Title Revisiting the core principles of physical rehabilitation after stroke: recapping the guidelines and underlining the importance of assessment

Keywords:

Humans; Stroke; Stroke Rehabilitation; Patient Care; Upper Extremity

Background

Both the UK National Clinical Guideline for Stroke and the NICE Guideline for Stroke Rehabilitation in Adults were published in 2023 and provide an important resource for healthcare professionals working in the field of stroke rehabilitation (Intercollegiate Stroke Working Party, 2023; National Institute for Health and Care Excellence, 2023). These guidelines are based upon a substantial body of current evidence, reviewed and interpreted by groups of experts, and distilled into concise recommendations. Guidelines aim to improve patient care by summarising the evidence-base to empower healthcare professional and patient decisions about appropriate healthcare interventions but are not designed to provide rigid rules that dictate practice (Brouwers et al., 2010; Intercollegiate Stroke Working Party, 2023; Rethnam et al., 2021). Exact protocols to deliver the recommended interventions are not described in either NICE or UK National Clinical guidelines, however the guidelines do reference professional consensus documents and protocols to inform clinical implementation.

This is the first of two linked editorials (second in draft and subject to review and acceptance) in which we seek to complement the guidelines by focussing on the core principles that underpin several of the key interventions they recommend, to support their optimal delivery. In this first editorial, we will precis the guidelines' recommendations for motor interventions after stroke, using upper limb rehabilitation as a critical example. We will then summarise some of the key elements of assessment, which forms the bedrock for goal setting and treatment selection. The second editorial will build on these discussions by drawing upon theories of motor learning and research from

preclinical and clinical studies that inform how selected physical rehabilitation interventions for the upper limb after stroke can be delivered to provide maximal benefit.

Despite a clear focus on *how*, it is beyond the scope of these editorials to provide a step-by-step guide for specific interventions for clinicians. Nonetheless, we hope they will provide occupational and physiotherapists with a useful clinically relevant summary of the core principles that support the optimal delivery of recommended physical rehabilitative interventions for people after stroke.

What do the guidelines tell us?

Where robust research evidence of effectiveness is available, guidelines articulate the main elements of treatment (what), subtypes of presentation (who), location of therapy (where), the timeframe in which interventions are likely to be effective (when) and how much therapy (dose) may be beneficial. In addition to the much-discussed increase in the daily dose of therapy articulated in both guidelines, the 2023 National Clinical Guideline for Stroke has a large section dedicated to motor recovery, with a focus on exercise, motor retraining and repetitive task practice as the primary approach of targeted therapy. The guidelines recommend that rehabilitation services are needs-led, removing the time constraint to community stroke services, and reflect the significant time course of recovery. Methods to support personalised care and practice are particularly prominent in the UK National Clinical Guideline, including a focus on patient education, self-directed and semi-supervised practice where possible, as well as group work and telerehabilitation when appropriate. The recommendations acknowledge fatigue, patient activation and preference are crucial elements to be considered in designing treatment plans.

There are nine recommendations for the upper-limb based upon the current evidence base in the 2023 UK National Clinical Guideline (Intercollegiate Stroke Working Party, 2023). These include recommendations for use of repetitive task training, self-directed training, consideration of Constraint Induced Movement Therapy (CIMT), electrical stimulation, mental practice, mirror box for appropriate patients, and for the first time, a recommendation to consider transcutaneous vagal

nerve stimulation for those with mild or moderate upper limb weakness. Recommendations pertaining to sensation, shoulder pain and spasticity, which are all important features of upper limb rehabilitation are also covered and remain largely unchanged from previous editions.

The importance of assessment

It is recognised that accurate assessment of impairment and function forms the bedrock of treatment planning. Skilled clinicians frequently begin by analysing movement, to identify impairments including musculoskeletal, neurological and non-motor limitations to function. Observation and physical assessment are used to guide reasoning of the cause of limits to range of movement, assess weakness and movement accuracy, smoothness, speed and pattern which will, in turn, direct treatment priorities. As we do not yet have readily available kinematic tools that can reliably assess motor control in clinical settings (Kwakkel et al., 2017), skilled therapists rely on skilled observation and physical assessment to guide detailed movement analysis. Particularly during the assessment, the clinicians use of their hands can provide valuable information about muscle activation (Bolognini et al., 2016). It may also give useful somatosensory input to the person with stroke, with afferent sensory information thought to enhance the person's ability to activate muscles, although this has yet to be established empirically (Bolognini et al., 2016). The skilled analysis of movement enables prioritisation of the key components of movement to target to improve performance. In concert with individual's goals, these data are vital to guide treatment selection, starting points and titrate the level of challenge.

We hope that this first editorial has provided a useful summary of some of the recommendations for motor recovery in the latest UK guidelines for stroke and highlighted the importance of several features of assessment that are vital to guide treatment. In the next editorial we will consider the theories that underpin some of the recommended interventions from the guidelines and provide a summary of the core principles of motor rehabilitation which inform their optimal delivery.

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