

Interventions Strategies to Promote Adaptive Behaviors by Persons with Acquired Brain Injuries

Claudia De Pace

University of Bari, Italy

Fabrizio Stasolla

University of Bari, Italy

INTRODUCTION

Researchers and caregivers working with persons with acquired brain injuries, severe to profound multiple disabilities and extensive motor disabilities are required to tackle two main questions. The first one deals the issue of differential diagnosis between vegetative state and minimal conscious state (Lancioni et al., 2010; Schnakers et al., 2009; Tshibanda et al., 2010). Thus, an individual with an apparent lack of consciousness indicating a preliminary diagnosis of vegetative state could need different rearrangements based on the combination of treatments pointed out from behavioral scales (e.g. Coma Recovery Scale), events-related brain potentials (e.g. P300 and/or mismatch negativity), functional magnetic resonance imaging (fMRI) and learning principles (Bekinschtein et al., 2009; Lancioni et al., 2010; Monti, Coleman, & Owen, 2009; Sancisi et al., 2009). In fact, a body of empirical evidence-based exists for individual considered in a vegetative state, while an opportunity of enhancing adaptive behaviors (e.g. promoting attention to environmental stimuli, fostering request and choice behaviors, teaching basic form of communication) is feasible for patients diagnosed in a minimal conscious state (Bosco et al., 2009; Machado & Korein, 2009).

The second question that researchers and caregivers are requested to tackle concerns the aforementioned improvements of adaptive behaviors envisaged for persons living in a minimal conscious state. In other terms, professionals should decide the intervention strategy suitable in order to make the aforementioned opportunity real (Maas et al., 2010; Wales & Waite, 2005). For example, researchers may systematically

apply stimulation (i.e. music therapy) as a way to restore a connection between patients and relevant environmental stimuli (Magee, 2007). Otherwise, professionals could choose learning principles strategies and the use of assistive technology for increasing self-determination by persons with extensive motor disabilities and communication impairments (i.e. multiple or lateral sclerosis) (Lancioni, Sigafoos, O'Reilly, & Singh, 2012).

An exam of the intervention options available with their eventual applicability and outcomes may point out a general outline of the existing reality in this field and may encourage the reader to acquire awareness of the rehabilitative benefits and limitations of the different options. The goal of this article is to provide such outline. To fill with this aim, the article (a) offer a short overview of the empirical studies of this area carried out between 2000 and 2013, and (b) argues the reported results in line with the practical, clinical and psychological implications and suggests some critical perspective for the future research.

1. BACKGROUND

Post-coma persons may have different occupational, social and rehabilitation perspectives based on their general motor conditions and communication abilities. Those who have extensive motor impairment and lack conventional (verbal) communication skills (vegetative state) may remain confined within a restricted context with (a) large dependence on caregivers to access environmental events/stimuli and (b) scarce opportunities to progress to forms of relevant occupation

and interaction. Those who do not have significant/extensive motor impairment and possess adequate communication (i.e. people in a minimally conscious state or who are emerging/emerged from it) may progress to recover relevant occupational and social functions, with positive implications for their general rehabilitation process and their context. For this latter group, any real chance of gaining independent and constructive engagement and communication would be based on the use of assistive technology.

We present a short overview of different options aimed at improving adaptive behaviors by individuals with acquired brain injuries.

2. METHOD

The first step consisted of carry out literature studies in the field and was performed through a computerized searches (i.e. PsychInfo, PubMed, Eric, Scopus databases) which focused on journal articles published in the 2000-2013 period. The keywords employed for that search were included within a combination of post-coma, acquired brain injuries, vegetative state, minimal conscious state, multiple disabilities, extensive motor disabilities, cognitive-behavioral interventions, stimulation, music and rehabilitation. Manual search of the references of the studies identified through the computerized search was also added as supplement to the process. The including criteria were (a) the involvement of post-coma participants, and (b) the presentation of individual or some group evidence regarding the effects or results of the intervention. The excluding criteria concerned pharmacological and/or physiotherapeutic unique approach studies as their consideration would exceed the objective of this article. According to the aforementioned criteria, 36 studies were included in this overview. For practical reasons, the studies were divided into three main categories (i.e. electrical stimulation, environmental stimulation, and assistive technology), based on the type of intervention strategy applied.

3. ELECTRICAL STIMULATION

Electrical stimulation includes surface and/or transcranial magnetic stimulation (Pape et al., 2009), and

deep brain stimulation obtained through electrodes implanted into Central Nervous System (brain) structures (Yamamoto & Katayama, 2005) have captured a significant amount of interest in rehabilitation field such as Parkinson's disease and psychiatric problems (Dymian & Coehn, 2010; Glannon, 2008) and post-coma patients diagnosed in a vegetative state (Schiff, Giacino, & Fins, 2009). The attention to the deep stimulation was matched with a debate concerning the methodological issues arising from the questions of their real impact and from ethical considerations. In spite of the aforementioned important issues, only 5 studies have been selected for this section.

For example, Pape et al. (2009) used transcranial magnetic stimulation with a man of 26 years old who was in an apparent vegetative state at the beginning of the treatment. The participant was involved in a road accident 10 months before the beginning of the stimulation strategy. He was reported with a severe brain injury due to aforementioned accident. Thirty sessions, each including 300 paired-pulse trains, were implemented 5 days a week over a period of 6 weeks. The repetitive paired-pulse presentation was used because it induces excitation (high-frequency stimulation) while involving periods of cortical rest, which is necessary to increase safety. The participant evolved from the apparent vegetative state that he presented initially to a minimally conscious state midway through the stimulation period. He improved his interaction with the environment (e.g., turned his head to look and focus on objects and persons), demonstrating minimal but certain evidence of self and environment awareness. These benefits seemed to be largely unchanged at a 1-year follow-up interview carried out with the patient's mother who was also the primary caregiver.

4. ENVIRONMENTAL STIMULATION

The environmental stimulation, which includes multisensory events such as auditory, visual, and tactile stimuli (Bekinschtein et al., 2005) to music therapy (Magee, 2007), is frequently linked to post-coma and vegetative state conditions is provided with the intent of enhancing the participant's level of sensory input and arousal and can also be conceived as instrumental to promote the participant's engagement with the immediate environment and awareness. The background tenets for supporting stimulation initiatives include (a)

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