public health concern.<sup>2,3</sup> It can be said that a broad spectrum and distinct lesions resulting in variable clinical consequences make the process of post-TBI rehabilitation challenging. A patient who sustains TBI can have variable outcomes ranging from complete recovery to a persistent vegetative state. A spectrum of TBI-related sequelae consists of altered consciousness, post-traumatic agitation, post-traumatic paroxysmal sympathetic hyperactivity, post-traumatic hydrocephalus, and post-traumatic neuroendocrine dysfunctions requiring different rehabilitation programmes and approaches.<sup>4</sup> Another challenge in the post-TBI rehabilitation studies is grading the severity of TBI. Several criteria are used to classify the severity of TBI, the Glasgow coma scale (GCS) being the most commonly used. Other criteria used to classify severity are neuroimaging findings of structural damage and duration of loss of consciousness, altered consciousness, or post-traumatic amnesia.<sup>5</sup> The primary challenge with GCS as a tool to measure the severity of

TBI is that it does not reflect the severity in all scenarios and is challenging to obtain in specific situations like intubation or drug overdose. Another disadvantage is that GCS is measured serially during admission, and studies often do not mention which GCS was used to grade the severity.

To better understand, we can expand the concept of TBI related neurorehabilitation beyond the aetiology of brain injury (i.e., ischemia, haemorrhages, hypoxia or secondary to systematic insults). The acute phase of TBI ranges from a localized (parenchymal hematomata) to diffuse injuries like subarachnoid, subdural haemorrhages or diffuse axonal injuries.<sup>4</sup> Wide spectra of manifestations include:

1. Neurological impairment: motor, sensory and autonomic dysfunctions, sleep disturbance, spasticity, post-traumatic epilepsy, hydrocephalus, heterotopic ossification, sexual dysfunction
2. Cognitive impairments: memory impairment, impaired planning, language problems, i.e., dysphasia, impaired judgment and safety awareness, personality and behavioural changes
3. Lifestyle-related consequences (including unemployment, financial constraints, loss of pre-injury roles and loss of independence).<sup>3</sup>

As many as 40% of moderate and severe TBI survivors have long-term disabilities, including cognitive deficits, psychiatric morbidity, and social dysfunction.<sup>6</sup> The disability varies according to the injury type and severity of TBI. For example, penetrating brain injuries produce deficits depending on the location of injury and volume of brain tissue damaged, while closed head injury results in diffuse TBI and specific impairments unique to the individual. Patients who died five years after TBI had a rapid functional decline and had poor functional status at the time of discharge, suggesting that there may be opportunities that often go undetected in identifying patients at risk of poor outcomes and appropriate management.<sup>7</sup> In a TBIMS national database study of 8573 patients, researchers report that TBI patients were two times more likely to die than non-TBI patients, and had life expectancy shorter by seven years.<sup>7-9</sup> In a meta-analysis and other studies, researchers reported that TBI patients had two to four times increased risk of Alzheimer's

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disease in a dose-effect relationship with increased risk in individuals with more duration of loss of consciousness and amnesia.<sup>10</sup> The risk of post-traumatic epilepsy ranges from 1.5% to 27%, depending on the severity of the disease.<sup>10</sup> Anticonvulsants and post-TBI rehabilitation, including music therapy, have found a promising role in reducing the risk and burden of post-traumatic epilepsy.<sup>11-12</sup> These findings suggest that the acute phase of TBI is the starting point of a lifelong process that affects multiple organs systems and either cause or accelerate the disease process leading to functional impairments.<sup>13</sup> Post-TBI rehabilitation takes centre stage when these impairments are sustained.

Based on the literature, the rehabilitation team needs to involve the patient and patient's family, a rehabilitation medicine expert, a nurse trained for rehabilitation, a physiotherapist, occupational therapist, speech therapy specialist, medical social worker, orthotics, clinical psychologist, counsellors and a team of medical specialities (including a neurosurgeon, orthopaedic surgeon urologist and radiologist).<sup>3</sup> Four types of multidisciplinary rehabilitation programmes are described: neurobehavioral, residential community reintegration, comprehensive (holistic) day treatment, and outpatient community re-entry.<sup>14</sup> The outcome of the post-TBI rehabilitation program is judged by patient-centred outcomes, which reflect the participation domain of the International Classification of Functioning, Disability, and Health (ICF) framework.<sup>15</sup> Subjective well-being and quality of life are often ignored in TBI rehabilitation outcomes. Studies have suggested that even if the specific impairments are not eliminated, multidisciplinary rehabilitation programmes are meaningful in successfully reintegrating TBI patients into social participation and community integration.<sup>16</sup>

In summary, post-TBI sequels are a group of events and can be a life-long disorder with various needs that may change over time.<sup>17</sup> The practice of rehabilitation in TBI is new and complex; therefore, the evidence for decision making is lacking owing to fewer studies on the topic.<sup>18</sup> Experts suggest that comprehensive multidisciplinary post-acute TBI rehabilitation is the best approach to reduce long-term disabilities in moderate and severe TBI as per current evidence. There is a greater need for data collection, multi-speciality collaborative team effort and multicentre investigations to pool the relevant information to understand the spectrum of TBI related disabilities and rehabilitation needs.<sup>4,19</sup>

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