

The PEDS Model of Child Neuropsychological Rehabilitation

Jonathan Reed, Katie Byard and Howard Fine
Recolo UK Ltd

Introduction

When a child suffers a traumatic brain injury (TBI) or a brain injury as a result of medical negligence the consequences are serious and far reaching. Injury to the young brain will affect all subsequent development. The injury often limits educational progress, employment prospects and the chances of living a fully independent life. Up until recently there has been little research about how to intervene to help with these difficulties from a neuropsychological perspective. Despite established adult models of neuropsychological rehabilitation, child neuropsychological models are less well-developed. Recently evidence has been growing about the factors that are important in child neuropsychological rehabilitation. In this article we review this evidence and propose a new model of child neuropsychological rehabilitation. We feel it is important for case managers to be aware of this evidence and the possible ways of intervening in order to make informed choices about what service to recommend and commission.

What the literature says about child neuropsychological rehabilitation

Although historically, child neuropsychological rehabilitation borrowed extensively from adult models of brain function, recovery and rehabilitation, it is now acknowledged that these models lack the developmental and systems perspective (i.e. acknowledging and working with the different systems within which the child exists including their peer group, family, professionals/carers involved, and education system). The developmental and systems perspective is regarded as essential in producing change in childhood brain injury (Anderson & Catroppa 2006, Ylvisaker et al. 2005).

Developmental perspective: there is an interaction between development and brain injury such that the timing and nature of the injury, the stage of skills development and the social context of the child interact to determine the outcome for the child (Eslinger et al. 1999, Ylvisaker et al 2005). The interaction between brain injury and development is exemplified by the finding that the profile of behavioural and psychiatric and emotional disturbance (a common and persistent sequelae of child brain injury) may worsen over time (Schwartz et al. 2003, Ylvisaker et al. 2005). These difficulties are usually associated with damage to the frontal lobes, an area of the brain typically affected in closed head injury.

There is a growing emphasis on the interaction between childhood development and frontal lobe damage when designing and implementing behavioural intervention programmes for children with behavioural disturbance following a TBI. Traditional behavioural management methods require the capacity to learn efficiently from consequences. The ability to learn in this way is reduced significantly by frontal lobe injury (Rolls 2000, Schlund 2002). In recent years *positive behaviour supports* have been highlighted as more appropriate strategies for managing the behaviour of children with brain injury. They focus more on managing the environment (to

prevent triggers to behaviour), rather than trying to shape and change behaviour. There is mounting evidence of the efficacy of this type of behaviour management (Feeney & Ylvisaker 1995, Ylvisaker 2003) including in the school environment (Pressley, 1995, Sweet & Snow, 2002, Ylvisaker et al. 2001). In addition, it is recognised that children with damage to the frontal lobes as a result of a brain injury have particular difficulty in planning and organising. Positive behaviour supports can also be used by the young person to compensate for these difficulties, for example by encouraging the young person to use graphic organisers and telephones and other specific organisational strategies, and through the provision and implementation of predictable and paced daily routines. Again, there is evidence of the efficacy of these types of intervention (Feeney & Ylvisaker 1995, Feeney & Ylvisaker 2003).

Systems perspective: there is an increasing body of research stressing the importance of *context-sensitive* neuropsychological intervention (e.g. Ylvisaker 2003, Ylvisaker et al, 2005). This approach argues that the best form of rehabilitation is that which integrates therapy into the child's everyday activities of daily life (ADLs) and routines at home, school, work and community life. In addition, in this approach, the role of the therapist after the initial period, is to act as a support system and for day to day therapy to be maintained by familiar people in the life of the child such as parents and teachers (Feeney et al, 2001, Feeney & Ylvisaker 2003).

What the literature says about the importance of the family in child neuropsychological rehabilitation

Psychosocial context and family function play important roles for recovery in childhood brain injury and it is recognised that there is a reciprocal relationship between family functioning and the neuro-behavioural disturbance of the child with brain injury (Anderson et al. 2001, 2005, 2006). Previous anecdotal evidence of the role of family functioning on brain injury recovery is now established in the literature such that there are significant benefits in the scholastic, behavioural and emotional functioning of the child when the family is supported, for example, through cognitive and behavioural strategies to cope with and manage the child and their behaviour more effectively (Taylor et al. 2002, Wade et al. 2005, 2006 a, b, c).

Furthermore, the context-sensitive approach recognises the role of the family in the care and rehabilitation of the child with a brain injury (Feeney et al, 2001, Feeney & Ylvisaker 2003). It is acknowledged that because of these new responsibilities, the family must be assessed, prepared and empowered by the rehabilitation team to take its place as an integral part of the caring and rehabilitating process (Armstrong & Kerns, 2003, Anderson et al. 2006).

The PEDS Model of Child Neuropsychological Rehabilitation

In the context of recent literature and anecdotal evidence from our own clinical work, we believe that neuropsychological recovery / development takes place within specific contexts. We have developed the PEDS model which stands for **P**hysical brain, **E**xecutive functions, **D**evelopment and **S**ystems:

Physical Brain: The brain is a physical organ connected to the rest of the body. A healthy body results in a healthy brain. It is important to look at diet, exercise and rest in a holistic approach in order to promote development and recovery.

Executive Function: Brain injury nearly always results in executive system damage. This is because the executive system is associated with the front areas of the brain (dorsal lateral pre frontal cortex and ventral medial cortex). The front part of the brain is most vulnerable to injury due to the impact of the brain hitting the skull at speed. Executive systems include planning, organisation and self control of behaviour and these are often impaired as a result of brain injury. Expecting a child or young person to rely on these systems to produce change does not work. It is important to take the burden of change and control directly off the child/ young person. This can be done by managing the environment, ensuring that there is structured activity (often in form of a structured timetable) and preventing difficulties occurring wherever possible.

Development: Brain and neuropsychological development occurs within stages (see Reed & Warner Rogers, In Press). Children with brain injury often get stuck at a certain stage. There is a need to understand what stage the child is at and to provide strategies and teaching to facilitate development on to the next stage.

Systems: Children and young people exist within different systems. It is vital to take account of these systems in order to produce change. The systems around a child or young person include the family system, the education system, the child's peer group and his or her carers. Our experience is that there is the need to work directly with these systems in order to produce change. It is vital to work directly with the different systems as well as the individual to provide optimum recovery and development. This is less likely to happen within an institution removed from these systems.

The PEDS model requires a comprehensive assessment of the child, family, school and carers resulting in a range of relevant goal-directed intervention options.

In this article we have presented a new model for paediatric neuropsychological rehabilitation. The model is based on a review of recent research and on our clinical experience. We hope that this article will help inform case managers so that they can recommend and commission good quality services in order to help children with brain injury fulfil their potential.

Dr Reed, Dr Byard and Dr Fine are chartered clinical psychologists and neuropsychologists who have developed a new child neuropsychological rehabilitation service, *Recolo UK Ltd*, based on the PEDS model. Details at recolo.co.uk.

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