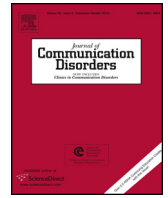


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Treating reading comprehension deficits in sub-acute brain injury rehabilitation: Identifying clinical practice and management



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ABSTRACT

There is limited evidence for cognitive-communication reading comprehension (CCRC) interventions for adults following acquired brain injury (ABI), particularly during sub-acute rehabilitation. The purpose of this study was to investigate the clinical practice of speech-language pathologists (SLPs) with CCRC deficits during sub-acute ABI rehabilitation and compare it to the best available evidence. An electronic survey was used to gather information from clinicians across Australia regarding clinical practice in the areas of assessment, intervention, treatment hierarchies and service delivery; survey questions were developed from an extensive review of the literature and expert clinician opinion. Survey findings were then compared with the literature in the form of a systematic review. Surveyed clinicians provided multiple interventions for CCRC rehabilitation, including impairment based (94.7%), activity based (94.7%) and reading strategy interventions (100.0%). Five strategies were used by >94% of SLPs (highlighting, identifying main points/wh- questioning, re-reading, summarising, reducing visual load). When compared with the literature, strong similarities were found for strategy-based interventions and individual service delivery, with broad similarities for functional and impairment-based interventions, and impairment based treatment hierarchies. Strong differences in assessment were identified. Strategy use reported in clinical practice (100.0% SLPs) was higher than in the literature. Further investigation into the effectiveness of specific reading strategies for people with ABI is warranted.

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1. Introduction

Adults with literacy difficulties face a range of challenges that can impact their education, future employment, self-image (Roman, 2004) and their ability to access the health system (Baker et al., 1996). Consequently, these adults often develop a range of strategies and social support networks to help with reading based tasks (Baker et al., 1996; Kahn & Kelly, 1991). For

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adults who experience changes to their reading skills suddenly, for example, following an acquired brain injury (ABI) or traumatic brain injury (TBI), a range of similar challenges may arise and rehabilitation may be required. Due to the sudden nature of their injury, these adults may not have immediate access to support networks or be able to develop compensatory strategies in early recovery to assist with complex reading. Therefore, remediation of reading comprehension may be required, to support and equip people with ABI (pwABI) with strategies to increase their independence with reading for both rehabilitation and discharge home. As the median age of adults experiencing TBI is increasing (Roozenbeek, Maas, & Menon, 2013), reading deficits may impact not only younger adults attempting to resume study or work, but also older adults attempting to return to work.

Reading comprehension is the act of interpreting written information from a text; this involves using prior knowledge to interpret information, making a representation in the mind about the text and its content, and then applying this information to new situations (Kendeou, van den Broek, White, & Lynch, 2007). For adults with intact reading comprehension skills, the process of reading and understanding is often quick and simple. However, reading is a complex process which uses a wide range of physical, cognitive and linguistic skills and systems. Perceptual and visual skills (e.g., vision, visual processing, saccadic eye movements, scanning) (Ciuffreda, Han, Kapoor, & Ficarra, 2006; Kapoor, Ciuffreda, & Han, 2004; Pollock et al., 2011), cognitive skills (e.g., memory, attention, executive functioning) (Ferstl, Guthke, & von Cramon, 2002; Holliday, Hamilton, Luthra, Oddy, & Weekes, 2005; Sohlberg, McLaughlin, Pavese, Heidrich, & Posner, 2000) and linguistic skills (e.g., decoding, word comprehension, sentence processing, comprehending syntax and grammar) (Graesser, 2007; Kiran & Sandberg, 2012) are needed to enable discourse level reading comprehension. Following ABI, difficulties in reading can arise following changes to any of these skills. Difficulties arising from changes to cognitive or cognitive-linguistic skills result in cognitive-communication reading comprehension (CCRC) deficits.

Typically, pwABI experience discourse or text level reading comprehension deficits (i.e., occurring at a paragraph level or above) in the context of a cognitive-communication disorder (CCD) (MacDonald & Wiseman-Hakes, 2010; Togher et al., 2014), however these deficits may also occur following aphasia (Meteyard, Bruce, Edmundson, & Oakhill, 2015). A recent systematic review investigated discourse level reading comprehension difficulties following ABI (Watter, Copley, & Finch, 2016). It identified these deficits arose following TBI, stroke, and other ABI (including inflammatory and infectious processes, post-aneurysm clipping, sub-arachnoid haemorrhage, post-tumour removal) (Watter et al., 2016).

While the incidence of CCRC deficits in pwABI is unknown, the features of these reading changes have been documented across the rehabilitation continuum. Early in recovery, people with traumatic brain injury (pwTBI) have demonstrated deficits in reading vocabulary, literal and inferential reading comprehension (Kaplan, 1990), and short discourse reading of up to four paragraphs (Hinchliffe, Murdoch, & Chenery, 1998). Chronic, longer term reading changes for pwABI include deficits in text level reading comprehension (Ferstl et al., 2002; Schmitter-Edgecombe & Bales, 2005), comprehension of text coherence (Ferstl et al., 2002) and inferential reading comprehension (Holliday et al., 2005).

Reading comprehension deficits can impact the activity, participation and independence of pwABI across many settings, including during rehabilitation (Malec, Smigielski, DePompolo, & Thompson, 1993), returning home, and in attempting to engage in future work or study (Laatsch & Guay, 2005). People living in the community with severe TBI reported reduced independence in daily functional reading tasks, including reading newspapers (51.8% independent), magazines (50.4% independent) and books (45.4% independent) (Jacobs, 1988). They often relied upon family to assist them to perform reading tasks.

1.1. The importance of reading in brain injury rehabilitation

While reading comprehension deficits occur as part of a broader CCD following ABI, their importance and impact on rehabilitation and recovery for pwABI may be under-recognized. The recovery of reading skills has been linked with cognitive recovery following ABI (Kaplan, 1990; Malec et al., 1993), and reading ability may reflect the level of academic ability for pwABI (Malec et al., 1993). In a small study of pwTBI ($n = 10$), the recovery of reading skills was reported as similar to the recovery of intelligence scores on cognitive assessment during the first six months of rehabilitation (Kaplan, 1990).

Reading was identified as one of three predictors of patient outcome for pwABI in outpatient rehabilitation, alongside time post onset and level of severity (Malec et al., 1993). Reading comprehension was also a predictor of positive outcomes in vocational ABI rehabilitation, and the highest predictor from a range of neuro-psychological assessments of whether participants received a vocational evaluation (Ryan, Sautter, Capps, Meneese, & Barth, 1992). As reading comprehension may predict success in ABI rehabilitation (Malec et al., 1993; Ryan et al., 1992), rehabilitation programs that use literacy-based interventions may impact the participation of pwABI with reading deficits (Malec et al., 1993) and possibly influence their rehabilitation outcomes.

1.2. Rehabilitation of ABI reading deficits and best practice

Speech-Language Pathologists (SLPs) typically provide rehabilitation for CCRC deficits following ABI as part of clinical practice (Blake, Frymark, & Venedictov, 2013; Coelho, DeRuyter, & Stein, 1996; Leon-Carrion, Dominguez-Morales, Barroso y Martin, & Leon-Dominguez, 2012; Shiel et al., 2001; Watter et al., 2016). Outcome measures have been used by SLPs to demonstrate improvements in CCRC following right hemisphere brain damage (Blake et al., 2013) and TBI (Coelho et al., 1996), yet types of interventions have not been reported. While current clinical and professional guidelines do not provide

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