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Title: A qualitative exploration of the lived experience of, and quality of professional support for, number processing deficits after brain injury or stroke.

Introduction: Acalculia is an acquired disability following brain-injury (hence forth, including stroke) (Ardila & Rosselli, 2002), which involves difficulty processing numerical information (e.g. 'phone numbers) or problems with calculations and understanding quantities (money, time). While difficulties may result from damage to quantity-processing units in the parietal region, or executive frontal regions, common difficulties are closely related to aphasic symptoms - for example, difficulties articulating numbers, understanding spoken number words, or reading digits or number words. Acalculia is not routinely screened for as part of standard brain-injury assessment, but studies suggest a prevalence of between 35%-60%.

Aims: To understand the impact of acalculia on adults with acquired brain-injury, and to explore professional support available for patients with acalculia.

Methods: We explored the impact of acalculia on the lives of 16 brain-injury survivors (7 males) with acalculia and 7 carers (4 males), using semi-structured online interviews (mean length of interview = 56min). Interviews investigated participants' experiences of living with acalculia and the type and quality of professional support they received post brain-injury. Fifteen participants with acalculia also reported aphasic symptoms. Participants ranged in age (mean = 58 years, $SD=12.95$), time post onset (mean =7.39 years; $SD=6.52$), lesion localisation, country of residence, severity of aphasic symptoms, and numeracy level prior to brain injury. Data were analysed using thematic analysis.

Results: Three main themes were identified: Awareness and Diagnosis, Emotional and Physical Impact, and Coping Strategies and Independence. Participants emphasised that concerns about language and mobility took precedence in the period immediately post brain-injury, and they only became aware of their specific difficulties with numbers later in their recovery. Both participants and carers repeatedly referred to the lack of awareness of, and treatment for, acalculia by all

professionals they came across. This contrasted markedly to identification and support given for equally prevalent conditions such as aphasia. Many mentioned the devastating impact acalculia has had on their lives and independence. Practical impacts included managing money or medication, making appointments, using timetables, organising social activities and employment.

Conclusions: Our results highlight the urgent need to increase awareness of acalculia amongst patients and professionals involved in post brain-injury care. There is a substantial and presently unmet clinical need to support professionals and patients by developing suitable assessments and interventions for acalculia.

Contribution to new knowledge: While a lot is known about numerical cognition, this study highlights the gap between advances in theory and the lack of translational research that positively impact patient care.

Implications for practice and/or policy service-user engagement and/or involvement in the study: This study was initiated by stroke survivors with a strong interest in acalculia and its rehabilitation, and the findings are testimony to the contribution of PCPI-led research. Going forward, findings will be used to identify and develop screening tests and interventions, and to increase awareness of acalculia among brain-injury survivors, their carers and professionals.

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