

Neuropsychology Rehabilitation: An Overview



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INTRODUCTION

Acquired Brain Injury (ABI) is currently recognized by the World Health Organization as being an issue of public health, usually resulting in disorders which impact the different areas of human functioning – biological, psychological and social. Developments in medicine and in acute and sub-acute healthcare now permit a good level of physical-functional recovery. It is the psychological effects however (cognitive, emotional and behavioral) – most persistent in the long term – which are the main cause of the difficulties that ABI patients have in reintegration into their various life contexts. For this reason, ABI has been referred to as a ‘silent epidemic’.

The critical relevance of neuropsychological rehabilitation in post ABI recovery has been widely recognized by the different professionals involved in continuous rehabilitation services (Cicerone et al., 2011). The holistic approach (Ben-Yishay et al., 1985) is one of several theoretical models currently available to guide neuropsychological rehabilitation. Programs inspired by this approach have been put forward as good practice for rehabilitation in the post-acute stage.

The rapid progress being made in the use of information and communication technologies (ICT) in clinical settings has led to the development of a variety of tools which can be used in rehabilitation, such as software for cognitive training in virtual reality environments and electronic reminders, amongst others. Traditional approaches in general and the holistic model in particular will surely benefit from merging clinical practice with new technologies.

The aim of this chapter is to explain the concepts and definitions that relate to the condition of ABI; to present the two main causes of ABI, its epidemiology and severity; to describe the various consequences for human functioning relative to participation in different spheres: personal, family and social; to address the recovery process, its mechanisms and different phases; to describe the historical development of neuropsychological rehabilitation in order to frame the holistic model as a consistent and current proposal for intervention; to advocate the use of new technologies as a complementary tool of intervention within the clinical setting of neurorehabilitation, and to present a proposal for the integration of these new approaches with the holistic model.

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BACKGROUND

Main Causes

Brain injury occurs when the brain loses some of its normal function due to cell death; it is followed by visible changes in brain morphology. The two most common causes - traumatic brain injury and stroke - will be addressed.

Traumatic Brain Injury (TBI) is defined as an assault to the brain caused by an external force capable of producing changes or decreasing the state of consciousness, resulting in deficits in cognitive ability or physical functioning (National Head Injury Foundation, 1989). Injuries resulting from an impact to the brain are referred to as closed when the skull remains intact and the brain is not exposed. Closed-head injuries are caused primarily by traffic accidents, falls, acts of violence and sports. This kind of injury usually has a pattern of diffuse neurological deficit and has complex cognitive, behavioral and emotional consequences. TBI may also result from penetration by a sharp object or projectile. In this case, lesions are called open and result in a focal neurological deficit. Road accidents, sports injuries, falls or assaults are the most frequent causes of TBI (Champion, 2006).

Lesions resulting from cerebro-vascular disorders are not typically considered closed-head injuries, as this last classification is usually applied to TBI. Disorders that lead to an interruption of sufficient blood flow to the brain are also however one of the main causes of brain injury. We are focusing here on the most common of these disorders, the cerebro-vascular accident (commonly called a stroke), which has a diverse set of underlying physical causes, including thrombosis, embolism, and hemorrhage (Lewandowski & Lovet, 2008). Stroke refers to focal neurological changes with sudden onset caused by a pathological mechanism at vascular level. Vascular supply to the brain depends on two major sources: carotid arteries, which are responsible for vascularization of the anterior regions of the brain, and vertebro-basilar arteries, which are responsible for the vascularization of the posterior regions of the brain. Brain damage results from ischemia or hemorrhage in a localized region related to the territory of a cerebral artery. Ischemia may be the result of local deposition of atheroma inside an artery (thrombosis) that interrupts blood circulation, or the result of embolic material (generally blood clots) coming from the heart or from extracerebral circulation (usually the carotid arteries in the neck). Hemorrhagic stroke is the rupture of a brain vessel in one specific region and can have several causes: rupture of a congenital malformation of brain vessels (arteriovenous malformation or aneurysm), or be associated to more systemic disorders such as diseases of blood coagulation, hypertension or diabetes.

The main difference between stroke and traumatic brain injury is that stroke tends to be more focal (in one arterial territory), as opposed to traumatic injury that tends to be multi-focal. Stroke also tends to involve both cortical and sub-cortical regions, against traumatic injury in which the cortical lesion is more important (Ropper, H., Samuels, M., & Klein, J., 2014).

Epidemiology and Severity

Several studies stress the high incidence of ABI in Europe and in the USA. A systematic review of the epidemiology of brain injury in Europe collected reports from 23 countries and estimated an average incidence of 235 new cases per 100,000 inhabitants/year (Tagliaferri, Compagnone, Korsic, Servadei, & Kraus, 2006). Another study by Bruns and Hauser (2003) estimates that 1.9 million people/year acquired a brain injury in the USA, of which about 90% (743/100000) require medical care and about 20% (150/100000) are annually admitted to hospital. The average incidence of TBI in developed countries has been reported as about 200 cases per 100,000 inhabitants/year.

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