acpin
Connecting knowledge and practice

AUTUMN 2024

Synapse

OFFICIAL JOURNAL OF THE **ASSOCIATION OF CHARTERED PHYSIOTHERAPISTS IN NEUROLOGY**

INSIDE

Welcome

Dear members,

Welcome to the autumn 2024 edition of *Synapse*.

Special features of this edition include:

- Abstracts from the ACPIN International Conference held in May 2024 in London
- Editorial from Simone Dorsch, Associate Professor in Physiotherapy, co-ordinator of the School of Allied Health honours programme at the Australian Catholic University
- A summary of the ACPIN online seminar held on November 23rd 2023

The aim of *Synapse* – the official journal of ACPIN – is to provide its readership (nationally and internationally), including wider multidisciplinary teams, an international, peer-reviewed platform for the publication, dissemination, knowledge exchange and discussion of recent developments and current research in the field of neurological rehabilitation.

The journal accepts original, quantitative and qualitative research reports, theoretical papers, systematic literature reviews, scoping reviews, service evaluations, quality improvement programmes, clinical case reports and technical clinical notes.

If you are interested in submitting your work for publication in *Synapse*, please follow the guidelines for manuscript preparation presented on page 43 and send your work for inclusion in the peer-review process. I look forward to receiving high-quality work for publication.

Praveen Kumar

Dr Praveen Kumar
PhD, MSc PhD, MSc, PG Cert (HE), MCSP, MACPIN, MIAP, MSPA
EDITOR

X @KumarDrP

Synapse
AUTUMN 2024

Contents

Implementing effective task-specific practice in stroke rehabilitation

Simone Dorsch Associate Professor in Physiotherapy, Co-ordinator of School of Allied Health Honours programme, Australian Catholic University

The Cochrane review of repetitive task-specific training[1] defines it as "an active motor sequence performed repetitively and aimed towards a clear functional goal". It can include pre-task movements that are complex and multi-joint. To ensure that task-specific training is effective it needs to be:

- **tailored to address the biomechanical requirements of the task**
- **adapted to the impairments of the stroke survivor**
- **intensive**

The implications of these features for physiotherapists will be discussed.

Figure 1

Effective task-specific training needs to be tailored to address the biomechanical requirements of the task

Therapists need to apply a clinical reasoning process to ensure that task-specific training addresses the biomechanical requirements of the task being practised. Therapists need a detailed knowledge of the essential components of tasks and an understanding of the contributions of impairments to activity limitations after stroke. A detailed understanding of the biomechanics of tasks includes the critical muscle groups, joint angles, movement speeds and the types of muscle contractions required for any of the components of the task being trained[2].

The steps of this clinical reasoning process are outlined and applied to the example of stroke survivor, Michael's walking.

- Observe the stroke survivor perform the task to identify the kinematic deviations
  - Michael has reduced hip flexion and reduced ankle dorsiflexion in swing phase. See *Figure 1*.
- Hypothesise the impairments that could be causing these kinematic deviations. In this example, the most likely contributing impairments are listed.
  - Michael's reduced hip flexion in swing could be caused by decreased hip flexor strength and/or decreased hip flexion co-ordination.
  - Michael's reduced ankle dorsiflexion in swing could be caused by decreased ankle dorsiflexor, strength, decreased ankle dorsiflexion co-ordination (eg unable to sustain ankle dorsiflexion as the knee extends), decreased passive ROM ankle dorsiflexion.
- Test to determine the contribution of these likely impairments:
  - Test hip flexor strength by MMT.
  - Test the speed of hip flexion.
  - Test hip flexion co-ordination by reproducing the demands of hip flexion in swing, ie in standing, test Michael's ability to flex his right hip from approximately 10° extension to 25° flexion rapidly (compare to left side).
  - Test passive ankle dorsiflexion ROM with knee flexed and knee extended (compare to left side).
  - Test ankle dorsiflexion strength by MMT with knee flexed and knee extended.
  - Test ankle dorsiflexion co-ordination by reproducing the demands of ankle dorsiflexion in swing, ie in standing: test Micheal's ability to dorsiflex his right ankle from approximately 20° plantarflexion to 5° dorsiflexion rapidly (compare to left side) and test ability to maintain dorsiflexion as knee moves from flexion to extension.
- Prescribe training exercises that address the main impairments:
  - Michael has adequate strength in hip flexion (Grade 4+) but is unable to achieve rapid hip flexion in standing (Time taken for 10 repetitions, Left leg = 9 seconds, Right leg = 12 seconds). Training needs to be task-specific part practice of rapid hip flexion as per testing procedure. See *Figures 2A and 2B*.
  - Michael has insufficient strength in ankle dorsiflexion (Grade 2) and is unable to achieve rapid dorsiflexion in sitting or standing (Repetitions in 10 seconds, Left leg = 32, Right leg = 12). Training needs to focus on strengthening right ankle dorsiflexors and task-specific part practice


Figure 2A


Figure 2B

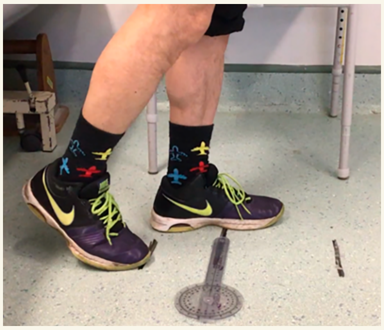


Figure 3A


Figure 3B

of dorsiflexion as per testing procedure. See *Figures 3A and 3B*.

- Whole practice of walking that targets rapid hip flexion and ankle dorsiflexion in swing could include:
  - Walking on a treadmill - the constant speed of the treadmill can be useful for increasing speed of swing phase.
  - Walking with cueing of cadence; this has been shown to be effective at increasing walking speed and step length[3].

Where stroke survivors have insufficient strength to produce adequate force to do a task, strength needs to be targeted. This can include isolated strengthening exercises, such as that shown in *Figures 4a and 4b* where Michael uses a sliding tiltable to strengthen his plantarflexors. When people can undertake task-specific training, it can be used to increase muscle strength as well as improve the muscle co-ordination required to perform the task successfully[4].

Effective task-specific training needs to be adapted to the impairments of the stroke survivor

The sensori-motor impairments that have the biggest impact on activity limitations after stroke are loss of strength and loss of co-ordination[5,6]. These are also the impairments that are the most amenable to being trained after stroke. However, training is not effective if it does not accommodate the other impairments that may occur after stroke. An example is Pusher's syndrome. This perceptual impairment results in the stroke survivor 'pushing' towards their affected side. Setting up task-specific practice of sitting or standing without adapting to this impairment would result in ineffective training. In *Figure 5A*, a stroke survivor attempts to sit and is unsuccessful because he has Pusher's syndrome. However, when the sitting practice is set up so that there is a wall on his intact side (*Figure 5B*) he can start to sit successfully as he has a cue for verticality. If he starts to push to the left side he is able to correct himself using this strong vertical cue.

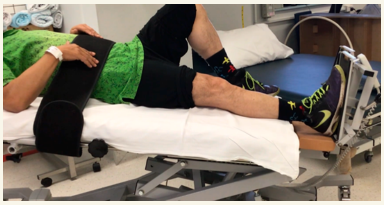


Figure 4A

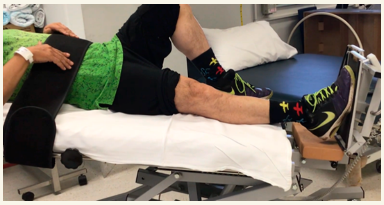


Figure 4B


Figure 5A


Figure 5B

Effective task-specific training needs to be intensive

Task-specific training can address the features above but not achieve change due to a low dosage of practice. To change outcomes after stroke, stroke survivors need to do enough practice. To increase amounts of practice, stroke survivors need to practise outside of time spent with therapists. Therefore, therapists need to focus on practice that will be done without them present. These expectations of practice outside therapy time need to start from the initial assessment. By the end of an assessment the stroke survivor should have some practice that they can undertake on their own. For example, once the exercise has been set up, Michael would be able to do his swing phase practice and plantarflexion strengthening exercises without the therapist present.

Strategies which have been shown to increase intensity of practice, (ie the amount of practice done within a timeframe) include using goal-oriented instructions with target numbers[7] and counting and recording repetitions of practice[8].

In conclusion, for therapists to deliver effective task-specific training in stroke rehabilitation they need to have a detailed understanding of the biomechanics of the tasks being trained. They need to apply an explicit clinical reasoning process that identifies the impairments contributing to the stroke survivor's activity limitations. Additionally, they need to set up exercises that mimic the biomechanics of the task being trained, then to provide goal-oriented instructions, count and record repetitions of practice and organise for intensive practice to happen outside of therapy sessions.

> *… for therapists to deliver effective task specific training in stroke rehabilitation they need to have a detailed understanding of the biomechanics of the tasks being trained.*

REFERENCES

1. French B, Thomas LH, Coupe J *et al* (2016) *Repetitive task training for improving functional ability after stroke* *Cochrane Database of Systemtatic Reviews* 11 (11):CD006073.
2. Williams G, Hassett L, Clark R, Bryant A, Olver J, Morris ME, Ada L (2019) *Improving Walking Ability in People With Neurologic Conditions: A Theoretical Framework for Biomechanics-Driven Exercise Prescription* *Archives of Physical Medicine and Rehabilitation* 100 (6) pp1184-1190.
3. Nascimento LR, de Oliveira CQ, Ada L, Michaelsen SM, Teixeira-Salmela LF (2015) *Walking training with cueing of cadence improves walking speed and stride length after stroke more than walking training alone: a systematic review* *Journal of Physiotherapy* 61 (1) pp10-15.
4. de Sousa DG, Harvey LA, Dorsch S, Glinsky JV (2018) *Interventions involving repetitive practice improve strength after stroke: a systematic review* *Journal of Physiotherapy* 64 (4) pp210-221.
5. Bohannon RW (2007) *Muscle strength and muscle training after stroke* *Journal of Rehabilitation Medicine* 39 (1) pp14-20.
6. Canning CG, Ada L, O'Dwyer NJ (2000) *Abnormal muscle activation characteristics associated with loss of dexterity after stroke* *Journal of the Neurological Sciences* 176 (1) pp45-56.
7. Hillig T, Ma H, Dorsch S (2019) *Goal-oriented instructions increase the intensity of practice in stroke rehabilitation compared with non-specific instructions: a within-participant, repeated measures experimental study* *Journal of Physiotherapy* 65 (2) pp95-98.
8. Dorsch S, Kander D, Chowdhury F (2023) *In stroke survivors, counting and recording repetitions and using target numbers increases intensity of practice: a randomised control trial* IGNITE conference, Brisbane, Australia.

Developing a research question: a summary of the ACPIN online seminar on November 23rd 2023

Dr Louise Johnson Consultant Physiotherapist in Stroke (NHS) and Principal Researcher (University of Southampton), University Hospitals Dorset NHS Trust
Dr Beth Clark PhD Senior Research Fellow, University of Southampton
Prof Jane Burridge Emerita Professor of Restorative Neuroscience, University of Southampton

The seminar was part of a series designed by Dr Praveen Kumar, designed to support clinical physiotherapists who want to conduct research

The seminar included an introduction to the topic followed by presentations from Dr Clark and Dr Johnson on their experience of taking a clinical question and turning it into a good research question, illustrating a range of different methodologies. After a short break, breakout sessions enabled participants to share what they had learnt from the presentations and apply it to their own research proposals. There was then an opportunity to feed back their ideas and to discuss them with the whole group. The seminar ended with a summary of what we had learnt.

The introduction established key points about forming a research question

Firstly, the importance of being curious and asking yourself what do you want to know or understand better was explained. Secondly why you need to talk to people, for example, colleagues and other professionals, as well as patients, and how it helps you to also understand who you need to work with. Thirdly, why your research must build on the work of others and why you need to read and critically review what other people have done. Finally, the importance of remembering two obvious, but important things were stressed: a research question must have an answer and answering a research question must have a purpose or make a difference.

Based on the pretext that the research question will determine the type of answer you get, examples were provided ranging across the development of an idea, testing feasibility, piloting a clinical trial and conducting a definitive randomised controlled trial. Guidance was given about when each type of study should be used and what you need to know before conducting it. The problem of conducting research in rehabilitation, especially generating questions arising from clinical practice, was analysed. Often these questions don't fit the standard medical model and ideas about how this problem could be addressed were discussed – in particular how an aim can be framed as a question to ensure that it leads to meaningful finding.

Louise's research question grew from observations she made in her clinical practice. She noticed how much physiotherapists talk to patients during the delivery of rehabilitation, and how this talk was often complex, providing frequent and sometimes abstract instructions about how to move. She was intrigued about why therapists do this, and whether or not it is helpful for recovery. Although she didn't know it at the time, what Louise was noting was a tendency for therapists to use explicit learning styles during rehabilitation. After talking to research colleagues she was led to several bodies of research in other disciplines, such as sports science and psychology, and she began to read widely around motor learning and the concepts of implicit and explicit learning. This led to Louise doing a PhD in this field, and subsequently an NIHR post-Doctoral Fellowship. Louise's research uses mixed methods. She sought to understand more about how we currently deliver stroke rehabilitation using observational methods, and went on to design a treatment intervention, informed by a Delphi Survey. She then tested different models of motor learning in feasibility and cluster randomised trials. She is also interested in implementation, and her more recent work has included qualitative research to understand patient and therapist views on different motor learning approaches.

Beth's research question also grew out of her clinical practice. She was working in the Stroke Unit of an acute hospital in 2008, when the Royal College of Physicians (RCP) first gave the recommendation that all people

[1] Norfolk and Norwich University Hospital NHS Trust
[2] University of East Anglia
[3] University of Huddersfield.

with stroke should receive 45 minutes of each therapy (occupational therapy, physiotherapy and speech therapy), as required, five days a week. As no such guideline had existed previously, she was interested to understand more, such as why 45 minutes? What is the evidence to support this? Is time really such an important factor? How are we going to achieve this? Beth used this curiosity as the basis of her PhD. Further discussion, reflection and reading led to research questions around:

- the evidence-base for the 45-minute guideline, and
- why some people with stroke do not receive the 45-minute guideline.

Beth undertook a Cochrane systematic review with meta analysis to examine literature related to the effect of time spent in rehabilitation on outcomes after stroke, in order to build on the theoretical evidence base. She then undertook focus groups and a Delphi study, with therapists, to examine why some people with stroke don't receive the recommended minimum of 45 minutes. After completing this study, Beth used the findings, with the findings of other literature, to review whether the 45-minute guideline is fit for purpose.

Breakout groups

In the breakout groups participants were asked to discuss some clinical ideas that they would like to test. They were then asked to narrow them down to two contrasting ones and turn each idea into a research question. During that process they were asked to think about what the answer might be and in what way knowing the answer would be useful. If they had time they were asked to briefly outline the methodology they would use for each, what they expected to happen after they had answered the research question and how the results would translate into clinical practice.

Participants then rejoined the session and the ideas were shared and discussed in the context of the session as a whole.

The effects of vestibular rehabilitation on balance in stroke:

a systematic review and meta-analysis

Rebecca Rayner[1], **Joseph Hartley-Palmer**[2],
John Stephenson[3], **Alex Benham**[3]

Stroke is a common clinical neurological condition caused by infarct or haemorrhage in the brain. It is a major cause of disability worldwide (Marshall *et al* 2022). Stroke often results in balance impairment, with subsequent difficulties in function and social participation. Balance is the ability of an individual to maintain themself dynamically within a base of support.

The control of human balance is complex, relying on the integration of visual, vestibular and somatosensory afferent inputs. Balance impairment post stroke is a consequence of either deficits in sensory and motor systems, or in central balance integration. Sensory re-weighting, the dynamic interaction of these afferent systems with each other, has been shown to be impaired in people with stroke compared to healthy controls (Bonan *et al* 2013). Balance impairment affects at least half of stroke survivors (Khan and Chevidikunnan 2021), and so having effective therapies to improve balance is key.

Vestibular rehabilitation (VR) is a treatment approach used to optimise vestibular function and sensory integration, with the three key components being adaptation, habituation and substitution (McDonell and Hillier 2015). Adaptation enhances the peripheral vestibulo-ocular reflex to improve gaze stability: an ability to keep vision stable when moving. Habituation is de-sensitising to movements and tasks that cause a sensation of dizziness or imbalance, and substitution is using other sensory systems to enhance central functioning and optimising the vestibulo-spinal tract control for balance.

Specific VR exercises are not included in current stroke clinical guidelines, but this approach is increasingly being used in clinical practice as a part of stroke rehabilitation. There is currently no clearly recognised superior balance treatment intervention for stroke (Hughes *et al* 2019). Stroke rehabilitation aims to maximise neuroplasticity to improve function and recovery of the person. The central vestibular system (in the brainstem and cerebellum) contributes to the perception of head, trunk and whole-body motion, aids generation of eye motion driven by peripheral vestibular apparatus (in the inner ear) and visual signals, and optimises balance and posture (Zhang *et al* 2022). VR targets the vestibular-cortical networks within the brain, and postural control mechanisms, which link closely with balance performance. Compensation, promoted by VR principles, in the cortex, brainstem and cerebellar pathways, achieves eye movement and postural stability.

VR is efficacious in other neurological conditions, such as multiple sclerosis and traumatic brain injury, with similar impairments to stroke, with positive treatment effects demonstrated in balance and gait (Synott and Baker 2020; Gurley *et al* 2013). Tramontano *et al* (2021) explored VR in varying central neurological conditions, including stroke, on a range of outcome measurements, with favourable outcomes trending in the VR groups. VR could be effective in people with stroke, to maximise balance performance, particularly if the stroke affects areas of the brain important in sensory integration, including the brainstem, cerebellar and cortical pathways.

This systematic review and meta-analysis aim to investigate whether vestibular rehabilitation (VR) is effective in optimising balance performance after stroke.

Habituation is de-sensitising to movements and tasks that cause a sensation of dizziness or imbalance, and substitution is using other sensory systems to enhance central functioning and optimising the vestibulo-spinal tract control for balance.

METHODS

The protocol for this systematic review was prospectively registered in October 2022 with the PROSPERO database (ID: CRD42022370295) and is reported

1. Norfolk and Norwich University Hospital NHS Trust
2. University of East Anglia
3. University of Huddersfield.

according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.

Studies were included in the review if:

- they were experimental designs with a control group
- they studied adult (18 years of age and over) stroke patients under one year post-first stroke
- supervised or unsupervised VR was the treatment intervention
- they reported clinical objective balance performance outcome measurements
- they were written in English and published from 2000 onwards

Studies were excluded from the review if:

- they were of a design other than experimental with a control arm
- they used galvanic stimulation, vibration or virtual reality as the vestibular treatment
- the primary outcome measurement focussed on neglect or gait; or the study only used laboratory posturography balance outcome measures, due to difficulties in using this outcome measure in routine clinical practice
- they used people with peripheral vestibular disorders or neurological conditions other than stroke
- participants were in the later phase of stroke rehabilitation (over 365 days post-stroke onset) or had more than one stroke

Search strategy, study selection and data extraction

The electronic databases, MEDLINE, CINAHL, EMCARE, EMBASE, were comprehensively searched by an academic librarian using a combination of keyword search terms around the constructs of vestibular rehabilitation, balance and stroke. Information databases were searched from January 2000 to October 2022. A date limit of the year 2000 was used and studies were excluded if not available in English. This date was chosen due to advances in stroke care at this time, coinciding with the first published stroke clinical guideline.

Duplicate hits were removed, and studies were assessed by two independent reviewers (RR, JHP) using specific set eligibility criteria, initially by title and abstract, then full text, using the Rayyan online tool (Ouzzani *et al* 2016). Disagreements were discussed and settled and could have been discussed with a third reviewer (AB) if needed, but this was not required. Information on the participant demographics, intervention application and main balance outcome in the studies was extracted independently by two reviewers (RR, JHP) onto a standardised data extraction template.

Risk of bias assessment

The quality of individual studies was assessed by two reviewers (RR, JHP) independently using the Cochrane Risk of Bias tool (ROB-2) by Sterne *et al* (2019). No discrepancies were identified.

Statistical analysis

Random effects meta-analyses were constructed using the DerSimionian and Laird model. This assumes that the individual studies represent a random sample from a population of studies with a mean treatment effect about which individual study effects vary. The main meta-analysis was based on the primary outcome of balance, as measured primarily by the Berg Balance Scale and by other measures. Clinical improvements in balance were represented by increases in reported scores. Where not reported directly, standard deviations were estimated from reported ranges and inter-quartile ranges following Cochrane recommendations (Higgins *et al* 2022).

A random effects model was chosen for the meta-analysis to reflect recognised clinical and methodological heterogeneity across included studies with respect to the outcome measures. All outcomes were interval-level numerical measures. Analyses were based on consideration of standardised mean differences, due to variation in the instruments used to record outcomes. Effects were based on intervention effect minus control treatment effect; with precision assessed via construction of associated 95% confidence intervals (CIs). The analyses were based on summary statistics of post-test scores or changes from baseline in both groups (sample size, mean and standard deviation).

Forest plots were conducted for the meta-analysis of balance (the primary outcome), reporting the synthesised estimate, and associated 95% CI, and a *z*-test for the standardised mean difference. Heterogeneity statistics were also reported, including Cochran's Q test for heterogeneity, the *I*2 statistic (the proportion of variation across studies ascribed to heterogeneity) and the τ2 statistic (an estimate of between study variance).

Sensitivity analyses were conducted on the meta-analyses of the primary outcome to assess the robustness of the derived estimates. In this process each of the k included studies were omitted in turn, and a meta-analysis was conducted based on the remaining *k*-1 studies. Any study which was suspected of excessive influence (considered to be indicated by the point estimate of the 'omitted' analysis of a study lying outside the confidence interval of the 'combined' analysis) was flagged as an influential study. Funnel plots were proposed for the meta-analysis of the primary outcome to detect small study effect-related bias, including publication bias and other types of bias which may result from the true treatment effect differing between small and large studies, and indicated by asymmetry in the funnel plot. Following Cochrane recommendations (Sterne *et al* 2019), funnel plots were proposed for construction, subject to a minimum of ten included studies. Synthesised effects from meta-analyses of secondary outcomes were reported in tabulated form. Subgroup analyses were proposed by stroke type (anterior or posterior), subject to availability of data relating to a specific stroke type from a sufficient number of studies.

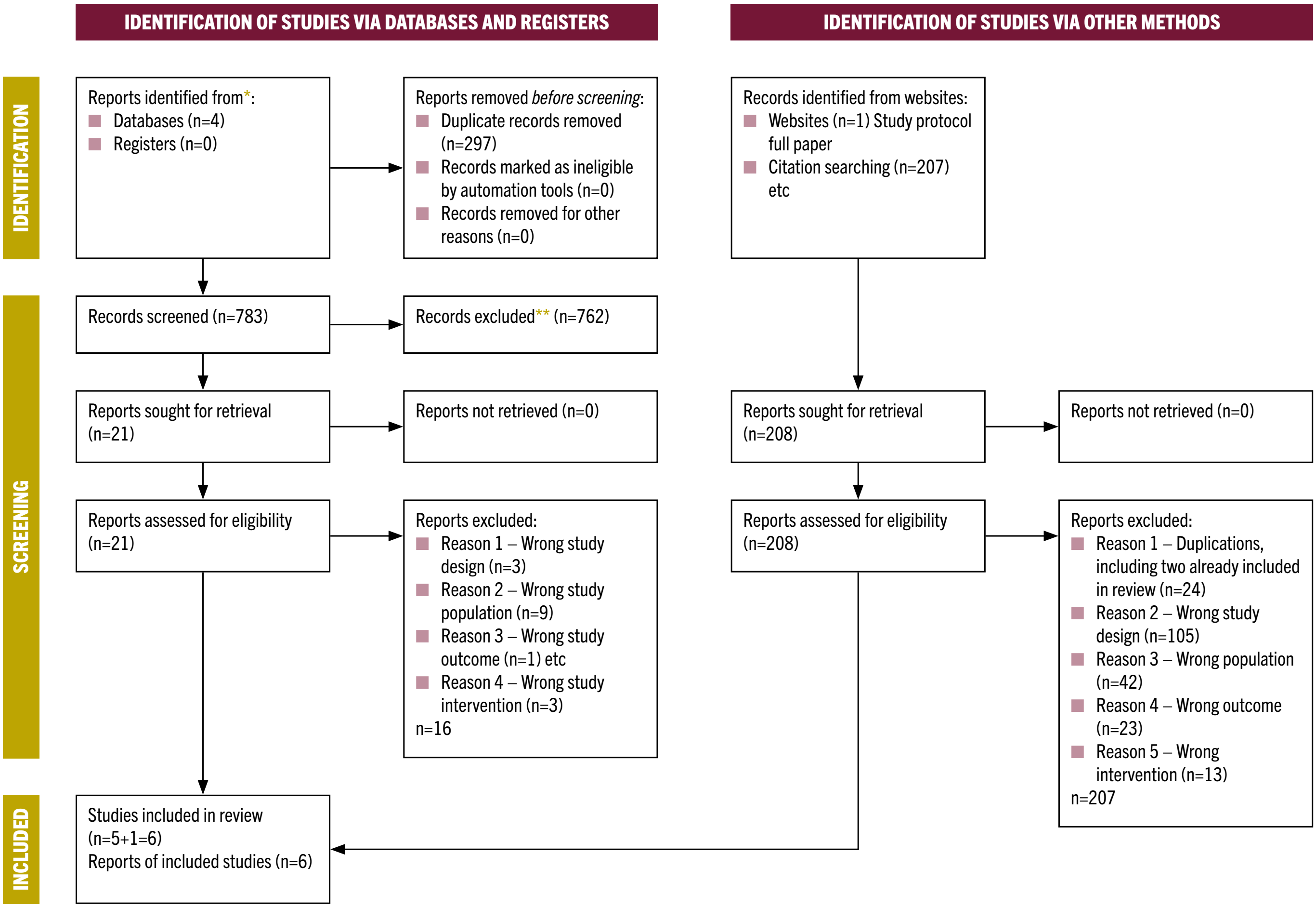
RESULTS

The combined four databases searched identified 1080 papers. After adjusting for duplicates, 783 trials were screened by title and abstract. This process identified 21 full-text articles, of which five met the inclusion criteria and were included in the review. One additional study protocol was identified; therefore, the completed study full text was located via an internet search and reviewed. This study was found to also meet inclusion criteria. The name of this study had changed from protocol to full study which meant that the term 'vestibular rehabilitation' was not included in the study title.

All 207 citations of the included studies were reviewed for relevant studies, but no new additional studies were identified. Hence a total of six studies were included in this meta-analysis (*Figure 1*).

Study characteristics

Of the six included studies, four (Balci *et al* 2013, Correia *et al* 2021, Tramontano *et al* 2018, Said Abd Elwahed *et al* 2021) were randomised controlled trials (RCT). Saleem *et al* (2019) was a randomised comparative study and Hansson *et al* (2020) was a pilot RCT. The total number of participants in the six included



* Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).
** If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD *et al*. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71. For more information, visit: http://www.prisma-statement.org/

Figure 1: PRISMA 2020 flow diagram

studies was 297, all of whom were stroke patients. Sample sizes of included studies ranged from 25 to 79. All studies included both male and female participants. Correia *et al* (2021) only included participants over 60 years of age. Mean participant age in other studies ranged from 60 to 65 years of age. Two studies (Balci *et al* 2013, Saleem *et al* 2019) included only posterior stroke patients, and Said Abd Elwahed *et al* (2021) included only anterior strokes. The other three studies investigated combined anterior and posterior stroke patient groups. There was a mixture of right and left-sided strokes, and infarcts and haemorrhages within the included studies.

Participants were under two weeks post-posterior stroke in one study by Balci *et al* (2013). The other studies had most participants under six months post-stroke, and all under twelve months post-stroke onset. They had varying baseline functional ability, ranging from being able to stand unassisted for 30 seconds and walk 30 metres with support (Correia *et al* 2021), through to walking ten metres with or without an aid. Balci *et al* (2013) used a Berg Balance scale score of <45/56. Five studies were from European countries and Saleem *et al* (2019) was completed in India.

Intervention

All six studies included at least two of the three main components of VR, defined by Whitney *et al* (2016) with two studies (Balci *et al* 2013, Saleem *et al* 2019) including all three components. Four of the six included studies had supervised intervention, with Balci *et al* (2013) being semi-supervised at a weekly review. Correia *et al* (2021) taught the exercises and then asked participants to complete a logbook detailing compliance. Doses varied amongst the studies. The shortest treatment intervention period was three weeks and longest was twelve weeks. Most studies completed exercises two to three times per week, ranging from 20 to 40 minutes per session. Said Abd Elwahed (2021) combined the VR into the usual 60-minute conventional physiotherapy session, so it was unclear how much specific VR was completed in this study. The home-based exercise studies (Balci *et al* 2013, Correia *et al* 2021) prescribed the highest dose: 20- to 30-minute sessions, two to three times each day. *Table 1* summarises the interventions in the six included studies.

Comparison groups

Tramontano *et al* (2018) and Said Abd Elwahed *et al* (2021) compared VR to conventional physiotherapy: defined as weight shift exercises, static standing balance exercises, gym ball exercises and strengthening. Hansson *et al* (2020) compared VR to conventional rehabilitation but did not define this specifically. Correia *et al* (2021) compared VR to no treatment following a period of conventional stroke rehabilitation for both treatment and comparator groups. Saleem *et al* (2019) compared VR to dual task training, and Balci *et al* (2013) compared VR to visual feedback training and a control group of conventional physiotherapy focussed on gait training and lower limb strengthening.

Study quality

Four of the six studies met the sample size they had calculated for their primary outcome measure. Hansson *et al* (2020) did not achieve

STUDY	SETTING	DOSE	SUPERVISED	SUBSTITUTION	ADAPTATION	HABITUATION
Balci *et al* 2013	Home exercises on discharge	Six weeks of 20–30 minutes, two to three times a day	Semi-supervised (weekly)	Yes	Yes	Yes
Correia *et al* 2021	Home exercises	Three weeks of 20–30 minutes, two times a day	No (after 1 taught session)	No	Yes	Yes
Tramontano *et al* 2018	In-patient rehabilitation	Four weeks of 20 minutes, three times per week	Yes	Yes	Yes	No
Saleem *et al* 2019	In-patient rehabilitation	Four weeks of 45 minutes, three times per week	Yes	Yes	Yes	Yes
Hansson *et al* 2020	Outpatient	Twelve weeks, two times per week	Yes	Yes	No	Yes
Elwahed *et al* 2021	Outpatient	VR included in sessions of 60 minutes, three times per week for six weeks	Yes	Yes	Yes	No

Table 1 Summary of study intervention characteristics

their intended sample size. The format of this study was amended during its conduct to a pilot RCT. Balci *et al* (2013) did not complete a power calculation.

The Cochrane risk of bias (RoB2) tool (Sterne *et al* 2019) was used to evaluate the included studies. Two studies showed low risk of bias and one showed overall high risk of bias. The other three studies showed some concerns, particularly in the measurement of the outcome, where they were non-blinded, and in reporting of the results. *Figure 2* shows a summary of findings using the RoB2 tool.

STUDY ID	D1	D2	D3	D4	D5	OVERALL
Balci *et al* 2013	+	+	+	+	+	+
Correia *et al* 2020	+	+	+	!	!	!
Tramontano *et al* 2018	+	!	+	!	!	!
Hansson *et al* 2020	+	+	+	+	+	+
Elwahed *et al* 2021	+	+	+	!	!	!
Saleem *et al* 2019	+	!	−	!	!	−

+ Low risk ! Some concerns − High risk

Figure 2 Risk of bias

Quantitative synthesis of primary outcome

Meta-analysis data included six studies with usable post-test or change from baseline data of the primary outcome of balance. Five studies reported balance using the BBS, and Saleem *et al* (2019) reported balance scores using the mini-BESTEST instrument. Five included studies reported a standardised mean difference favouring intervention methods with Hansson *et al* (2020) reporting no effect. Of the five studies that reported an effect favouring intervention methods, all but Balci *et al* (2013) reported a statistically significant effect (at the 5% significance level) in favour of intervention methods. No studies reported any effects in favour of control treatment.

A meta-analysis on the outcome of balance revealed that a synthesised estimate of the standardised mean difference in balance scores from intervention treatment methods and control treatment methods was 0.935 (95% CI 0.391 to 1.480); ie favouring intervention methods. A z-test of the standardised mean effect revealed strong evidence (at the 5% significance level) for a non-zero effect (z=3.37; p=0.001). Cochran's $\tau 2$ test for heterogeneity revealed strong evidence (at the 5% significance level) for statistical heterogeneity ($\tau 2(5)$=15.0; p=0.001). The $I2$ statistic was 66.7%, indicating moderate levels of heterogeneity (high proportion of variation across studies ascribed to heterogeneity). The $\tau 2$ statistic (an estimate of between study variance) was revealed to be 0.300. The data are summarised in a forest plot (*Figure 3*).

A sensitivity analysis revealed no individual study to be exerting excessive influence on the meta-analysis, with all point estimates of the omitted analyses lying within the 95% CI associated with the estimate of the combined analysis. Estimates and associated CIs are plotted on an influence plot (*Figure 4* overleaf).

A funnel plot for the balance outcome was not constructed due to the number of included studies being below the minimum requirement of ten studies.

Assessment of heterogeneity

The Galbraith plot for the balance outcome revealed that none of the included studies were outside the shaded region, indicating no evidence for heterogeneity (*Figure 5* overleaf) and consistently high levels of study precision. However, the number of included studies limits interpretation of this plot.

DISCUSSION

The aim of this systematic review and meta-analysis was to explore the effectiveness of VR on balance scores in acute stroke patients. Following the comprehensive search, six studies were included, and a meta-analysis revealed

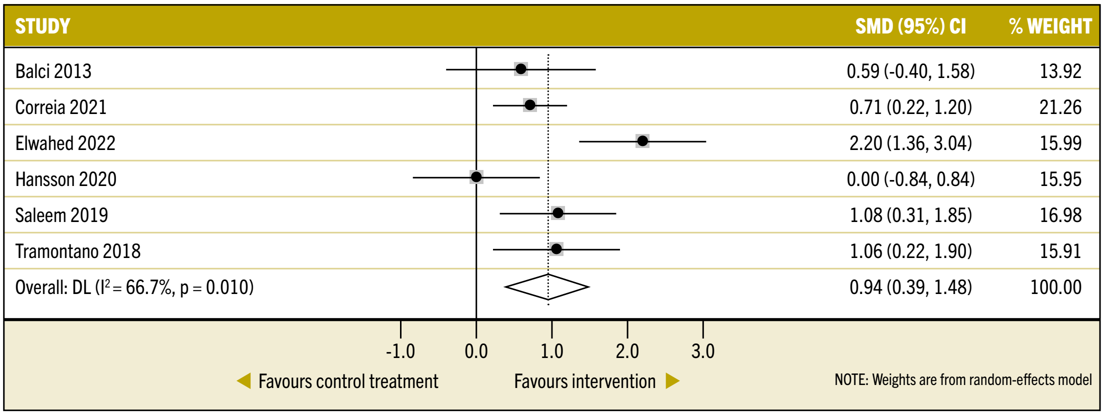


Figure 3 Forest plot for primary outcome (balance)

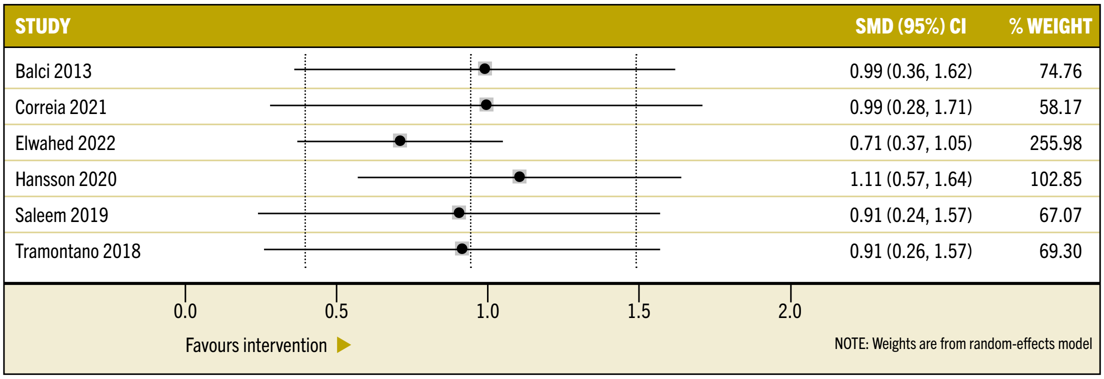


Figure 4 Influence plot for balance outcome

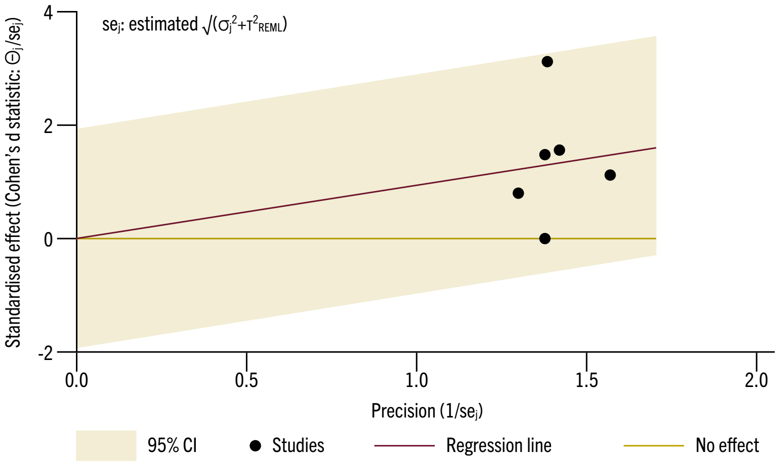


Figure 5 Galbraith plot for meta-analysis of balance outcome (with 95% confidence limits)

that VR confers a significant benefit on balance (p=0.001), with a synthesised estimate of the standardised mean difference in balance scores of 0.935 (95% CI 0.391 to 1.480) favouring the intervention, with moderate levels of heterogeneity detected across included studies. Therefore, VR may be considered a useful intervention to address balance impairment after a stroke.

The six included studies had a mixture of anterior and posterior strokes, and none commented on previous or current vestibular dysfunction, oculomotor or gaze stability deficits. Depending on brain area affected, VR may have different mechanisms of enhancing balance recovery. For example, posterior stroke may affect central sensory re-weighting and vestibular afferent input greater than an anterior stroke. Interestingly, in the Said Abd Elwahed *et al* (2021) study, all participants had a parieto-insular cortex stroke, an area of particular importance in the central vestibular network. Most included studies combined stroke types, hence subgroup analyses were not conducted. As research evolves this is worth strong consideration: different components of VR may be better utilised for different types of anterior versus posterior stroke. Hansson *et al* (2020) did not use adaptation and interestingly showed no treatment effect, which may be of relevance when designing VR treatment plans in stroke.

VR aims to enhance balance performance with three core components. The two most pertinent to balance performance are substitution: optimising afferent inputs to regain motor output for balance largely via the vestibulo-spinal tract; and adaptation: enhancing vestibulo-ocular reflex integration, as it is likely this peripheral reflex is intact. The core components were all utilised throughout the studies and well-documented, aiding clinician interpretation of the exercises used. Treatment dose, duration and setting varied in the studies, from in-patient to community, with VR completed over three to twelve weeks, showing a lack of consensus and research defining efficacious dose and duration. Correia *et al* (2020) offered very minimal supervision, which is not recommended in VR; therefore this may have compromised treatment effects gained due to variable and unknown treatment fidelity.

Consistent use of the Berg Balance Score (BBS) in five out of the six included studies corresponds with regular use in clinical practice to measure balance performance. As the BBS predominantly focuses on static balance and somatosensory input, it may not be the most optimal balance outcome for assessing vestibular rehabilitation as an intervention, although it is acknowledged that there are few vestibular-specific balance outcome measures available for clinical use. Better balance outcome measures to assess VR may include the Modified Clinical Test of Sensory Interaction in Balance, Dynamic Gait Index, mini-Bestest and the activities-specific balance confidence scale. This would be a good topic for future research to explore further in stroke patients. One inclusion criterion was that clinical balance outcome measures must have been utilised in the study rather than just posturography laboratory measures. This aimed to aid research finding transferability to clinical practice. No studies were identified in the search that just used posturography measures; therefore, all studies exploring balance were likely to have been included.

The results of this systematic review and meta-analysis supports findings in a systematic review by Tramontano *et al* (2021) whose results favoured VR treatment in a variety of neurological disorders exploring balance and gait outcomes. Three of the studies in that review included, but were not confined to, stroke patients. They reported that VR programmes are safe and could easily be implemented with standard neurorehabilitation protocols in patients affected by neurological disorders. No adverse effects and minimal attrition loss were noted in studies included in this review, possibly indicating the acceptance of the VR programmes used. One systematic review (Mitsutake *et al* 2020) focussing on the effectiveness of VR for gait in stroke found beneficial effects of VR for gait parameters, also linked to falls risk; but reported that very low-quality evidence was available to review and included only three studies. An RCT by Mitsutake *et al* (2017) showed improvements in dynamic gait and vestibular ocular reflex after three weeks training in stroke patients when compared to a control group receiving conventional rehabilitation. Balance is closely linked with walking, especially more dynamic gait parameters. Efficient gait requires effective sensory re-weighting, thus clinically a similar hypothesis regarding the role of VR for balance and gait would be anticipated.

Study limitations

There were no studies exploring people with severe balance impairment, where the person could not stand unsupported. This means the findings are only generalisable to people post-stroke with mild–moderate balance impairment. This corresponds with the current clinical implementation of VR exercises and balance rehabilitation, which is easier to complete in this higher-functioning patient population. Using the RoB-2 tool for clinical studies may have caused risk of bias to be rated higher than if another more lenient scale was utilised, but the need for high-quality research in the field is apparent. Studies not detailing vestibular impairment or specifics around oculomotor and dynamic gaze stability impairment is relevant and should be considered in future research on this topic.

CONCLUSIONS

Results were positive for VR to enhance balance in adult stroke patients with mild to moderate balance impairment. The characteristics of VR intervention differed between the studies. Study quality was overall of some concern, mainly due to limitations in blinding assessors and reporting of results. Further research is warranted into the properties of vestibular rehabilitation exercises in specific sub-groups of stroke patients, such as posterior versus anterior stroke, or those with known oculomotor and/or dynamic visual acuity impairment. Studies researching VR should screen for these and possibly also for underlying peripheral vestibular dysfunction at baseline, which none of the included studies did. Research is required to explore VR use in more severely impaired stroke patients who cannot stand unaided and have significant balance impairment. An overall lack in high-quality evidence on this topic means further robust randomised controlled trials are needed, using valid vestibular outcome measures for vestibular dysfunction and gaze stability. Research defining dose and duration is needed and further larger-sample higher-quality research addressing this important clinical topic, before recommendation in clinical guidelines can be considered.

> *Further research is warranted into the properties of vestibular rehabilitation exercises in specific sub-groups of stroke patients, such as posterior versus anterior stroke, or those with known oculomotor and/or dynamic visual acuity impairment.*

REFERENCES

Balci, BD, G Akdal G, Yaka E, Angin S (2013) *Vestibular rehabilitation in acute central vestibulopathy: a randomized controlled trial* *Journal of Vestibular Research* 23 (4-5) pp259-267.

Bonan IV, Marquer A, Eskiizmirliler S, Yelnik AP, Vidal PP (2013) *Sensory reweighting in controls and stroke patients*, *Clinical Neurophysiology* 12 (4) pp713-22.

Correia A, Pimenta C, Alves M, Virella D (2021) *Better balance: a randomised controlled trial of oculomotor and gaze stability exercises to reduce risk of falling after stroke*, *Clinical Rehabilitation* 35 (2) pp213-221.

Gurley J, Hujsak B, Kelly JL (2013) *Vestibular Rehabilitation following mild traumatic brain injury,* *NeuroRehabilitation* 32 (3) pp519-28.

Hansson EE, Pessah-Rasmussen H, Bring A, Vahlberg B, Persson L (2020) *Vestibular rehabilitation for persons with stroke and concomitant dizziness—a pilot study* *Pilot and Feasibility Studies* 6 pp146-154.

Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors) (2022) *Cochrane Handbook for Systematic Reviews of Interventions version 6.3* (updated February 2022) Cochrane. Available from *www.training.cochrane.org/handbook*.

Hugues A, Di Marco J, Ribault S, Ardaillon H, Janiaud P, Xue Y., Pires J, Bonan I, Gueyffier F, Rode G (2019) *Limited evidence of physical therapy on balance after stroke: A systematic review and meta-analysis* *PLoS One* 14 (8) e0221700.

Khan F, Chevidikunnan MF (2021) *Prevalence of balance impairment and factors associated with balance among patients with stroke. A cross-sectional retrospective case control study* *Healthcare* 9 p320.

Marshall I, McKevitt C, Wang Y, Wafa H, Skolarus L, Sackley C, Clarke S, Hamidi F, Stevens E, Rudd A, Rodgers A, Wolfe C (2022) *Stroke pathway – An evidence base for commissioning – An evidence review for NHS England and NHS Improvement* *NIHR Open Research* 13257.1.

CORRESPONDING AUTHOR
Rebecca Rayner
rebecca.rayner@nnuh.nhs.uk

McDonell MN, Hillier SL (2015) *Vestibular rehabilitation for unilateral peripheral vestibular dysfunction Cochrane database of Systematic Reviews* 13 (1) CD005397.

Mitsutake T, Imura T, Tanaka R (2020) *The effects of vestibular rehabilitation on gait performance in patients with Stroke: A systematic review of RCTs Journal of Stroke and Cerebrovascular Disease* 29 (11) pp105214.

Mitsutake T, Sakamoto M, Ueta K, Oka S, Horikawa E (2017) *Effects of vestibular rehabilitation on gait performance in post stroke patients: a pilot randomised controlled trial International Journal for Rehabilitation Research* 40 (3) pp240-245.

Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A (2016) *Rayyan — a web and mobile app for systematic reviews Systematic Reviews* 5 pp210.

Said Abd Elwahed A, Hassan Abd Elkader W, Shehata Rezkallah S, Shaker Belal E, Ismail Abbas A (2021) *Effects of vestibular rehabilitation on postural stability in anterior circulation stroke patients: A randomized controlled trial Fizjoterapia Polska* 21 (5) pp172-181.

Saleem S, Arora B, Chauhan P (2019) *Comparative study to evaluate the effectiveness of vestibular rehabilitation therapy versus dual task training on balance and gait in posterior cerebral artery (PCA) stroke Journal of Clinical and Diagnostic Research* 13 (11) pp10-17.

Sterne JAC, Savović J, Page MJ, Elbers RG, Blencowe NS, Boutron I, Cates CJ, Cheng H-Y, Corbett MS, Eldridge SM, Emerson JR, Hernán MA, Hopewell S, Hróbjartsson A, Junqueira DR, Jüni P, Kirkham JJ, Lasserson T, Li T, McAleenan A, Reeves BC, Shepperd S, Shrier I, Stewart LA, Tilling K, White IR, Whiting PF, Higgins JPT (2019) *RoB 2: a revised tool for assessing risk of bias in randomised trials* BMJ 366 l4898.

Synnott E, Baker K (2020) *The effectiveness of vestibular rehabilitation on balance related impairment among multiple sclerosis patients: A systematic review Journal of Multiple Sclerosis* 7 (1) pp1-8.

Tramontano M, Bergamini E, Iosa M, Belluscio V, Vannozzi G, Morone G (2018) *Vestibular rehabilitation training in patients with subacute stroke: A preliminary randomized controlled trial NeuroRehabilitation* 43 (2) pp247-254.

Tramontano M, Russo V, Spitoni GF, Ciancarelli I, Paolucci S, Manzari L, Morone G (2021) *Efficacy of vestibular rehabilitation in patients with neurologic disorders: A systematic review Archives of Physical Medicine and Rehabilitation* 102 (7) pp1379-1389.

Whitney SL, Alghwiri AA, Alghadir A (2016) *An overview of vestibular rehabilitation, chapter 3* in *Handbook of Clinical Neurology* pp87-205.

Zhang S, Liu D, Tian E, Wang J, Guo Z, Kong W (2022) *Central vestibular dysfunction: Don't forget vestibular rehabilitation Expert Review of Neurotherapeutics* 22 (8) pp 669-680.

Beyond stroke early supported discharge:
collaborative partnership enabling more stroke survivors to be supported at home

Catherine Mandri MSc, BSc HONS, MCSP, MACPIN Clinical lead for stroke and specialist neurophysiotherapist, Maidstone and Tunbridge Wells NHS Trust. Co-lead for stroke research, Kent Surrey and Sussex CRN
Sarah Shipton BSc HONS, MRCOT Clinical specialist occupational therapist for neurology and stroke, Maidstone and Tunbridge Wells NHS Trust
Jo Cutting Stroke Program Director, Maidstone and Tunbridge Wells NHS Trust

In 2018, Kent and Medway Integrated Care Board (ICB) developed a regional stroke service reconfiguration, with the aim to improve stroke care and increase specialist staff numbers (ISDN 2022). The three hyper-acute stroke units (HASU) and acute stroke units (ASU) sites were confirmed and progress towards full business case (FBC) commenced.

This occurred alongside the closure of Medway ASU and the start of the COVID-19 pandemic, resulting in an increase in 107% of stroke activity at Maidstone and Tunbridge Wells NHS Trust (MTW), requiring Maidstone Hospital to dramatically improve throughput of their ASU (Cutting and Chenery 2021). At this time MTW had access to a traditional early supported discharge team (ESD); however, the increase in activity and throughput requirement meant additional services needed to be developed. MTW and Hilton Nursing Partners (HNP) developed 'The Hilton Stroke Pathway' (HSP), a partnership to improve the flow of stroke patients out of the acute setting and provide specialist stroke rehabilitation and care within their home environment. This article explores the implementation of a unique and innovative needs-based home stroke rehabilitation service.

Early Supportive Discharge (ESD) is only suitable for up to 40% of the stroke population (National Stroke Programme, 2022). Inpatient and community stroke rehabilitation varies in intensity and usually doesn't meet the recommended standards of 45 minutes a day (Gittins *et al* 2020 and RCP 2016), therefore MTW considered the HSP an innovative solution to help overcome some of these challenges and ease the burden on the acute hospital. The pathway combined virtual and homecare rehabilitation services, using specially trained carers from HNP to deliver stroke therapy prescribed by MTW stroke therapy team. The service provided occupational therapy, physiotherapy and speech and language therapy. At the time of implementation, virtual and telerehabilitation elements of the service were utilised by the speech and language therapy team; however, all professions reviewed goals and progress via phone calls or virtual sessions. The service is stratified into three levels: intensive, moderate and recovery (*Figure 1* overleaf).

The flexibility in the different levels of care enabled a variety of needs and levels of rehabilitation to be effectively delivered at home, which traditionally is not incorporated in ESD. Thus, the aim of the service was to facilitate and support a needs-based home stroke rehabilitation service and enable more stroke patients to continue their rehabilitation at home. A literature review was completed to see if other similar services had been commissioned; however, this service was found to be unique to West Kent.

Stroke specialist care is defined as that provided by healthcare professionals with the necessary knowledge, skills and experience in managing stroke, evidenced by a suitable qualification and training (*National Stroke Programme 2022*, page 8). The HNP carers were

The flexibility in the different levels of care enabled a variety of needs and levels of rehabilitation to be effectively delivered at home…

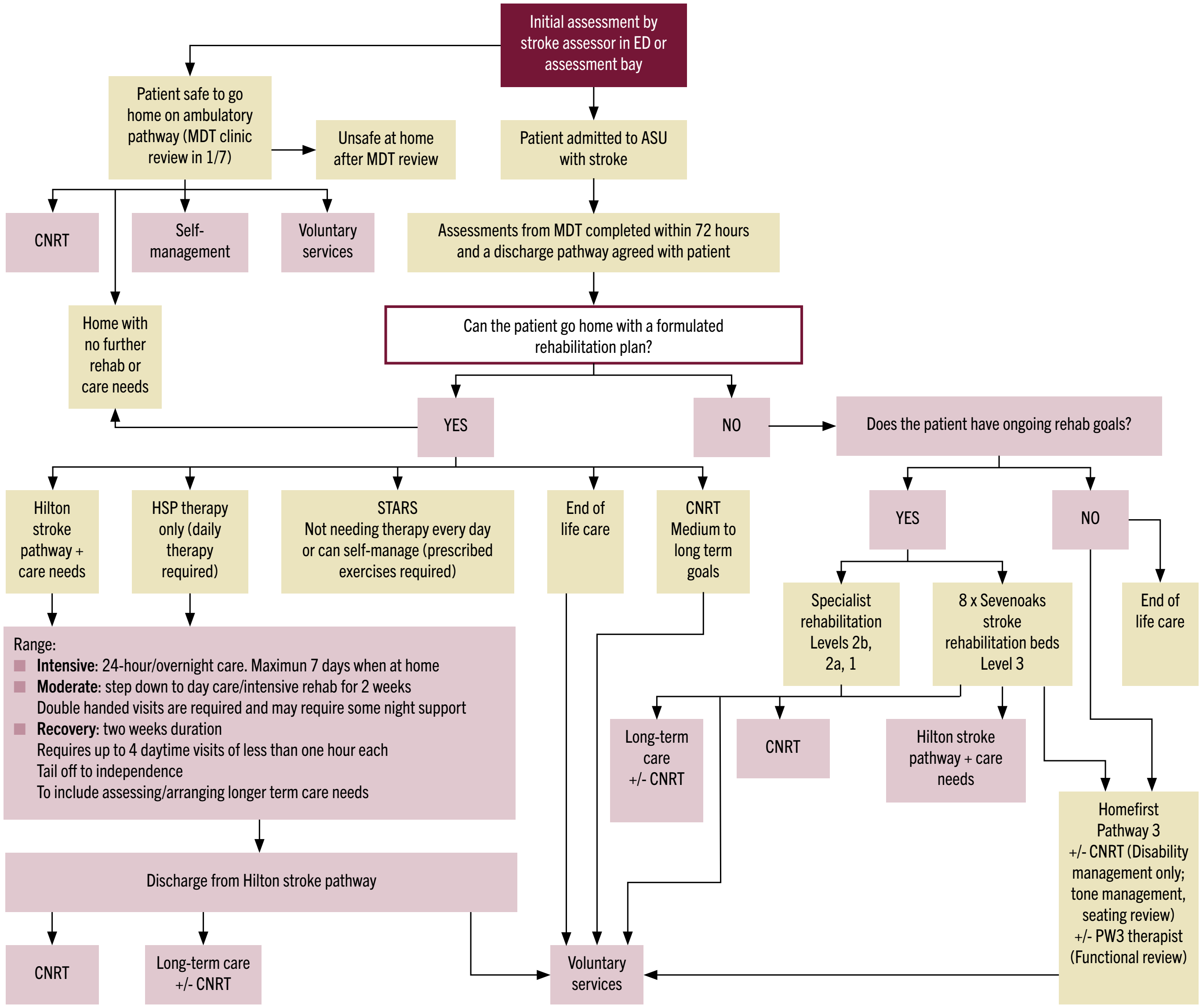


Figure 1 A diagram demonstrating the flow pathways for West Kent stroke patients

provided with training by MTW stroke therapists and completed sessions with the ASU nursing and therapy teams within Maidstone Hospital. Additionally, they completed local competency documents and bespoke training for individual patients, when required.

The pandemic has demonstrated NHS stroke services' ability to adapt to using digital solutions and to explore the use of telerehabilitation (TR) (Auger *et al* 2023). Use of virtual multidisciplinary meetings and frequent virtual communication with other services has facilitated decision-making processes for delivery of rehabilitation and seamless transfer of care. MTW stroke therapists were initially going to supervise the rehabilitation virtually but found some challenges; therefore, a blended model of face-to-face and TR was adopted. Auger *et al* (2023) argue it is difficult to provide services entirely by TR, which confirms the relevance of a hybrid model where therapists choose between face-to-face or TR interventions and this can empower and better prepare patients for self-management (Mulder *et al* 2022).

MATERIALS AND METHODS

This quality improvement project was approved by MTW, and ethical approval was not required. Ashford, Dartford and Maidstone Hospitals were selected to become a HASU/ASU during a full review of Kent and Medway stroke services, including stakeholder consultation, judicial review and Secretary of State review. Due to multiple delays within this process, the closure of Medway ASU in June 2020 and the COVID-19 pandemic, Maidstone ASU saw an increase in activity from these challenges.

As an innovation development project, MTW collaborated with HNP to help develop a service to improve stroke patient flow and increase rehabilitation within the home environment. The aim was to safely support an increased number of stroke survivors at home, providing effective and intensive rehabilitation, and reduce the spread of COVID-19. The pathway is overseen by MTW stroke therapists, discharge liaison services and Hilton care.

The service accepted all patients diagnosed with an acute stroke living at home in West Kent who were medically fit for discharge and had ongoing rehabilitation goals. The eligibility criteria varied for each of the different stratifications (*Appendix*). The 'therapy only' stratification has eligibility criteria of therapy goals with no additional care needs. Patients were eligible for the other HSP stratifications if they had occupational therapy, physiotherapy or speech and language therapy rehabilitation goals and additional care needs. There are three different stratifications available, allowing a flexible needs approach to service and rehabilitation provided. These stratifications are:

- **Intensive**: 24-hour single-handed care up to seven days, with the aim to progress to the other stratifications.
- **Moderate**: Double handed visits up to four times a day for a maximum of six weeks
- **Recovery**: Single handed visits up to four times a day for a maximum of six weeks

The aims of HSP are to:

- Enable safe discharge home for stroke patients requiring specialist rehabilitation as soon as they are medically fit.
- Ensure patients' stroke-specific rehabilitation and care was delivered safely and effectively.
- Provide a flexible service supporting patients with a variety of stroke needs.

Pilot

A pilot of the change of service was completed between December 2020 and June 2021 due to the closure of neighbouring stroke units and significant increase in MTW stroke activity. The pilot was formally evaluated and presented to the ICB and NHS Trust executive teams. Due to the success of the pilot, MTW decided to continue this service as standard clinical practice for Maidstone Stroke Unit. The service is only currently a model used at Maidstone Hospital as the service is funded within MTW.

Measures

Five key criteria are collated by MTW and HNP and monitored monthly: financial performance, clinical service delivery, quality of care, patient experience and stakeholder feedback. All measures were used to evaluate the service and are routinely collected as part of normal clinical care. The pathway is registered and meets all the criteria for an ESD service under the Senital Stroke National Audit Programme (SSNAP) system; therefore therapy days and minutes are systematically recorded. The Modified Rankin Scale (mRS) and stroke Therapy Outcome Measures (TOMs) are recorded on admission and discharge to monitor functional improvement. The stroke TOMs was chosen as it describes the abilities of an individual across four dimensions and demonstrates change. The dimensions include: Impairment, Activity, Participation and Wellbeing. Previous research suggests the stroke TOMs are reliable and valid outcome measure (Enderby and John, 2019). Individual holistic goals are set for each patient via goal and task sheets for the HNP carers to incorporate rehabilitation into each visit.

Current practice

Figure 2 explains the current practice of the HSP pathway from the acute setting into the community. If patients became medically unwell, they were transferred back to Maidstone HASU and could rejoin the HSP service once medically stable and if there were no changes in their rehabilitation goals.

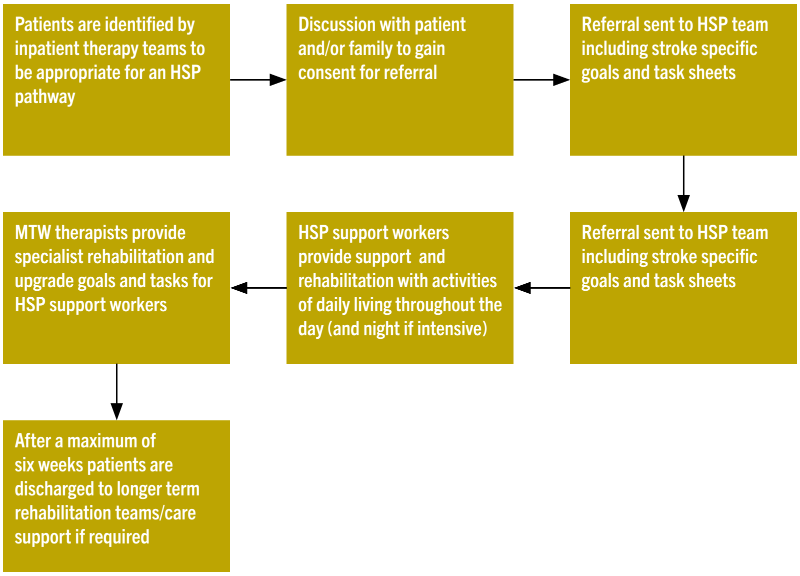


Figure 2 HSP pathway

RESULTS

The following section demonstrates the service evaluation results within the five key criteria: financial, clinical service delivery, quality of care, patient experience and stakeholder feedback.

Financial benefits

During 2022 there were a total of 150 patients with an average of 12.5 patients per week. The cost of the service per year is £642,914.00.

However, during the pilot period, a cost analysis was completed of bed days saved from stroke patients completing their rehabilitation at home. This analysis calculated that this service saved MTW £925,486.00 per year.

Clinical service delivery

Patient outcome measures, service stratification utilisation and social care requirements were collated and reviewed during a monthly service review meeting to ensure high standards of care are ongoing.

Modified Rankin Scale (mRS)

During 2022 the median mRS on admission to the HSP pathway was three, and the discharge score was a median of two, implying that most of the patients on HSP during this year have moved from a moderate disability to slight disability (Banks and Marotta, 2007).

> *The biggest improvement has been seen at an activity level, meaning that the patients leaving the pathway are able to complete more day-to-day tasks for themselves.*

Therapy Outcome Measures (TOMs)

There has been a significant difference in the average stroke TOMs admission vs discharge scores in three out of four domains: impairment, activity and participation (significant difference ≥0.5) (Enderby and John 2019), showing the excellent outcomes that intensive daily stroke specialist therapy can help to achieve.

The biggest improvement has been seen at an activity level, meaning that the patients leaving the pathway are able to complete more day-to-day tasks for themselves. The only domain that has not improved significantly is wellbeing which could be linked to the lack of psychological support for patients on the pathway, demonstrated in *Table 1* and *Figure 3*.

DOMAIN	ADMISSION	DISCHARGE	DIFFERENCE
Impairments	3.45	4.10	0.65
Activity	3.56	4.26	0.70
Participation	3.50	4.10	0.60
Wellbeing	4.37	4.74	0.37

Table 1 Admission and Discharge TOMs score for 2022

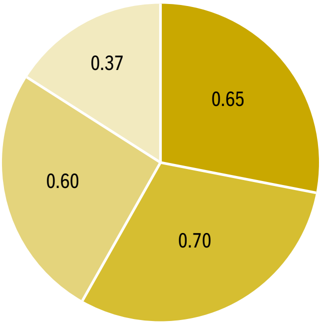


Figure 3 Difference in TOMs score 2022

Table 2 shows the usage of the different stratifications during 2022, demonstrating the dependency of the patients is mirroring a traditional ESD. However, the usage of the moderate and intensive stratifications enabled for more complex patients to be managed at home compared to ESD, adding an extra dimension to support needs-based rehabilitation at home.

STRATIFICATION LEVEL	FREQUENCY OF STROKE SURVIVOR USAGE FOR 2022
Recovery	132
Moderate	7
Intensive	11

Table 2 Pathway usage for patients on HSP from January 2022 to December 2022

Table 3 shows the level of social care required for patients when leaving the HSP service, over a 12-month period. This highlights the 82% of patients leaving the service were independent and did not require ongoing care.

OUTCOMES	NUMBER OF PATIENTS	PERCENTAGE
Independent	123	82%
Private care package	6	4%
Readmitted, decline in health/infection/fall	9	6%
Enablement to reduce ongoing social care needs	9	6%
Social services care package	1	1%
Rehabilitation bed	1	1%
Respite bed	1	1%

Table 3 Social care required on discharge for patients on HSP from January 2022 to December 2022

Quality of care

Quality of care included local governance reporting as per MTW protocols, but additionally was monitored by SSNAP results.

SSNAP

The HSP service is registered on SSNAP as an ESD service and fulfils all the SSNAP criteria required (SSNAP 2021). Traditional ESD have 24 hours as a target to initially see patients; however HSP has a 4-hour target for initial contact.

At time of writing, national clinical guidelines recommend that people with stroke should be offered and participate in at least 45 minutes of each appropriate therapy every day, at a frequency that enables them to meet their rehabilitation goals, and for as long as they are willing and capable of participating and showing measurable benefit from treatment (*National Stroke Programme 2022*, page 9). *Figure 4* shows that the median number of minutes for all disciplines within the HSP team are higher than the national average. There are fluctuations in SSNAP results throughout the year due to staffing levels and redistribution of staff to support other stroke pathway service demands, which reflects a common challenge within NHS service redesign.

Figure 5 shows that during the period of January 2022 and January 2023 the HSP pathway provided therapy for a significantly higher percentage of days than the national average.

The SSNAP results imply that patients on the HSP service were getting high intensity rehabilitation within their homes for occupational therapy, physiotherapy and speech and language therapy. The benefits of higher intensity rehabilitation can be seen in the improvements in the clinical outcome measure recorded.

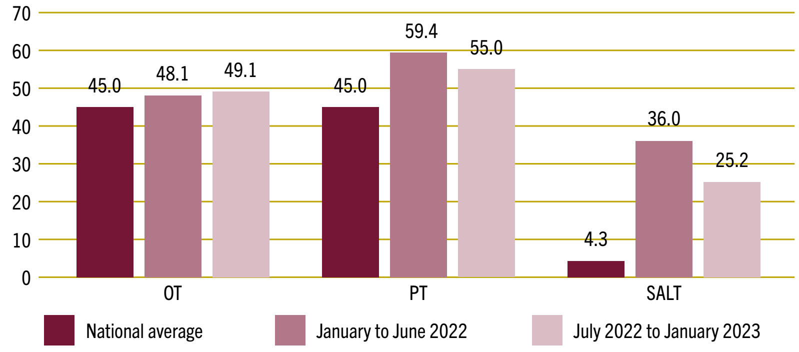


Figure 4 Median number of therapy minutes provided

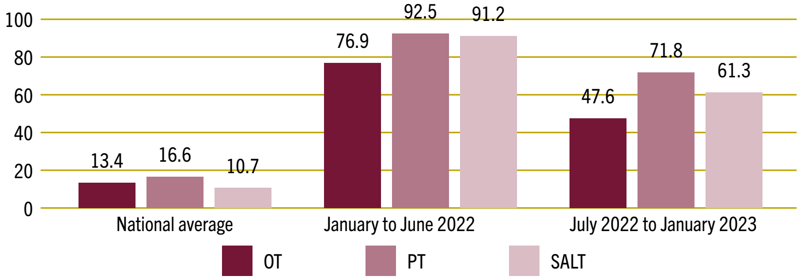


Figure 5 Median percentage of days on which therapy is received

Patient experience

Friends and family feedback was collated regarding the new service model, with a large proportion of results positive. Below demonstrates a few quotes collated from stroke survivors about their experience on HSP.

> "…*The staff were all wonderful, including some of the new recruits in the Hilton team*…"

> "…*very positive for the future and can't thank everyone enough*…"

Any common themes for improvement were reviewed in monthly service review meetings with appropriate action for implementation.

Stakeholder feedback

Staff and other stakeholders' feedback is collated and reviewed within the monthly service review meeting and other stroke-specific pathways governance meetings.

Common staff feedback themes are:

- Sense of achievement
- Positive, motivated and confident with new pathway
- Less fearful about sending patients home earlier within their rehabilitation journey.

DISCUSSION

The integration of HNP and the MTW multidisciplinary team (MDT) enabled safe and effective facilitation for stroke patients to continue rehabilitation in their homes, whilst achieving high levels of intensity and independence. The results demonstrated that collaborating with external care providers can increase the flexibility within ESD, enabling a shift towards a needs-based rehabilitation model for a more diverse group of stroke survivors. The NHS Long Term Plan (2019) reports the need to allow a greater number of patients to be given the choice as to where they undertake their treatment and to enable more rehabilitation to occur at home. This quality improvement project has demonstrated that collaboration can be cost efficient and effective at improving stroke survivors' care and functional outcome (NHS 2019).

The HSP model was effective in reducing the amount of time spent on a stroke unit, facilitating earlier discharge home to continue rehabilitation and the 4-hour review target enabled stroke survivors to feel supported with their transition from secondary to primary care. This is reflected from the patient feedback collated and reviewed in the regular service review meetings.

Intercollegiate Stroke Working Party (2023, page 66) suggest that stroke survivors should be able to have intensive rehabilitation for up to three hours a day for motor deficits to improve functional outcome. The structure of the HSP meant that stroke survivors received a minimum of four visits a day facilitating intensive rehabilitation. The current level of intensity is significantly higher than the national average in the SSNAP

The pathway was well received by stroke survivors and staff, providing a direction of travel towards community-based stroke rehabilitation services which reflect the national guidelines for stroke services.

results. Stroke survivors using the HSP currently receive an average of 2.4 hours of therapy a day for a significantly greater number of days than the national average. The innovation to increased intensity and the flexibility to encompass a larger, diverse caseload than ESD has enabled a wider group of patients to return to their previous functional and social participations as demonstrated in the stroke TOMS results, which had four domains with a 'Minimally Important Clinical Difference of ≥0.5' (Enderby and John 2019). The HSP has shown significant improvement with functional outcomes and integration back into occupational roles. In 2022, 82% of the patients did not require further social care at the end of the pathway.

However, wellbeing results have not improved as quickly, but this may be due to recruitment challenges within neuropsychology. Having a specialist neuropsychology MDT member should help to improve overall wellbeing as well as functional ability, both vital for stroke survivors (National Stroke Programme 2022). The capacity to return to occupational roles has wider societal benefit, such as allowing people to return to work and reducing carer burden (Moore *et al* 2023). However, analysis of this benefit was outside of the scope of this quality improvement project. We recommend that the long term societal and financial benefits of this pathway model should be explored in future research.

There are known challenges of funding and recruiting specialist therapists when covering a large geographical area, such as West Kent (ISDN 2021). However, the innovation of using alternative workforce models and improvements in technology enables the format and scope to increase the intensity of rehabilitation. Furthermore, telerehabilitation services, via virtual groups, self-management programmes and online exercise regimes being overseen by the therapists have provided positive outcomes (*Intercollegiate Stroke Working Party* 2023, page 82). These telerehabilitation services are being explored at an operational level for future development within the HSP and could help overcome some of the common challenges within community-based stroke rehabilitation.

This project is a positive example of innovation in which a flexible and adaptive model of care, when compared to a traditional ESD structure, allows for improvement in quality of care by providing faster transition from the acute stroke unit into the community setting (Stroke GIRFT 2022). This project found the high number of visits initially has meant that the falls risk and incident numbers have been low. Stroke survivors' transition from acute to home setting has commonly been highlighted as challenging (Chen *et al* 2021), with stroke survivor feedback extremely positive (Hilton Nursing Partners 2023). Adapting the structure of service provision has helped to overcome this difficult yet vital part of rehabilitation.

As part of the development of this service, training was provided to HNP, thus providing carers with additional stroke-specific skills. HNP invested in technology and IT training for their staff, demonstrating the company's innovative ethos. The joint working with a qualified MTW stroke therapist further supported their training for complex stroke survivors. The project also allowed for the therapy staff to rotate into the service, gaining additional knowledge and understanding of community services, providing new opportunities for personal development and improved discharge decision-making in the acute setting. Additionally, the acute staff were supported in decision-making, as the HSP MTW stroke therapists came into the acute stroke unit for joint reviews of complex cases. This allowed competency-based development of the total workforce and increased the variety of work for staff, which has been demonstrated to improve workforce retention (NHS 2019, KMPG International 2023). The investment in staff development was reflected in the common themes from the stakeholder feedback.

The multi-organisational working of the HSP has increased acute bed capacity with supported timely discharge, thus significantly reducing the cost of bed days within the acute stroke unit, leading to financial saving for MTW. Innovation to move away from traditional models of care correlates with the need to use taxpayers' money more effectively (NHS 2019). However, HSP is currently only commissioned for six weeks of rehabilitation, meaning those who still have ongoing rehabilitation requirements often have to wait prior to continuing towards their goals with the community providers.

There are limitations of the service evaluation methodology including the lack of previous research and data to compare with the effectiveness of the new model of community-based rehabilitation. Additionally, a convenience sample of stroke survivors within one geographical area means there is lack of generalisability of the results of the service evaluation to the wider stroke population. The main clinical challenge identified was the access to medical care via the local general practitioner. The patients on HSP have more complex needs than those who use traditional ESD pathways; therefore, receiving responsive input and advice for common post stroke complaints, such as spasticity, pain and continence support, is an ongoing barrier. The National Stroke Programme (2022) argue that medical and nursing staff are key members of an ESD team; therefore, exploration needs to occur to incorporate these roles within the core team for the HSP. Futhermore, the results identified small usage of the moderate and intensive pathways, highlighting ongoing educational needs for ASU therapy staff for effective utilisation. The service has attempted to overcome this challenge by increasing in-reaching from MTW HSP therapists to support and educate those with more complex discharges via HSP.

However, the results demonstrate the service evaluation effectively utilised innovation and implementation of the evidence-based practice which shape stroke-specific guidelines and recommendations but also the NHS Long Term Strategy (NHS 2019) within a busy and challenging clinical environment. This suggests that this model of care within stroke could enhance the traditional ESD model of rehabilitation and adds to the body of evidence supporting the need for increase investment within community-based stroke rehabilitation. However, caution needs to be taken as to the impact of this service evaluation and further in-depth research is required to understand the full impacts and benefits for stroke survivors.

CONCLUSION

This service evaluation demonstrated what can be achieved in a short timeframe and in challenging circumstances. The implementation was robust and a positive use of NHS resources to proactively enable changes in stroke service provision across West Kent. The pathway was well received by stoke survivors and staff, providing a direction of travel towards community-based stroke rehabilitation services which reflect the national guidelines for stroke services. It successfully demonstrates how collaboration with external partners can enhance traditional rehabilitation models to work towards a flexible and needs-based rehabilitation, more suitable for the rapid development of stroke services in the modern-day NHS (Intercollegiate Stroke Working Party 2023, NICE 2013).

Ongoing development and recommendations for the service are:

1. Increase the breadth of MDT professionals to include a specialist stroke nurse, medical staff and neuropsychologist.
2. Increase the service provision from qualified therapy staff to cover seven days a week.
3. Increase innovative use of technology; via virtual groups, increase use of apps and increased self-directed therapy sessions.
4. Develop robust data collection systems for non-SSNAP information.
5. Formalise a stroke-specific training programme for collaborative partner staff development.
6. Continue to work with local community providers to develop stroke rehabilitation past the six-week period.
7. Increase stroke survivors' self-efficacy and rehabilitation management by encompassing the option for a greater number to continue their rehabilitation journey at home.
8. Ongoing research into the rehabilitation model used within HSP.

REFERENCES

Auger L-P, Moreau E, Côté O, Guerrera R, Rochette A, Kairy D (2023) *Implementation of telerehabilitation in an early supported discharge stroke rehabilitation programme before and during Covid-19: An exploration of influencing factors* Disabilities 3 pp87-104.

Banks JL, Moratta CA (2007) *Outcomes validity and reliability of the Modified Rankin Scale: Implications for stroke clinical trials* Stroke 38 (3) pp1091-1096.

Chen L, Dongxia Xiao L, Chamberlain D, Newman P (2021) *Enablers and barriers in hospital-to-home transitional care for stroke survivors and caregivers: A systematic review* Journal of Clinical Nursing.

Cutting J, Chenery E (2021) *Evaluation of home stroke rehabilitation pilot* [PowerPoint presentation]. Available via Maidstone and Tunbridge Wells NHS Trust. (Accessed on: 21st June 2023).

Enderby P, John A (2019) *Therapy Outcome Measure: User Guide and Scales* 3rd Edition, Croydon, J&R Press Ltd.

Gittins M, Lugo-Palacios D, Vail A, Bowen A, Paley L, Bray B, Gannon B, Tyson S (2020) *Delivery, dose, outcomes and resource use of stroke therapy: the SSNAPIEST observational study* Health Services and Delivery Research 8 (17).

Hilton Nursing Partners (2023) *Home Rehab Contract Monitoring Meeting* [PowerPoint Presentation]. Available via Maidstone and Tunbridge Wells NHS Trust. (Accessed on: 21st June 2023).

Intercollegiate Stroke Working Party (2023) *National Clinical Guidelines for Stroke*.

Kent and Medway Integrated Stroke Delivery Network (ISDN) (2021) *Developing a future stroke workforce model for Kent and Medway*. K&M ISDN.

Kent and Medway Integrated Stroke Delivery Network (ISDN) (2022) *ICSS and LAS transformation work plan 2022/23*. K&M ISDN.

KMPG International (2023) *Healthcare Horizons*.

Moore N, Reeder S, O'Keefe S, Alves-Stein S, Schneider E, Moloney K, Radford K, Lannin NA (2023) *"I've still got a job to go back to": the importance of early vocational rehabilitation after stroke* Disability and Rehabilitation 46 (13) pp2769-2776.

Mulder M, Nikamp C, Nijland R, Van Wegan E, Prinsen E, Vloothuis J, Buurke J, Kwakkel G (2022) *Can telerehabilitation services combined with caregiver-mediated exercises improve early supportive discharge services post stroke? A study protocol for a multicentre, observer-blinded, randomised control trial* BMC Neurology 22 (1) pp1-10.

National Health Service (NHS) (2019) *The NHS Long Term Plan*.

National Stroke Programme (2022) *National service model for an integrated community stroke service*.

Royal College of Physicians (RCP) (2016) *Stroke Guidelines*.

Sentinel Stroke National Audit Programme (SSNAP) (2021) *Post-acute Organisational Audit proforma*.

Stroke Getting It Right First Time (2022) *GIRFT Programme National Speciality Report*.

CORRESPONDING AUTHOR

Catherine Mandri (MSc, BSc HONS, MCSP, MACPIN)
Clinical Lead for Stroke and Specialist Neurophysiotherapist, Maidstone and Tunbridge Wells NHS Trust. Co-Lead for Stroke Research, Kent Surrey and Sussex CRN
Catherinemandri@nhs.net
ORCID: 0000-0002-1032-9673
Social media:
X: @CatherineMandri
LinkedIn: www.linkedin.com/in/catherine-mandri-8b4787281

ACKNOWLEDGEMENTS

We would like to acknowledge the support from Maidstone and Tunbridge Wells NHS Trust and Hilton Nursing partners in developing this quality improvement project for publication.

DECLARATION OF INTEREST STATEMENT

No declarations of interest

APPENDIX

	HOME REHABILITATION HILTON STROKE PATHWAY Maximum six weeks		
Care stratification	Recovery (up to four daytime visits of less than one hour each.)	Moderate (double handed daytime visits and may require night support visits.)	Intensive at home (requires 24-hour support for up to seven days.)
1 Medical stability	■ Medically stable with no anticipated deterioration in condition.	■ Medically stable with no anticipated deterioration in condition.	■ May require increased level of care due to possibility of deterioration in condition. ■ May require a high-priority reassessment by SALT in the event of aspiration.
2 Nutrition and hydration	**MUST Score = 0** **Aspiration risk matrix: insignificant** ■ No NG management needs. ■ Normal or stable modified diet. ■ Able to eat and drink independently or with support from care staff.	**MUST Score below 1** **Aspiration risk matrix: < low** ■ No NG management needs. ■ Self-feeding rehab goals. ■ May require assistance with preparing and/or eating a modified diet (eg thickened fluids/puree diet).	**MUST Score up to < 2** **Aspiration risk matrix: < medium** ■ No NG management needs. ■ Therapy-led dysphagia rehabilitation goals. ■ Weekly monitored oral diet prescription. ■ May have PEG in situ and returning to tastes for pleasure.
3 Bowel and bladder	■ Patient may have double incontinence/in-dwelling catheter with DN intervention/care. ■ Management of continence overnight in place to prevent skin deterioration.	■ Patient may have double incontinence/in-dwelling catheter with DN intervention/care plan. ■ Management of continence overnight in place to prevent skin deterioration.	■ Patient may have double incontinence/in-dwelling catheter. ■ Must have TWOC and long-term catheter inserted.
4 Mobility	■ Less complex moving and handling. ■ Able to be left safely between visits. ■ Single handed. ■ Able to sit out for four hours in appropriate seating.	■ Routine physical issues. ■ Sarasteady or other appropriate mobility aids. ■ 1-2 to handle. ■ Able to sit out for four hours in appropriate seating.	■ Routine physical issues. ■ Sarasteady or other appropriate mobility aids. ■ 1-2 to handle. ■ Daily physio input required for a designated period.
5 Positioning and pressure damange prevention	**Waterlow score 10–14** ■ No pressure damage or low risk. ■ Requires weekly reassessment.	**Waterlow score 10–14** ■ No pressure damage or low risk. ■ Requires three times per week reassessment.	**Waterlow score 15–19** ■ Daily assessment of pressure areas required. May require DN input. ■ Reposition overnight with one person.
6 Pain and medication management	■ Pain well controlled or no pain. ■ Compliant with taking medication but may need some assistance.	■ Pain well controlled or no pain. ■ Compliant with taking medication but may need some assistance.	■ Pain well controlled or no pain. ■ Compliant with taking medication but may need some assistance.
7 Vision and perception	■ Patient is aware of potential risks/safety issues; is compliant with safety recommendations; is safe to be left between care visits including overnight.	■ Patient is aware of potential risks/safety issues; is compliant with safety recommendations; is able to call for help/able to raise alarm; is safe to be left between care call; may require night visits. ■ Regular 1–2 x weekly OT review.	■ May have impaired vision and initially require 24/7 support; unaware of safety issues/potential risks; not compliant with safety recommendations; unable to call for help; cannot be left alone between visits or overnight. ■ Daily OT/OTAP contact.
8 Communication	■ Good insight, no safety concerns. ■ Self-managing impairment, good support. Mild/moderate aphasia/ communication difficulties/dysarthria. Mild listener burden. ■ 1 x weekly SALT review	■ Good insight/family able to support. ■ Moderate aphasia/communication difficulties. Requires structured environment strategies. ■ Moderate listener burden. ■ Regular 1–2 x weekly SLT and OT review.	■ Severe aphasia/communication difficulties. ■ Initial safety concerns and potential low insight for review in functional setting. ■ May require specialist AAC assessment and input. ■ Moderate to high listener burden. ■ Daily SLT/SALTA contact.
9 Cognitive impairement	■ Mild cognition impairment. ■ Patient is aware of potential risks/safety issues; is complaint with safety recommendations; is able to call for help; is safe to be left between visits including overnight. ■ 1 x week OT review.	■ Mild/moderate cognitive impairment. ■ Patient is aware of potential risks/safety issues; is compliant with safety recommendations; able to call for help/someone in property to raise alarm; safe to be left between care visits. ■ Regular 1–2 x weekly OT review.	■ Moderate/severe cognitive impairment/unaware of safety issues/potential risks; not complaint with safety recommendations; unable to call for help; unable to be left between visits or overnight. ■ Daily OT/OTAP contact.
10 Pyschological care	■ No significant mode issues/behaviour issues.	■ No significant mode issues/behaviour issues.	■ Mild mood disorder. ■ Patient is happy to be at home with the designated level of support maybe 24/7 initially.
11 End of life care	N/A	N/A	May require end of life care

acpin
Connecting knowledge and practice

Advance
Expand
Lead

ACPIN International Conference 2024

Igniting progress

Thursday 16th and
Friday 17th May 2024

Advancing skills, expanding knowledge, leading change in neurophysiotherapy

Abstracts

The factors influencing delivery of constraint-induced movement therapy for upper limb recovery in stroke

A systematic literature review

Alex Christiansen
Great Western Hospital NHS Foundation Trust, Swindon, United Kingdom

Background

Constraint-induced movement therapy (CIMT) is a recommended treatment approach to improve upper limb (UL) function after stroke. However, it is not routinely used in clinical practice. There is a wealth of research into the efficacy of CIMT, with only some studies investigating barriers to delivery. The factors affecting delivery have not been explored through a systematic literature review (SLR) before.

Aims

The aim of this systematic literature review is to summarise and critique the current literature describing the influencing factors for the implementation of CIMT for UL recovery after stroke.

Summary of review

Electronic databases (AMED, CINAHL, Cochrane and Medline) were searched for studies investigating the barriers or facilitators to delivery of CIMT with adult stroke patients. 338 articles were identified through initial searching; ten articles were included in this review following removal of duplicates and application of eligibility criteria. The appropriate Critical Appraisal Skills Programme (CASP) framework was applied to each study, followed by thematic analysis to identify results.

Conclusion

Therapist knowledge, experience and confidence in implementing CIMT is a significant influencing factor. Typically, patients were not a limiting factor, but therapists' perceptions of patients' motivation were more widely reported to limit delivery. Elements were compounded by organisational factors including manager support, organisational priorities, resources, time and training support. Therapists are encouraged to attend training courses on the delivery of CIMT, where possible, to gain experience for them to confidently deliver CIMT, rather than learn solely through reading literature. Clinical leaders should explore the organisational barriers of resource, service priorities and managerial support to facilitate the delivery of CIMT.

Safety, feasibility and efficacy of assessing and treating benign paroxysmal positional vertigo in acute traumatic brain injury

A multi-centre randomised trial

Rebecca Smith[1], Caroline Burgess[2], Jenna Beattie[3], Abby Newdick[4], Vassilios Tahtis[5], Bithi Sahu[1], John Golding[6], Jonathan Marsden[7], Barry Seemungal[1]

Background

Benign paroxysmal positional vertigo (BPPV) affects approximately half of moderate–severe acute traumatic brain injury (TBI) patients. Importantly, BPPV is linked to physical and psychosocial impairments and heightened risk of falls. Despite this, there are no data on the safety and practicability of assessment or the effectiveness of treatment. We aimed to evaluate the safety and practicability of BPPV assessment and treatment in acute TBI.

Methods

This was a three-armed, parallel groups randomised feasibility trial recruiting from three major trauma centres in London, with 12-week follow-up. Following assessment, BPPV-positive patients were randomly allocated to one of three interventions (Repositioning manoeuvres, Brandt-Daroff exercises or advice). Outcome assessors were blinded to the intervention. Recruitment was via convenience sampling to gather a cohort of participants over 18 years' old with a confirmed, non-penetrating acute TBI. Exclusion criteria were orthopaedic or medical instability, or GCS < 14 at assessment.

Results

2014 patients were screened. 1818 were excluded or declined to participate. 196 were consented, of whom 8% (16/196) could not be assessed due to discharge. Of 180 patients, 34% (62/180) had BPPV, with 58 patients receiving an intervention (Four cases were discharged prior to intervention). No serious adverse events were recorded, with six adverse events of vomiting reported. Intervention fidelity data noted treatments were delivered accurately and consistently across all sites. Trial progression criteria were met indicating scope to move to a fuller randomised controlled trial. 35/58 (60%) patients' BPPV had resolved by the 12-week follow-up. Repositioning manoeuvres demonstrated higher BPPV resolution (78%) compared to Brandt-Daroff exercises (42%) or advice (53%). Ten patients experienced recurrence.

Conclusions

Our data demonstrated the safety and feasibility of BPPV assessment and treatment in acute TBI. Although repositioning manoeuvres provided superior BPPV resolution, a definitive trial would be required to confirm these findings as well as the optimal time to treat given recurrence rates.

Exploring social, cultural and environmental factors that influence the meaning of, and attitudes to, exercise among people with Parkinson's disease

A qualitative study.

Fred Baron, Angeliki Bogosian
University of London, London, United Kingdom

Background

Exercise is recommended for people with Parkinson's disease (PD). It can improve mobility and reduce falls, and in high doses may slow symptom progression. Social, cultural and environmental factors can influence exercise behaviours, but there is a paucity of this research among people with PD.

Objective

To explore the social, cultural and environmental factors that influence the meaning of, and attitudes to, exercise among people with PD (PwP).

Methods

We conducted 18 semi-structured face-to-face, online or phone interviews with PwP. Interviews used a lifespan approach to identify factors influencing participants' exercise behaviours before and after their diagnosis of PD. Participants were recruited through Parkinson's UK local support groups and nationwide research databases. Reflexive thematic analysis was used to analyse the data. Patient and physiotherapist advisory groups provided advice on study design, materials and data analysis.

Results

Three main themes were identified:

1. Why I exercise
2. What helps, and
3. Exercise with Parkinson's

Participants had a variety of core reasons which motivated them to exercise through their lifetime: mood and well-being, body image, competition and camaraderie. Having active partners, supportive work, and varied exercise options were among the important facilitators of exercise across their lifetimes. Participants believed strongly in the benefits of exercise for PD, but reported feelings of guilt about not exercising enough and frustration when symptom progression made it harder to continue.

Conclusions

Lifespan interviews can reveal important intrinsic and external influences on exercise behaviour among PwP, and could be used to develop individualised exercise interventions in future trials.

---

[1] Imperial College London, London, United Kingdom.
[2] King's College London, London, United Kingdom.
[3] Imperial College Healthcare NHS Trust, London, United Kingdom.
[4] St George's Hospital NHS Trust, London, United Kingdom.
[5] King's College Hospital NHS Trust, London, United Kingdom.
[6] University of Westminster, London, United Kingdom.
[7] Plymouth University, Plymouth, United Kingdom.

The MiNT Academy: an innovative platform for clinical education and neurotechnology development

An initial service evaluation

Alison Watt[1,2], Amy Dennis-Jones[1,2]

Objective

The objective of this abstract is to highlight the educational platform of the MiNT Academy, which aims to promote the clinical adoption of neurotechnology, support digital workforce transformation, and promote evidence-based practice.

Methods

The MiNT Academy is an interdisciplinary team that created therapy-focused educational content. The core educational activities were reviewed, which included completing a free e-learning Level 1 module on Neurotechnology Theory, an in-person Neurotechnology Study Day for pre-registration physiotherapy students, and attending the MiNT UK 2023 Conference, which was attended by a cross-sector audience. All learners were provided with feedback questionnaires, and the responses were analysed for themes and critical data points.

Results

The results showed that the Level 1 training had 316 clinicians registered, of which 16% completed the module. The Neurotechnology Study Day was attended by 97 students from the University of West England. 121 individuals attended the MiNT UK conference, with a 54% questionnaire response rate. The key positive themes that emerged included networking opportunities, knowledgeable speakers, content quality and clinical perspectives. Conversely, the two key negative themes were content repetition and day length. Common future suggestions were hands-on sessions and additional NHS examples.

Conclusion

The MiNT Academy's educational platform has the potential to enable technology application and promote evidence-based practice. The feedback from the learners has been positive, and the identified areas of improvement, such as avoiding repetition, having knowledgeable speakers and providing hands-on training, will be essential for future MiNT education. The MiNT Academy will continue to utilise feedback to improve and better reach target audiences, highlighting practice relevance, liaising with more universities to establish study days and developing electronic sharing links for learners to connect colleagues.

---

1 The MiNT Academy, Bristol, United Kingdom.
2 Hobbs Rehabilitation, Winchester, United Kingdom.

Shoulder pain in the neurological patient

Current management in Level 1 in-patient neurorehabilitation servicess across London

Michele Walsh[1], Alison Knight[1], Rachel Higgins[2], Celine Lakra[2], Shona Bruce[3], Martine Nadler[4], Lawrence Hayes[4], Amber Murray-Smith[5], Aideen Steed[1], Stephen Ashford[1], Hilary Rose[1], Ben Beare[2], Will Goodison[2], Jenny Parker[2]

Background

Shoulder pain following brain injury is a common impairment which impacts rehabilitation outcomes and independently predicts reduced quality of life. Despite its frequency and significant consequence, best practice regarding management remains unclear.

Aim

In the absence of clinical guidelines or national consensus, this London-based collaboration aimed to identify and describe clinical practices related to shoulder pain in patients with a diagnosed neurological condition requiring Level 1 in-patient neurorehabilitation.

Method

Representatives from five Level 1 rehabilitation units in London participated in six virtual meetings between October 2022 to October 2023. A minimum of three units were represented at each meeting. Current practice was determined via interview questions and peer-to-peer discussion. Areas of commonality and difference were explored and possible reasons for variance were discussed.

Results and discussion

All professionals agreed that shoulder pain in this patient group requires an MDT approach for assessment/management.

Areas with differences in service delivery included the use of electrical stimulation, accessory/passive movements and injection therapy.

- Electrical stimulation was used by all units, but in varying dosage, frequency, intensity or pad placement.
- Passive/accessory movements, which have a limited evidence base within this population, were used in some units but not others.
- Botulinum toxin was consistently available, but not steroid injection or suprascapular nerve blocks.

Conclusion

Management of shoulder pain across Level 1 in-patient neuro-rehabilitation services across London is evidence based but with differences in service delivery and specialist interventions available. A national consensus on best practice would be helpful to expand this initial exploration.

---

1 Regional Hyper-acute Rehabilitation Unit, Northwick Park Hospital, London North West Hospitals Trust, London, United Kingdom.
2 National Rehabilitation Unit, National Hospital for Neurology and Neurosurgery, London, United Kingdom.
3 Regional Neurological Rehabilitation Unit, Homerton Hospital, London, United Kingdom.
4 Wolfson Rehabilitation Centre, St Georges Hospital, London, United Kingdom.
5 Royal Hospital for Neuro-Disability, London, United Kingdom.

The effects of long-term attendance to a Parkinson's disease-specific exercise class

Annabelle Legal
Foundations Physio, Farnham,
United Kingdom

Aim

To understand the effects as assessed objectively via outcome measures (OMs) and subjectively in informal discussions of attending a PD specific weekly exercise class led by a neuro-physiotherapist.

Background

Participants diagnosed with PD attended an exercise class in a gym. FP partnered with Everyone Active for the purpose of encouraging patients to feel more confident working out in a gym setting. The class was led by a neurophysiotherapist who tailored the exercises to the patient's needs, every week for a year, using 'areas for improvement' (AFI) identified using OMs to create a new, impairment-specific workout each week. The class structure was ten minutes warm-up, 40 minutes circuit exercises, ten minutes cool-down.

Data collection

Data was recorded for each OM at the end of each round of eight weeks as follows:

- 1min STS
- 10m walk
- 10m walk CoM
- 10m walk MoM
- 3m backwards walk
- Balance SLS

Findings: all OMs improved after one year for all patients. Three patients stopped attending because of non-PD-related reasons. Each AFI identified at the end of an eight-week round improved in the following round (except on one instance across all patients/all year). Two patients reported improved participation in other classes or activities. One patient reported no functional improvement, but feeling that "I would be getting worse if I wasn't attending the class".

Conclusion

Continuous attendance to a PD-specific exercise class promotes holistic improvement in the long term. Improvements in components of gait such as walking speed and dual tasking abilities, endurance and reduced risk of falling were observed. Patients reported functionally improving or not deteriorating. All patients reported a psychological/emotional benefit to attending a weekly class in the long term.

Setting up and running of muscle cafes for neuromuscular patients

Nicola Grose, Gemma Martin, Elaine Burrows, Ann Morgan, Joanna McTiernan
North Bristol NHS Trust, Bristol,
United Kingdom

Background

The Southwest Neuromuscular Operational Delivery Network (SWNODN) is a specialist multidisciplinary team working to support patients with rare long-term muscle and nerve problems. In addition to the clinical service, the network aims to support patients' emotional and psychological wellbeing, encourage peer support and reduce isolation. Muscle cafes were inspired by other similar projects and set up to facilitate a social opportunity for those with often rare, neuromuscular conditions to get together and share experiences and learn from each other. Muscle cafes are a safe open space facilitated by professionals from the SWNODN.

Muscle cafes have been offered face to face and via Zoom (via Zoom through the pandemic).

Structure/format

Two-hour Zoom online session for patients to join and session facilitated by Network staff. There have been 17 muscle cafes since 2020 with 77 attendees (some attending regularly).

The muscle cafes have sometimes been general, themed, condition specific and patients invited within their geographical area to help encourage social connections.

Programme planned out for 2023.

Results and feedback

Results from a patient survey of those who had attended, conducted in 2022.

Includes some graphs on the poster from the patient survey, infographic, and patient quotes about their experience of attending.

Discussion

Positives and challenges of running the muscle cafes.

Future development highlighted.

Local muscle groups Muscular Dystrophy UK.
Pater R et al (2023) *267th ENMC International workshop: psychological interventions for improving quality of life in slowly progressive neuromuscular disorders* *Neuromuscular Disorders* 33 (7) 562-569.
Meade O *et al* (2018) *The use of an online support group for neuromuscular disorders: a thematic analysis of message postings* *Disability & Rehabilitation* 40 (19) pp2300-2310.
Holt N *et al* (2022) *Art on referral: remote delivery in primary and secondary care during the coronavirus pandemic* Evaluation Report, Arts Council England.

What do patients understand about the place of self-directed rehabilitation as part of their recovery following stroke, with emphasis on the learning involved for this self-directed practice?

Emily Hatch, Sally Davenport
University College London, London,
United Kingdom

Background

Rehabilitation following stroke requires intensive levels of practice to promote functional change. The revised stroke guidelines emphasised self-directed rehabilitation as a method to increase therapy time. In order to participate, adult learning theories suggest patients require the knowledge and motivation to engage. A service evaluation was carried out to explore patient understanding of the place of self-directed rehabilitation following stroke, with particular emphasis on the learning involved for this.

Methods

Patients admitted to an inpatient rehabilitation unit following stroke completed two semi-structured interviews and a questionnaire related to their understanding and experience of recovery and rehabilitation following stroke. Data were collected between April and June 2023. Interviews were transcribed and analysed thematically alongside questionnaire responses.

Results

Five patients, aged between 50 and 93 years (median 86 years), were interviewed. Two themes were identified from the data: "We are vulnerable laymen when it comes to stroke diagnosis and recovery" and "We want to engage in rehabilitation but need expert guidance". Due to a limited knowledge, patients require guidance to engage in therapy, therefore find self-directed practice difficult to initiate.

Conclusions

Patients following stroke have low levels of health literacy with limited understanding of their diagnosis or recovery. Whilst patients want to engage in rehabilitation and return to 'normal', due to a lack of knowledge and understanding, they do not know the place self-directed rehabilitation has in their recovery following stroke.

Establishing the optimal design of a Neurofit class using outcome measures and individual case studies

Ideas for widespread implementation

Kelly-Ann Rogers, Adam Poulter
Foundations Physio, Farnham,
United Kingdom

A Neurofit class was introduced to our service to improve patient function, establish a community for patients living with a neurological condition and build confidence exercising in a gym environment. We reflect on this one year on and formulate ideas for widespread use.

The class mirrors the Neurofit principles, challenging strength, flexibility, power and cardiovascular ability in a variety of neurological conditions.

The class is run for one hour and includes a warm-up, a circuits style exercise portion and cool down. We also explore other exercise formats including HIIT, boxing and Pilates to add variety and consistent attendance. The class is structured in eight-week blocks with outcome measures completed at the end of each block to highlight change.

Due to our small population size, we have analysed four cases for reflection; these include two stroke patients, one MS patient and one haemorrhage secondary to a cavernoma patient.

The outcomes reveal only the two stroke patients reach normative values by the end of their programmes. However, all but the MS case show functional improvement (see table). Our biggest triumph is two of these cases have self-discharged from the class and are now confident enough managing their rehabilitation independently. With the MS patient, they remain below normative values but have maintained their scores despite functional deterioration.

From reviewing the outcomes, they reveal the biggest improvement after 16 weeks. However, it would be beneficial to continue reviewing this over a longer time period to establish the optimal class length. Further functional and balance outcomes could also be implemented to highlight change in more depth and show a more personal impact. Suggestions include the Berg balance scale and the quality of life measure, the SF-36 survey.

Recovery of function through FES-assisted cycling therapy with virtual reality biofeedback in chronically spinal cord-injured people

Sarah Massey[1], Sue Paddison[2], Nick Donaldson[1], Jane Burridge[3], Dimitrios Airantzis[1], Lynsey Duffell[1]

Functional electrical stimulation (FES) cycling can improve muscle strength and facilitate neurological recovery in those living with spinal cord injury (SCI).

The iCycle was developed to promote active engagement with rehabilitation, by combining FES cycling with a virtual reality (VR) cycling-racing game.

In this pilot study, we have initially recruited two people with chronic SCI, who are marginal walkers (C1, T9; AIS D), to attend three iCycle training sessions per week for up to twelve weeks, with the option of exiting the trial at four and eight weeks.

Outcomes include:

- International Standards for Neurological Classification of SCI (ISNCSCI)
- 10-metre walk tests (10MWT)
- 6-minute walk tests (6MWT)
- Trunk Impairment Scale (TIS)
- Berg Balance scale (BBS)
- Walking Index for SCI (WISCI-II)
- Voluntary cycling power, assessed at Baseline, four, eight and twelve weeks.

Both participants had grade 4 or 5 ISNCSCI motor scores at baseline and showed no overall changes in motor or sensory ISNCSCI scores.

However, improvements at four weeks from Baseline in 10MWT time (-10 s, -3 s; P1, P2), 6MWT (+33 m, +135 m), and WISCI-II scores (+3, +1) were maintained until the end of the twelve-week period. P1 showed improvement at four weeks in TIS scores (+4), and incremental improvements in BBS, out of 56 (30, 40, 39, 41; Baseline, four, eight and twelve weeks).

Both participants improved their average voluntary cycling power across each four-week interval. Semi-structured interviews identified both enjoyed the VR cycling-racing game, reporting that it distracted from their physical exertion, helping with motivation.

Our preliminary results indicate that iCycle training may help with exercise motivation, providing increased voluntary power output during cycling, and improved walking and balance after four weeks for participants who are marginal walkers. However, iCycle training may not alter ISNCSCI sensory scores. A further four participants will be recruited into this ongoing study.

---

[1] University College London, London, United Kingdom.

[2] Royal National Orthopaedic Hospital Trust, Stanmore, United Kingdom.

[3] Southampton University, Southampton, United Kingdom.

Effectiveness of a twelve-month pilot neuroscience early supported discharge service on patient flow, readmissions rates, and clinician and patient experience

Merryn Waddy[1], Alice Watts[1],[2]

Introduction

There are rising health inequalities for patients with neuroscience conditions. Their clinical complexity is reflected in extended length of stay, high readmission rates, Emergency Department (ED) reattendance and demand for specialist therapies. The benefits of specialist early supported discharge services have been recognised within stroke care but have not been provisioned across other neurological conditions.

Objective

An Early Supported Discharge (ESD) service was developed, which aimed to support patient flow by expediting hospital discharge.

Methods

A pilot ESD service operated for twelve months, with 100 patients referred. Data was collected at time of referral and throughout the patient journey. The ESD service provided physiotherapy to patients with a neurological or neurosurgical diagnosis that showed rehabilitation potential on discharge. ESD provision began within 48 hours of discharge, for up to five weeks. Data was collected on bed day savings, rates of readmission, ED reattendance and ongoing rehabilitation needs.

Results

Thirty per cent of clinical presentations were Acquired Brain Injury and 16% a diagnosis of Functional Neurological Disorder (FND). The service reduced the length of stay by 3.4 days per patient, with total bed day savings of 293, with cost savings of £102,000 and revenue generation of £238,000. Incidence rates of ED reattendance for people with FND reduced from 21.9% to 5.8% within five weeks of discharge.

Conclusion

The piloted ESD expedited patient discharge and supported the transition from hospital to home. The service reduced the incidence of onward referral, improved longer term disability management and reduced unnecessary readmissions.

---

[1] North Bristol NHS Trust, Bristol, United Kingdom.

[2] Cardiff and Vale Univeristy Health Board, Cardiff, United Kingdom.

A novel hands-on tech circuit based therapy for inpatient stroke upper limb rehabilitation

A healthcare improvement project

Robert Bateman, Eva Nunez
The Wellington Hospital, London, United Kingdom

Following a stroke, up to 70% of patients experience loss of arm function leading to significant disability and reduced quality of life. National clinical guidelines have supported repetitive task practice characterised by a high number of repetitions that need to be substantially higher than is currently being delivered (RCP 2023).

There is a growing role for technology to aid delivering this intensity (Daly *et al* 2019). Auditing our service revealed upper limb rehabilitation was primarily delivered in a single 45-minute session five times per week. Time on task ranged from 19 minutes (Armeo Spring session) to three minutes (physiotherapy non-technology-based session).

The aim of this service improvement initiative was to enhance the opportunity for patients to engage in arm rehabilitation following stroke. The objective was to assess the feasibility and efficacy of a novel semi-supervised (1:3 paradigm) 90-minute (time scheduled) five times a week, circuit-based 'Hands-on-Tech' upper limb group for adult inpatients following stroke.

Feasibility would examine recruitment, intervention-related outcomes (adherence, adverse event and technology usability for staff and patients) alongside efficiency gains.

The primary outcome measure was the Fugl Meyer Upper Extremity (FM-UE) and Arm activity measure (ArmA). Five patients participated in the three-week pilot. Attendance was 95% with a mean time on task of 41 minutes. 1:3 paradigm was challenging and not consistently achieved. Three minor adverse events occurred relating to fatigue. Pre-to-three-week FM-UE gains were 7.8 points (23.6 to 31.4) indicating a clinically meaningful difference (Page *et al* 2012). Pre-to-three week ArmA section A and B demonstrated a clinical meaningful reduction of 7.2 points and 9.4 points respectively (Ashford *et al* 2014). A novel 'Hands-on-Tech' training appears feasible for in-patients post stroke. Follow-up evaluation of 1:3 paradigm in the moderately impaired upper limb stroke population is required.

Feasibility trial and project development of icf based neuro assessment application (Abilitate)

Laura Marriott, Louis Martinelli
Hobbs Rehabilitation, Winchester,
United Kingdom

Introduction

The International Classification of Functioning, Disability and Health (ICF) provides a standard language and framework for the description of health and health-related states known as domains, helping us to describe changes in body function and structure. The ICF records the presence and severity of deficits in function using qualifiers and coding for goal setting. This is a difficult process for a clinician to follow and share in a consolidated platform.

This feasibility study explored and determined the suitability and development of an ICF-based assessment and goal-setting tool in the form of a web application called Abilitate.

The Abilitate application, developed by tech2people, is a method of documentation and interdisciplinary exchange of clinical information. Used on a tablet/laptop in real time or in retrospect, it guides the clinician to consider impairment, function, and participation of goals and outcome measures.

Objectives

To review the current processes within standard practice, support the development of a web-based application to streamline data capture, and to address the continuity and quality of assessment and reassessment between clinicians, ensuring a seamless standard of practice.

Method

We trialled the application in two outpatient neurological rehabilitation centres located across the south coast of England with seven patients. The application was used for the initial and midpoint reassessment. During the trial, clinicians gave real-time feedback for app development.

Conclusion

We successfully implemented the application into clinical practice, noting the support it provided in prompting clinicians for reassessment and outcome measures. Data was captured and exportable, reducing the workload for documentation and report writing, standardising the process of assessment, outcome measures and language.

We were able to give feedback on technical terminology for global consistency. A more detailed and further trial is planned for 2024, using it in a single-site whole department for two months.

A qualitative analysis exploring role perception as a barrier to achieving adherence with national guidance on urinary continence care post-stroke

Laura Henderson[1,2], Graeme Wallace[2],
Charlotte Buttery[2], Sally Davenport[1]

Introduction

Urinary incontinence (UI) is an important clinical problem closely associated with disability, mortality and institutionalisation. The roles and responsibilities of different staff in delivering effective rehabilitative continence care after stroke is not prescriptive in current guidance although there is support for a multidisciplinary approach. Using qualitative methods, this evaluation aimed to explore staff's perception of their role in UI rehabilitation in an acute post-stroke environment.

Method

A questionnaire to explore staff experience, perceptions, confidence and knowledge of UI post-stroke was distributed to medics, nurses and allied health professionals. Responses informed a follow-up interview schedule and interviews were held with representation from each of the clinical groups. Framework analysis was used to identify themes at both stages.

Results

Analysis of 43 questionnaire responses identified four themes:

1. Roles and responsibilities
2. Current clinical practice
3. Training needs
4. Opportunities

These themes evolved in the wake of follow-up interviews into:

- A focus on containment and the impact of UI on patient well-being
- Invisibility of UI as a rehabilitative goal
- Readiness for change with recognition of the value of multidisciplinary working for UI rehabilitation

Conclusion

The acuity of care on an acute stroke unit was identified as making rehabilitation of UI challenging. The perception was, however, that addressing UI needs to be seen as a rehabilitative goal and that nurses, medics and allied health professionals can all play an important role in supporting delivery of this. MDT training and interdisciplinary working specific to UI may support a rehabilitative culture shift in UI care post-stroke.

---

[1] UCL, London, United Kingdom.
[2] Maidstone & Tunbridge Wells NHS Trust, Maidstone, United Kingdom.

Urinary incontinence post-stroke

A need for a multidisciplinary team approach

Laura Henderson[1,2], Graeme Wallace[2],
Sally Davenport[1]

Introduction

Urinary incontinence (UI) post-stroke has multifactorial causes including pre-existing urinary dysfunction, neurogenic UI and other functional impairments. Despite these different causes, there is a lack of role-identification amongst the MDT in post-stroke UI rehabilitation. This service evaluation aimed to assess associations between a range of measures to explore their relationship with UI.

Method

Using retrospective data analysis of first ever stroke survivors admitted to an acute stroke unit, continence status; age; sex; premorbid disability; stroke severity and subtype; and cognitive, transfer and language abilities were recorded. Outcome data on discharge included continence status, disability, transfer ability, discharge destination and length of stay. Univariate analysis was used to compare people with and without UI.

Results

Admission data on 84 people post-stroke showed that UI on admission was significantly associated with age, size of stroke and stroke subtype, as well as a lower Abbreviated Mental Test (AMT) scores ($p=0.038$), greater dependency with transfers ($p<0.001$) and higher degrees of aphasia ($p=0.033$). On discharge, results from 74 patients showed greater disability ($p<0.001$) and dependency with transfers ($p<0.001$), increased length of stay ($p<0.001$) and higher rates of institutionalisation ($p<0.001$) in patients with UI.

Conclusion

The data demonstrated a strong association between a range of impairments/activity limitations post-stroke and continence status at discharge. This confirms associations with cognition, communication and immobility which are less consistently reported in the literature. This suggests that a delivery model involving a greater multi-professional focus on UI care post-stroke is needed to address the different causes.

---

[1] UCL, London, United Kingdom.
[2] Maidstone & Tunbridge Wells NHS Trust, Maidstone, United Kingdom.

Service evaluation of patient and clinician experience of goal-setting practice in a Level 1 specialist inpatient rehabilitation service

Emma Dodds, Bethan Roberts, Ciara Preston, Aonghus Ryan
Oxford Centre for Enablement, Oxford, United Kingdom

Background

Rehabilitation is successful when person-centred and people's unique beliefs are identified. Values-based questionnaires are critical to ensure concurrence between life goals and treatment goals, which influences motivation. In practice, clinicians did not attend goal-setting meetings and patients were unaware of their goals.

Aims

To understand patient and clinician experience of goal setting. To compare frequency of goal setting and documentation with other Level 1 services.

Methods

Two bespoke surveys were designed. Information sheets detailing the background, aim and QR code survey link were emailed to all clinicians involved in goal setting, and printed for all patients. Clinicians and patients were invited to separate focus groups. Four services were contacted by email.

Results

Nine patients (50%) completed the survey. 6/9 strongly agreed their goals reflected what was important to them, 8/9 rated the importance of a written goal sheet and 7/9 had one.

24 clinicians (80%) completed the survey. 13/24 always attended the meetings, 18/24 always reviewed goals and 14/24 provided goal sheets. Seven patients (38%) joined the focus group and fed back experience of irregular meetings, absent clinicians and irrelevant goals. They indicated a wish to tick off goals and rate their attainment.

14 clinicians (46%) joined the focus group. Annual leave, non-working day, competing clinical demands and time-consuming documentation were barriers. Clinicians had mixed views about goal attainment: it might add complexity and time, but allow patients to rate progress.

Three services (75%) responded. Goal-setting frequency varied from weekly, fortnightly, to as needed. 2/3 used a values-based questionnaire, 1/3 used goal attainment scaling and 3/3 provided a goal sheet.

Conclusion

Attending goal-setting meetings was not prioritised by clinicians. Training will be delivered to help clinicians and patients understand the goal-setting process, paperwork will be streamlined and co-produced with patients, and the service will be re-evaluated.

Techniques and technologies in electrical stimulation for neuromuscular rehabilitation

A practical clinical guide (IET book)

Jane Burridge[1], Ian Swain[2], Tamsyn Street[3]

A new practical clinical guide for everyone interested in Functional Electrical Stimulation (FES) is coming soon and will be published in 2024.

The non-technical style of the book will ensure that it is accessible to clinicians who do not have a technical or engineering background. The book will include a wide variety of established FES applications, as well as those that have been developed more recently, providing example case studies demonstrating implementation into clinical practice. The book will provide insight into understanding the underlying neurophysiology and mechanisms that explain the effects of FES. Anyone conducting research, whether they be from a clinical, scientific or engineering background, will find that the book fills in the gaps in their knowledge and understanding.

---

[1] University of Southampton, Southampton, United Kingdom.
[2] Bournemouth University, Bournemouth, United Kingdom.
[3] Salisbury NHS Foundation Trust, Salisbury, United Kingdom.

Real-world use, walking ability, confidence improvement and patient satisfaction using lower limb orthoses provided after chronic stroke

An extended scope audit

Isabel Cary, Anthony C Pereira, Martine Nadler
St George's Hospitals NHS Foundation Trust, London, United Kingdom

Introduction

Provision of lower limb orthoses is recommended for neurological patients with lower limb deficits to improve walking which impacts on long-term patients' participation, disability and quality of life[1, 2]

Setting

Multidisciplinary tertiary orthotics clinic (London teaching hospital)

Methods

Records were retrospectively screened July 2022–July 2023 identifying stroke patients more than six weeks after orthosis provision.

- Record orthosis use (hours/week), satisfaction (numerical rating scale 0-10;NRS), walking ability +/- orthosis (Functional Ambulation Category, FAC), confidence +/- orthosis (NRS) and orthotic choice (clinician/patient).
- Record cognition, ability to don/doff orthosis independently and physiotherapy input.

Results

Two-hundred-and-fourteen neurological patients attended for 31 new assessments, 226 reviews and 135 fittings. Fifty stroke patients were surveyed: n=33 male, aged 59±12.3 years (mean SD), median time since stroke 3.7 years. 38/50 cognitively impaired (mild=25, moderate=13).

All except three patients were ambulant with their orthosis (median FAC 4). 27/50 were unable to walk at all without it.

Forty-six patients wore ankle-foot-orthoses (AFO); eight chose a different AFO to their recommended prescription, 4/50 had knee-ankle-foot orthoses (KAFO). Average weekly hours worn was 20–50 (n=33) and 1-5 (n=12) with five patients not wearing their orthosis at all. 30/50 patients had physiotherapy (past year).

Analysis

Satisfaction with orthoses was high 7.8/10±2.5 (mean SD). Confidence significantly increased (mean NRS increase 4.6/10) when walking with orthoses vs without (paired t test, $p<0.01$), regardless of hours worn. There was an association between increased confidence and overall satisfaction (paired t test, $p<0.01$).

All eight patients who chose an orthosis different to their ideal prescription wore them more than 20 hours/week. There was no association between cognition and hours worn or satisfaction. There was no significant association between ability to don/doff independently and hours worn (ANOVA).

---

[1] RCP (2023) *Stroke Guidelines*.
[2] Johnston *et al* (2021) *APTA Guideline*.

The experiences of professionals involved in coproduced health research projects

A qualitative systematic review

Karen Jones[1], Jude Isaac[1,2]

Background

The Chartered Society of Physiotherapy (CSP) highlights the importance of clinical research addressing the areas most meaningful to patients, carers and clinicians. This can be achieved by coproducing health research as a team of equal stakeholders. Limited research exists focusing on the experiences of professionals involved in such projects.

Aim

To explore the experiences of professionals involved in coproduced health research projects.

Methods

Systematic Review (MSc research project submitted October 2021).

- Search strategy: All relevant databases to identify qualitative research studies.
- PRISMA – 16,248 records were identified from databases. Following removal of duplicates and initial screening, seven studies were identified for analysis.
- Assessment of methodological quality: seven studies were critically appraised by two reviewers using the CASP critical appraisal tool, following which three further studies were excluded.
- Data extraction/synthesis: four articles underwent data extraction using the JBI QARI data extraction tool, and data was synthesised using a meta-aggregative approach.

Findings

Three main findings were established: factors facilitating the success of coproduction, barriers to co-production and positive outcomes of co-produced research.

Barriers included traditional research conventions, power struggles and researchers' understanding of coproduction. Facilitators included shared decision-making, flexibility and acceptance of other approaches. Researchers felt that coproduction gave research more credibility, and took research into new and different directions. There was a feeling of responsibility for raising the profile of coproduction and influencing its use in future research.

Recommendations

Shared decision-making should be embodied throughout the whole research process to capitalise on the different skills and experiences of a research team.

The conventions of traditional research that can be a barrier to coproduction should be challenged and adapted where possible.

Quality coproduced research can be valuable in informing the direction of future health research, care and services. Further clarification is needed regarding its definition and process in health research.

---

[1] Cardiff University, Cardiff, United Kingdom.
[2] Hywel Dda University Health Board, Carmarthenshire, United Kingdom.

Rehabilitation information for patients and family transferring to a neurorehabilitation unit

What is important and what is enough?

Christina Nodding, Dr Ciara Preston
Oxford Centre for Enablement, Oxford, United Kingdom

Introduction

The transition from acute hospital to inpatient neurorehabilitation can be uncertain for both patients and their family. People with acquired brain injury and their relatives should be provided with information about their rehabilitation to aid understanding, reduce anxiety and support health literacy.

Aims

To evaluate patient, family and carer opinion of current information provided on admission to a specialist neurorehabilitation unit.

Methods

Two surveys were designed in Microsoft Forms to capture patient, family and carer opinion on information they received at admission to rehabilitation. All data was anonymous; no identifiable information was recorded. Results informed the redesign of a new 'welcome pack'.

Results

Patients (n=9), families and carers (n=5) completed the surveys. 33% of patients (n = 3) reported they received no information about the ward routine or therapy timings. However, all family and carers indicated they received this information. 55% of patients (n = 5) and 40% of family and carers (n=2) reported they received enough information about planning and review of rehabilitation.

Comments ranged from "no information has been given about anything" to "they gave me a lot of information most of the time". Both groups suggested additional information should be provided including written information regarding facilities, parking and visiting times.

Conclusion

Information about rehabilitation should be provided to patients and their families to support health literacy. Patients, families and carers may require information in different formats to accommodate cognitive, communication, emotional and physical changes following brain injury and support understanding of the rehabilitation journey. A repeat survey with new patients, family and carers will identify if the new information provided has met their needs.

A study to determine the prevalence of vestibular dysfunction in people with multiple sclerosis (MS) attending the outpatient service in St James's Hospital (SJH), and to investigate the usability and effects of Vertigenius™, a mobile health application

Gillian Quinn[1], Hugh Kearney[1], Dara Meldrum[2]

Background

Vestibular pathology including vertigo, gaze instability and balance are common in people with MS. Vestibular rehabilitation therapy (VRT) is a specialised, non-invasive form of therapy which is effective in people with MS for improving balance, quality of life and fatigue.

Objective

To determine the prevalence of vestibular dysfunction in people with MS attending SJH. The secondary aim was to determine the usability of Vertigenius™, a mobile health application designed for delivering vestibular rehab.

Methods

A cross-sectional study exploring prevalence rates of vestibular dysfunction was conducted via a self-report questionnaire.

The exploration of Vertigenius™ was a pilot usability study using a pre-treatment-post treatment design.

Analysis

Descriptive statistics were used for the analysis of demographic data and self-report symptoms of vestibular dysfunction. Paired t-tests and Mann Whitney U tests were used to investigate pre and post treatment outcomes.

Results

The mean age of the cohort for the prevalence part of the study was 47.8 years (N= 52) and 83% were female. Relapse-remitting MS was the most common sub type (69%). Vestibular symptoms were experienced by 86.5% of the cohort with dizziness and vertigo being the most commonly reported.

For the intervention part of the study, the mean age was 44.1 years (N = 16) and 88% were female. Exercises prescribed included gaze stability, dynamic balance/gait and habituation exercises.

Post intervention (N = 10 complete data sets) there was a significant improvement seen in patient reported measures of dizziness, imbalance and oscillopsia ($p < 0.05$) and in physical measures of balance and dynamic visual acuity ($p < 0.05$).

Conclusion

Vestibular dysfunction is common among people with MS and should be routinely assessed. VRT using a mobile health application is highly usable and well tolerated in people with MS and has positive effects on balance and dizziness.

---

[1] St. James's Hospital, Dublin, Ireland.
[2] Trinity College Dublin, Dublin, Ireland.

Reshaping rehabilitation

Discoveries from RLH's acute rehab service

Monica Atterton-Evans, Alex Kerr
Royal London Hospital, London,
United Kingdom

The Royal London Hospital Rapid Access Acute Rehabilitation (RAAR) service has been commissioned by NHS England (NHSE) to provide six weeks of hyper-acute intensive rehabilitation to patients with complex needs in the Major Trauma Centre (MTC).

Service structure and MDT staffing ratios are in line with BRSM specialised neurorehabilitation service standards for Level 1 rehabilitation pathways. Diagnoses of patients on the RAAR service have included traumatic and acquired brain injury, spinal cord injury, polytrauma including limb amputations and Guillian Barre Syndome.

This poster details the clinical outcomes from RLH RAAR's first nine months of operation from April 2023 until December 2023. The UKROC data set submissions have been analysed with particular focus on Functional Independence/ Assessment Measure (FIM+FAM) and Northwick Park Nursing Dependency Score/Care Needs Assessment (NPDS), in addition to outlining patient demographics and patient/family experience of the service. The FIM+FAM data shows a marked improvement in functional independence from admission to discharge from the service, the NPDS data shows RAAR produces a significant care cost saving per patient, and discharge location data demonstrates a reduced need for transfer to expensive specialist rehab services.

Overall, the data and patient feedback proves the clear benefit to patients in providing rapid access to rehabilitation in the acute hospital setting after severe injury or illness. With these findings, we also present suggestions for further improvement to the service.

Dizzy, doddery and discombobulated: exploring the symptoms of dizziness and imbalance in patients with vestibular schwannoma treated with radiotherapy at a tertiary cancer centre

Joanne Jethwa[1,2], Leanne Williams[1],
Sally Davenport[2], Adine Adonis[2,3]

Introduction

Vestibular schwannoma (VS) is a brain tumour of the vestibulocochlear nerve causing auditory and vestibular symptoms. The National Institute for Health and Care Excellence (2021) and Tessa Jowel Brain Cancer Mission (2024) recommend patients with brain tumours have early and ongoing access to specialist therapy. International VS guidance recommends regular audiological and facial nerve assessment but omits vestibular assessment. Vestibular assessment is routine in the VS clinic at The Royal Marsden Hospital (RMH) so symptom burden is unclear. Equity of access to rehabilitation is unclear as the local patient profile and symptoms burden is not understood, and there is no defined referral pathway.

Aim

To understand vestibular symptoms in local VS population, describe the patient profile, and identify improvements to local VS services.

Methods

An observational study assessed vestibular function in VS using a symptom questionnaire, Dizziness Handicap Inventory (DHI), oculomotor examination and MiniBESTest. Case-note audits identified demographics, frequency of rehabilitation referral, and rehabilitation waiting times.

Results

The RMH VS population was older than the catchment population. There was no gender or race difference, contrary to previous findings of increased incidence in Caucasian populations.

Vestibular symptoms (dizziness, oculomotor impairment, and imbalance) and secondary symptoms (anxiety, fatigue and cognitive changes) were frequent. The majority caused mild or moderate functional impact on work or recreation.

Rehabilitation need correlated significantly with a DHI score >20 combined with moderate–severe functional impact. Rehabilitation waiting times significantly improved with early physiotherapy assessment. Patients reported many benefits of physiotherapy as part of an MDT clinic.

Conclusions

Vestibular symptoms are common and impactful in VS. They should be assessed as standard and included in guidelines. Prevalence of secondary symptoms appear common and warrant formal investigation. A DHI score >20 combined with moderate/severe functional impact identified rehabilitation need, but should not replace physiotherapy as part of an MDT clinic.

---

[1] Royal Marsden NHS Foundation Trust, London, United Kingdom.
[2] University College London, London, United Kingdom.
[3] Imperial College Healthcare NHS Trust, London, United Kingdom.

Application of the ACPIN Functional Electrical Stimulation clinical practice guidelines for walking to a specialist FES service

Katie Mahoney
Odstock Medical Ltd, Salisbury,
United Kingdom

Background

Odstock Medical Ltd provides a well-established clinical service, where users of Functional Electrical Stimulation (FES) are supported with the provision and long-term use of FES devices.

In 2022, ACPIN published *Clinical Practice Guidelines*[1] (CPGs) for the use of FES in adults with mobility impairments. The CPGs were used to benchmark the service delivered at OML's Salisbury Clinic, where the majority of users are adults who use FES to improve their mobility.

Methods

Each standard in the guideline was compared to the service delivered at OML's Salisbury Clinic. A report was produced outlining the results and shared amongst the Clinical and Leadership Teams at OML.

Results

The FES Clinic meets the majority of best practice points in the CPGs. Areas where OML met all the criteria were the referral process, discussing the potential benefit of FES and considering precautions to FES. The standards were also met or exceeded in access to FES services, initial assessment and treatment, and ongoing monitoring and support.

There were three main areas identified for improvement (relating to standards 5.7, 5.12, 8.4 and 8.5). These areas included offering better guidance for users who experience difficulties when the service is not open, peer support being available to a greater number of FES users, and structured time for Continuous Professional Development activities.

Conclusion

The ACPIN CPGs have provided a useful way for benchmarking an existing FES service and highlighting good practice and areas for improvement. It is recommended that other FES specialist services consider using the ACPIN CPG criteria to benchmark their services.

---

[1] ACPIN Clinical Guideline Working Group (2022) *Evidence Based Clinical Guidelines for the use of Functional Electric Stimulation to Improve Mobility in Adults with lower limb impairment due to an upper motor neuron lesion.*

Minor stroke, major problem

A description of the minor stroke patients presenting to a busy London hyperacute stroke unit in 2022

Ioan Morgan[1], Sally Davenport[2]

Background

Between a third and half of all stroke admissions are minor, but understanding of the different profiles of patients in this population is limited. Many people with minor stroke report ongoing symptoms, even when none are identified in the acute setting. Service provision for people with minor stroke after hospital discharge in North West London is limited. This study set out to discover if there are defined subgroups that can be identified within the people admitted to NPH HASU with a minor stroke and do these link to their ongoing needs after discharge?

Methods

Analysis of the full 2022 stroke admissions was undertaken following an adapted ideal type methodology to identify subgroups in the minor stroke cohort. Once identified, stroke outcomes using the modified Barthel Index (mBI) and modified Rankin Scale (mRS) were analysed at discharge and six-month follow-up. Results between subgroup mBI and mRS were analysed to determine variation between the subgroups.

Results

Minor strokes accounted for 62.2% of all stroke admissions at NPH in 2022. Seven subgroups within the wider minor stroke cohort were identified. Each subgroup has a unique patient profile based on age and co-morbidity. Stroke outcomes at acute discharge and at six-month follow-up were significantly different between the subgroups with only two showing a clinical improvement (older age no PMH and thrombolysed). 62% of patients had no stroke specialist referrals on discharge from the acute trust.

Conclusions

Subgroups within the minor stroke cohort at NPH allow for more detailed understanding of the differing needs of the patients. Understanding these differing needs allows for more specific and targeted service development to support people after discharge. Currently, low numbers of onward referrals at the time of discharge from the acute trust may well contribute to the lack of clinical improvements seen across the cohort.

---

[1] London North West University Healthcare NHS Trust, London, United Kingdom.

[2] Physiotherapy Group, University College London ICHGOS, London, United Kingdom.

Online exercise groups for people with Parkinson's disease

Do they have a role in future healthcare delivery post pandemic?

James Alexander[1], Danielle Rhone-Adrien[1], Paige Agutter[1], Sinead Wiseman[1], Julie Jones[2]

Background

Online group exercise is popular for people with Parkinson's disease (PwP), reducing barriers and offering a flexible approach to physical activity. The COVID-19 pandemic created a step change in online exercise group provision. Following the pandemic, PwP still want online exercise group provision to manage their Parkinson's disease (PD) symptoms. Online group exercise for PwP has shown good feasibility, adherence and self-reported health benefits. Provision of online exercise groups differs nationally and understanding how they can best support PwP in the UK is unknown. It is unclear what these groups should look like and how they should be implemented in future healthcare delivery.

Method

A qualitative phenomenological study utilising semi-structured interviews. Following favourable ethical review, a purposive sample of exercise professionals who have delivered live online exercise groups specifically for PwP. Exercise professionals took part in online interviews via Microsoft Teams between March and June 2023. Data were analysed using reflexivity thematic analysis. Themes were created inductively based on familiarisation with the data and deductively from theoretical and conceptual frameworks underpinning the study.

Results

Ten female participants (mean age 46 years; seven physiotherapists and three qualified fitness instructors) participated in the study. Four key themes were identified: challenges with planning and set up; challenges with online groups in PD care pathways; challenges with online group delivery; and challenges with running an online business.

Conclusion

Online exercise groups remain valuable in supporting PwP to increase their access to physical activity to manage their PD symptoms. Challenges remain in how online exercise groups fit into the care pathway for PwP alongside NHS, third sector and other community provision. Careful consideration of the role and responsibility of individual groups and providers is needed so PwP can make informed choices about which group meets their individual needs.

---

[1] St George's University, London, London, United Kingdom.

[2] Robert Gordon University, Aberdeen, United Kingdom.

Experiences of the clinical implementation of treadmill training in Parkinson's disease

Helen Knott, Sherene Butler, Emily Buckle
Oxford Health NHS Foundation Trust, Oxford, United Kingdom

Treadmill training in Parkinson's disease has been shown to improve overland gait velocity, balance and quality of life in excess of usual overground walking practice. However, treadmill studies use intensive lab based interventions, unattainable for the majority of patients and NHS services. The Physical Disability Physiotherapy Service therefore recently started trialling an adapted form of this treadmill training using parameters based on the laboratory studies (85%, 100% & 115% of average walking speed) but in community gyms.

Patients were provided with once a week treadmill sessions led by therapy assistants, alongside usual care, to see if overland walking speed improved. Additional qualitative feedback was also collected to aid the service evaluation and project development.

Initial results showed the adapted treadmill training programme improved gait speed (n=5, mean gait speed change = +0.28m/s). These improvements are in excess of MCIDs despite all patients only being able to average 30min sessions, rather than the recommended 30-60min of the laboratory research. Sessions were usually curtailed by limited exercise tolerance, fatigue or general discomfort but all patients completed the recommended six sessions. Qualitative patient feedback has been overwhelmingly positive, leading to co-production of patient information leaflets for future participants, and an observed increase in patient adherence to independent gym usage post-intervention.

The service evaluation is continuing to further test these provisional findings, involving greater numbers of patients and ensuring inclusion of individuals at all stages of Parkinson's disease proven to benefit from treadmill training. Further quantitative measures, including balance and quality of life, are also being collected with long-term follow-up.

Acceptability of an online support group to improve physical activity for people with Huntington's disease

A qualitative study protocol

Xiaoyi Shu[1], Nan Yang[2], Sarah Gunn[3]

Background

Huntington's disease (HD) is a progressive degenerative neurological condition. Sustaining physical activities for individuals with HD poses multiple difficulties around physical and psychological engagement. To address this, the Chinese Huntington's Disease Association implemented a social media-based activity log intervention, achieving 200–400 sign-ins monthly over two years. This study aims to assess acceptability of the intervention by conducting focus groups.

Method

This study is being conducted and reported in accordance with the Consolidated Criteria for Reporting Qualitative Research. Electronically signed informed consent is being obtained from all participants.

Participants are people from HD families who either have had a positive genetic test for HD (premanifest or manifest), or who have a family member for whom they provide physical, psychological or practical support. People with or supporting someone with juvenile HD were excluded. We aim to interview 15 individuals in four to five groups. The interview guide is designed based on Sekhon's Theoretical Framework of Acceptability, consisting of seven domains. Additional questions are included in the interviews to explore service users' views on further development of current support to improve physical activity and other aspects of a healthy lifestyle.

Audio-recorded interviews will be transcribed verbatim, anonymised and imported to qualitative data management software (NVivo). Five-step Framework Analysis will be applied for qualitative data analysis. Data will be collected and initially analysed in Mandarin. The analytical framework with indexed data will be translated to English. Data charting, mapping and describing will be completed in English.

Conclusion

The findings of focus group interviews will provide perspectives on the strengths and barriers of current interventions as well as opportunities to integrate other aspects of a healthy lifestyle.

---

1 Royal Free Hospital NHS Foundation Trust, London, United Kingdom.
2 Shanghai University of Sport, Shanghai, China.
3 University of Leicester, Leicester, United Kingdom.

The feasibility of frame running as an exercise option for people living with multiple sclerosis

Gary McEwan[1], Cathy Bulley[2],
Georgia Andreopoulou[3], Kavi Jadamma[1],
Pelly Koufaki[1], Marietta van der Linden[1]

Aims

To explore the feasibility, acceptability, and preliminary efficacy of frame running for people living with multiple sclerosis (pwMS).

Design

A mixed-methods approach was adopted with assessments of quantitative measures at baseline and after a twelve-week frame running intervention (one hour session/week) followed by an interview.

Method

Recruitment, retention and attendance rates were recorded. Patient-reported outcome measures included the Godin Leisure Time Exercise Questionnaire (GLTEQ), Multiple Sclerosis Walking Scale (MSWS-12), Fatigue Scale for Motor and Cognitive Functions (FSMC), and Exercise Self-Efficacy Scale (ESES). The Canadian Occupational Performance Measure (COPM) assessed the self-perceived ability to perform activities of daily living and satisfaction with this performance. Participants' experiences of frame rRunning were captured during phenomenological semi-structured interviews. Quantitative and qualitative data were analysed using descriptive statistics and thematic content analyses, respectively.

Results

Eight pwMS (six females, two males), all with progressive MS, patient determined disease steps (PDDS) ≥ 4 were recruited. Recruitment, retention and attendance rates of 47%, 75%, and 87% were achieved respectively, with no serious adverse events reported. Small to moderate effect sizes indicating improvement were observed for the MSWS-12 (d=0.27), FSMC (d=0.20), ESES (d=0.46) and the GLTEQ (d=0.73). COPM results showed that most participants reported clinically meaningful improvements in their performance of activities of daily living and satisfaction with this performance. Themes emerging from the interviews included 'good way of raising heart rate', 'perceived improvements in ADL', 'social aspect', 'sense of moving', and 'well-earned fatigue'.

Conclusion

Frame running presents a feasible and enjoyable exercise option for pwMS and may have potential to improve measures of physical function and the ability to perform mobility-related daily activities. Further research is warranted to ascertain the longer-term sustainability, benefits and adverse effects of frame running in a larger group of people living with MS.

---

1 Queen Margaret University Edinburgh, Musselburgh, United Kingdom.
2 Queen Margaret University Edinburgh, Musselburgh, United Kingdom.
3 Anne Rowling Regenerative Neurology Clinic, Edinburgh, United Kingdom.

Foot drop management devices in people with MS

A systematic review

Vedad Abdolkhani, Marietta Van Der Linden,
Kavi Jagadamma, Cathy Bulley
Queen Margaret University, Edinburgh, United Kingdom

Background

Multiple sclerosis (MS) is an autoimmune condition affecting the central nervous system, often causing foot drop, which severely limits mobility and daily activities. Ankle foot orthoses (AFO) and functional electrical stimulation (FES) are common management options, but issues with AFO fitting and ankle control have spurred interest in FES.

Aims

To inform clinical decision-making, this systematic review summarises evidence from quantitative and qualitative studies on FES, AFO, and other devices for foot drop management in MS. It assesses effects on gait parameters like speed, endurance, energy cost, falls, pain and quality of life.

Methods

A literature search across databases (Cochrane, Web of Science, PubMed, MEDLINE, CINAHL, PsycINFO, SPORTDiscus) followed by screening by two independent researchers was conducted. Studies were assessed using the Effective Public Health Practice Project instrument (quantitative) and McMaster University's critical review form (qualitative). Data extracted included study design, participant characteristics, interventions and outcomes.

Results

From 10,337 records, 62 articles underwent full-text review, with 28 included. AFO showed limited improvement in endurance and ambulation tasks; only one study explored dorsiflexion assist orthosis. FES, especially externally applied types, increased walking speed but had mixed effects on energy cost and endurance. Therapeutic benefits of FES were inconclusive. Comparative studies between FES and AFO were limited, as were qualitative analyses exploring user experiences.

Discussion

Further research is essential to evaluate assistive technology comprehensively, necessitating broader outcome measures than just walking speed. Understanding patient experiences is crucial for optimising device effectiveness and user satisfaction in MS foot drop management.

Results of a cross-sectional survey evaluating early impact and implementation of evidence based clinical practice guidelines for the use of Functional Electric Stimulation to improve mobility in adults with lower limb impairment due to an upper motor neuron lesion.

Kristoffer Skjelvik[1], Christeen Awadallha[1], Stefania Di Mauro[1], Marietta van der Linden[1], Tamsyn Street[2,3], Jane Burridge[4], Sarah Joiner[5], Adine Adonis[6,7], Cathy Bulley[1]

Background

In October 2023 the Association of Chartered Physiotherapists in Neurology (ACPIN) published a Clinical Practice Guideline to support service provision using Functional Electrical Stimulation for mobility in people with upper motor neuron lesion. It is important to optimise and evaluate guideline implementation and seek feedback to inform its improvement over time. This study aimed to evaluate the early implementation and impact of this guideline by exploring multiple stakeholders' awareness, use and perceptions of it.

Methods

A descriptive, online, cross-sectional survey sought insights from multiple key stakeholders, including service users and providers, FES developers, distributors, researchers and educators. The survey was developed online, utilising both multiple-selection, open- and closed-response questions to pragmatically meet the study's aims. A multifaceted dissemination strategy was used to promote response from the different stakeholder groups. Frequency responses were calculated for closed questions and conceptual content analysis was used to create response categories for open questions.

Results

By 31/1/24 82 respondents represented all stakeholder groups, including 28 FES users. N=55 (67%) had accessed, and n=38 (46%) of participants had used, the guideline. Various positive impacts were reported, most notably on service providers' confidence in their practice. Amongst those who had not accessed the guideline (n=27; 33%; 20 of whom were FES users), most reported lack of awareness as a barrier (n=18 ;67%). Of those who had accessed, but not used the guideline (n=17), common barriers were lacking time (n=7; 41%) and being unaware until recently (n=5; 29%).

Conclusion

Early guideline implementation appears promising and its potential for positive impact is apparent. Interventions to increase awareness and enable people to receive the most relevant guideline content efficiently are needed to optimise implementation and impact. This survey has increased guideline awareness, and repetition in future years may support ongoing promotion, while evaluating ongoing impact and informing future guideline revision.

---

1 Queen Margaret University, Edinburgh, United Kingdom.
2 Salisbury NHS Foundation Trust, Salisbury, United Kingdom.
3 Bournemouth University, Bournemouth, United Kingdom.
4 University of Southampton, Southampton, United Kingdom.
5 MS Trust, London, United Kingdom.
6 ACPIN, London, United Kingdom.
7 Imperial College Healthcare NHS Trust, London, United Kingdom.

A qualitative exploration of user experiences of novel footwear and other devices for footdrop

Chris Kelly[1], Sarah Hellicar[1], Niamh Buchan[1], Niall Cowie[1], Cathy Bulley[1,2], Derek Santos[1,2], Kavi Jagadamma[1,2], Gillian Robinson[2,3]

Background

Footdrop is a common impairment associated with varied neurological conditions. This can lead to trips and falls, resulting in reduced participation in life. Orthotic devices are frequently used to improve walking, but people report that they do not meet all their biopsychosocial needs. Novel footwear for footdrop has been developed that addresses both biomechanical and biopsychosocial needs. This study explored people's experiences of using different devices.

Methods

Individual in-person and online qualitative interviews were undertaken with 18 people with footdrop who had worn the novel footwear for seven or more days. They had also used at least one of the following devices: ankle foot orthoses (AFOs), functional electrical stimulation (FES), and foot-ups. Thematic analysis was undertaken.

Results

Participants described balancing positive and negative aspects of devices. Ease of use and appearance were considered important; novel footwear, AFOs and foot-ups were found easily adjustable. Use of FES with different footwear was valued, while the novel footwear positively impacted on confidence and perceived falls risk. AFOs and foot-ups were found uncomfortable, restrictive and cumbersome, causing self-consciousness. FES was found difficult to use; AFOs restricted ankle range of motion and foot-ups posed barriers to driving. People had contrasting views about appearance and comfort of the novel footwear. Choice of which device(s) to use for different purposes involved an interplay of different priorities, influenced by disability level, footdrop characteristics and personal preferences.

Conclusion

People need different orthotic devices depending on their footdrop characteristics, personal priorities and context of use. They may therefore need different devices in parallel and over time. This highlights the need for a person-centred approach to device prescription and for research and development that supports individualisation, as there is no single device that is suitable for everyone or for every activity.

---

1 Queen Margaret University, Edinburgh, United Kingdom.
2 Health Design Collective, Musselburgh, United Kingdom.
3 Compass, Edinburgh, United Kingdom.

The treatments and outcomes of people with a neurological injury attending a regional multidisciplinary focal spasticity service over an 18-month period

A retrospective service evaluation

Elizabeth Dunn[1], Adine Adonis[2,3], Emma Bretherton[4]

Background

The contribution of the therapy delivered alongside botulinum toxin (BoNT) injections, as part of multidisciplinary focal spasticity management is not well understood. Neither are the outcomes from focal spasticity management with repeated BoNT cycles. This study aimed to understand the management, treatment, goal achievement and outcomes, over an 18-month period, at a focal spasticity service. A range of neurological conditions, including stroke, were included.

Methods

A retrospective case note review was completed at a regional focal spasticity service. New patients who attended the service between April 2019 and January 2021 and received 18 months of input that included BoNT and therapy were included. Clinical characteristics, treatment delivered, goal achievement and change in outcomes were analysed.

Results

Seventy participants received between one to five cycles of BoNT and a median of five therapy sessions (IQR3.75-8). Passive goals were most frequently set (81.41%) with 74.92% of all goals achieved. Positive goal achievement rates occurred for different goal types, including active, passive, pain and impairment goals. These positive changes were seen across up to five cycles of BoNT and therapy. Upper limb Ashworth Scale scores improved following the first cycle of BoNT and therapy ($p<0.001$). No other significant changes in outcome measure occurred at other timepoints.

Conclusions

An MDT approach to focal spasticity management resulted in positive goal achievement across a range of different types of goals. Further prospective studies, with well powered samples, are required to understand the best type and dose of therapy to optimise outcomes when managing focal spasticity. Consistent documentation of outcome measures and therapy dosing will enable services to optimally review the effectiveness of their therapy provision as part of focal spasticity management.

---

1 University College London, London, United Kingdom.
2 University College London, London, United Kingdom.
3 Imperial College Healthcare NHS Trust, London, United Kingdom.
4 University College London Hospitals NHS Foundation Trust, London, United Kingdom.

Developing advanced physiotherapy practice roles

An example of a social health role developed with the Parkinson's community in the United Kingdom

Bhanu Ramaswamy
Sheffield Hallam University, Sheffield, United Kingdom

Introduction

The numbers of people ageing with long-term conditions are increasing; health services must evolve from traditional medicalised management to engage with the wider community to assist people in staying well (Roberts and Dixon 2013).

Escalating life complexities presented at clinical caseload level has boosted the expansion of clinical roles across health professions. Accruing evidence suggests that advanced physiotherapy roles provide benefits to the public and the health systems when applied innovatively, networking widely and in non-traditional ways (Williams *et al* 2019).

The slower growth in advanced physiotherapy posts outside clinic or hospital-based services necessitates examples that demonstrate the advantages of advanced roles in fields like neurology, and those outside unwieldy health organisation structures.

Purpose

To explore the four pillars of Advanced Clinical Practice (Health Education England 2017) through my role as an independent physiotherapy consultant with the Parkinson's community. Examples to underpin the implementation of each pillar use the modified international framework for competencies in advanced practice roles (Tawiah *et al* 2023).

1. **Clinical practice** condition expertise was gained working with the Parkinson's community for over three decades in acute care and community setting, to now providing shared-management for individuals' journeys into the long-term, enabling them to maintain family roles and social interests.
2. **Leadership** visibility in health advocacy was gained by representing the profession on national and international projects for the benefit of professional colleagues and the Parkinson's community. Each drives forward physiotherapy collaboration influencing health-provision modernisation.
3. **Education** providing direct facilitation of learning in others (eg lecturing or authorship), or organising professional conferences, or events for people with Parkinson's to educate themselves and professionals.
4. **Research** facilitating the creation and dissemination of knowledge around physiotherapists' interventions assisting people to live well with Parkinson's.

Conclusion

Advanced practice roles reward both the communities they serve and the physiotherapy profession.

Vestibular disorders affect communication

Implications for physiotherapy practice

Sally de la Fontaine[1], Sylvia Taylor-Goh[2], Peter Dr Savundra[3], Nicola Harris[4]

Until recently, only anecdotal evidence existed suggesting that understanding, speaking, reading and written communication is affected in vestibular disorders. However, the findings from a recent study by Taylor-Goh *et al* showed that communication difficulties were pervasive, affecting the majority of respondents. The implications of these findings upon physiotherapists' practice is the focus of this presentation.

Method

A 35-item online cross-sectional survey, employing both purposive and convenience sampling of UK adults with vestibular disorders. Descriptive and correlation statistics were used to analyse the survey data.

Results

Most respondents reported experiencing more than one vestibular disorder. Vestibular migraine was the most frequent diagnosis (46/117, 39%), then Meniere's disease (31/117, 27%), and PPPD (30/117, 26%). Concomitant medical conditions included anxiety (34/117, 29%), migraine (34/117, 29%), depression (21/117, 18%) and neurological conditions (25/117, 20%). Communication difficulties affected 111/117, 95% of respondents with 108/117 (97%) reported difficulties with understanding and 100/117 (90%) with talking, 81/117 (73%) with reading, and 71/117 (61%) with written communication. These difficulties significantly impacted daily life, affecting activities, social interactions mood, and mental health for between 76% and 87% of the respondents.

Implications

When treating individuals with vestibular disorders, physiotherapists must be aware of various factors that may hinder the individual's optimal participation in therapy. These factors include the therapy environment, expectation of multi-tasking, listening or talking and exercising at the same time, reading instructions, positioning of the therapist, the complexity and volume of information presented and speed of talking.

Conclusion

Heightened awareness regarding the impact of vestibular disorders on communication and participation is crucial to optimise an individual's ability to actively participate in vestibular rehabilitation. The application of these findings should lead to further research, could change physiotherapy practice and the recommendations will enhance an individual's ability to engage in therapy.

---

1 Milestones Clinic Ltd, Farnham, Surrey, United Kingdom.
2 Relational Communication Practice Ltd, London, United Kingdom.
3 150 Harley Street & Portland Hospital, London, United Kingdom.
4 Nicola Harris & Associates, London, United Kingdom.

The development of a vestibular assessment and rehabilitation service in Cork University Hospital

Liz O'Sullivan, Emer Maher
CUH, Cork, Ireland

Introduction

Dizziness, imbalance and vertigo are reported to affect 15–20% of the adult population and contribute to falls. It's been reported in older persons that vestibular disorders account for 48% of vertiginous complaints[1]. World guidelines for falls prevention and management advocate that vestibular tests are part of falls assessment[2]. Vestibular rehabilitation therapy has been shown to be effective for treating a variety of vestibular conditions[3].

Development of service

Vestibular service began in 2011 following completion of an advanced vestibular course by a senior physiotherapist. This was following an increase in vestibular assessment referrals.

Service model

Patients are currently seen in weekly clinic by two staff who have completed advanced training.

Source of referrals are a mix between in-patients (40%) and out-patients (60%).

In-house training has been provided to physiotherapy staff to allow for timely and efficient screening of all referred in-patients.

Referral rates have grown from 14 referred in 2014 to 120 in 2023. Referral sources have also changed with increased referrals from A&E 38% in 2018 to 55% in 2023. This growth has been achieved through education sessions about the service to A&E staff. A third of those referred in 2023 were assessed and discharged by physiotherapy staff on the same day.

Clinical outcomes

120 referrals received in 2023. Outcome measures routinely used as part of assessment are Dizziness Handicap Inventory (DHI) and Functional Gait Assessment (FGA). On review of 2023 data there were 55 complete data-sets which had DHI data pre and post treatment. Average change in DHI pre / post treatment was 18 points which has previously been reported as a minimally detectable change when treating vestibular disorders[4]. Patients received two sessions on average and 85% were discharged with symptoms resolved.

Conclusion and recommendations

Sustaining this service delivery model is dependent on regular education sessions to both medical and physiotherapy staff resulting in timely referrals. Clinically meaningful changes can occur with intervention, with a significant percentage of patients only requiring one or two sessions.

1 Casani A *et al* (2021) *Current Insights into Treating Vertigo in Older Adults* *Drugs & Aging* 38 pp655-670.
2 Montero-Odasso M *et al* (2022) *World guidelines for falls prevention and management for older adults: a global initiative* *Age & Ageing* 51 (9) pp1-36.
3 Hall CD *et al* (2022) *Vestibular rehabilitation for peripheral vestibular hypofunction: An updated clinical practice guideline from the Academy of Neurologic Physical Therapy of the American Physical Therapy Association* *Journal of Neurologic Physical Therapy* 46 (2) pp118-177.
4 Jacobson GP, Newman CW (1990) *The development of the Dizziness Handicap Inventory* *Archives of Otolaryngology Head and Neck Surgery* 116 pp424–427.

Ultrasound guided injection of botulinum toxin for the management of spasticity

A Delphi study to develop a scope of practice, competency and governance framework

Gary Morris[1,2], Stephen Ashford[3,4],
Michael Smith[5]

Introduction

Ultrasound guided injection of botulinum toxin for the management of spasticity is increasingly being used in practice, but what constitutes current best practice has not been defined. There is a need to establish a scope of practice, competency and governance.

Methods

A purposively selected multidisciplinary (physicians, physiotherapists, occupational therapists) panel of experts (n=15) were engaged in a Delphi study.

In Round 1, open-ended questions were posed relating to:

- Potential scope of practice for 'ultrasound imaging in spasticity management'; (specifically relating to ultrasound image guided injection of botulinum toxin)
- Education/competency and governance considerations.

In Round 2, respondents were asked to rate their level of agreement with the statements generated.

Results

Three different scopes of practice relating to ultrasound imaging in spasticity management were accepted. The primary scope of practice was the use of ultrasound imaging to guide safe and accurate delivery of botulinum toxin. Relating to this primary scope, seven competency requirements were agreed relating to areas including image optimisation and interpretation, needle visualisation and safety. A singular, broad governance statement was generated.

Conclusion

Relating specifically to guided injection of botulinum toxin for management of spasticity, we present a scope of practice, competency and governance framework. These are integrated within a framework approach to provide a mechanism for increased patient access to accurate, safe and effective focal spasticity treatment. The framework supports focused training routes, greater inter-profession communication and wider clinical community engagement in spasticity management using this modality.

---

[1] Cardiff University, Cardfiff, United Kingdom.
[2] Hywel Dda University Health Board, Cardigan, United Kingdom.
[3] Kings College London, London, United Kingdom.
[4] London North West University Healthcare NHS Trust, London, United Kingdom.
[5] Cardiff University, Cardiff, United Kingdom.

Enhancing self-directed upper-limb (UL) exercise practice using GripAble gaming device and Lycra arm sleeve in people with stroke (PwS)

An evaluative pilot study

Praveen Kumar[1], Alex Pearce[1],
Virginia Ruiz Garate[2], Jason Welsby[1],
Praminda Caleb-Solly[3]

Background

GripAble™ (a self-directed exergaming device) has shown to increase repetitive practice in PwS. Previous studies have shown that a Lycra SDO® arm sleeve may encourage use of the affected arm by acting as a reminder through ascending neuromuscular activity. The aims of this study were to evaluate use of these technologies by PwS in the community, use of outcome measures and explore users' experience.

Method

Evaluative pilot study design. We recruited PwS through Bristol After Stroke. Participants were randomised into two groups and received intervention for four weeks:

- GripAbleTM devices alone
- GripAbleTM device with Lycra sleeve

Outcome measures included: Action Research Arm Test (ARAT), Motor Activity Log (MAL), the Technology Acceptance Model questionnaire, wrist-worn bilateral accelerometers to monitor UL activity.

Results

Ten participants were recruited and seven fully completed the study. 75% (n=3) of Group 1 and 100% (n=3) of Group 2 participants met the goal of 300 repetitions per day that they engaged with GripAble™. Overall acceptability of GripAble™ was 71%, however 62.5% (n=5) experienced problems with the device. Analysis of difference between groups could not be completed due to the low sample size. The majority of patients had difficulty in completing the MAL.

Discussion/conclusion

GripAble™ may facilitate independent UL rehabilitation for PwS within their home environment. However, there is a need for support and education while using technology-based interventions such as GripAble™ for PwS. It is not clear whether Lycra sleeves influenced rehab. A future study should investigate the accessibility and effectiveness of GripAble™ for PwS in the community.

---

[1] University of the West of England, Bristol, United Kingdom.
[2] Mondragon Unibertsitatea, Bilboa, Spain.
[3] University of Nottigham, Nottingham, United Kingdom.

Lycra sleeve compression and its physiological and biomechanical effects on the upper limb in healthy adults

Praveen Kumar[1], Adam Stokes[2],
Kieran Barber[3], Harriet Hockey[4],
Ben Harris[5], Jeffrey Ho[6], Michael Brooks[7],
Nahian Rahman[1], Richard Diteesawat[1]

Background

Previous studies have shown beneficial effects of a Lycra arm sleeve in people with stroke (PwS); however, the mechanism of these effects is unclear. The aim was to investigate the effects of a Lycra arm sleeve on pressure, temperature, range of movement and muscle activity using a prototype measurement system on the upper limb (UL) in healthy adults prior to testing on PwS.

Method

This was a cross-sectional crossover study. Data was collected on Grip Strength (GripAble), muscle activity in shoulder muscles (Electromyography-EMG), proprioception (during UL reaching task), temperature sense (BOJACK TMP36 3 Pin Temperature Sensor) and pressure (a custom-built cuff with two pneumatic pouches and sensors) with and without a Lycra sleeve.

Results

Sixteen healthy individuals (M=7, F=9) with a mean age of 25±7 years were recruited. Without sleeve, the mean EMG activity, temperature, grip strength, and joint position sense were 1.155 volts (±0.058), 32.5°C (±5.9), 20.8kg (±9.6) and 58.1mm (±31.5). Corresponding values with 'sleeve on' were 1.213V (±0.178), 34°C (±5.3), 21.1kg (±9) and 50.8mm (±29) respectively.

Conclusion

Changes were recorded with 'sleeve on' in the majority of biomechanical and physiological parameters tested in young healthy people. The prototype needs refinement and testing in PwS in future studies.

---

[1] University of the West of England, Bristol, United Kingdom.
[2] Five Valleys Physio, Bristol, United Kingdom.
[3] Royal Devon University Healthcare NHS Foundation Trust, Cullompton, United Kingdom.
[4] Gloucestershire Hospital NHS Foundation Trust, Gloucester, United Kingdom.
[5] Sirona Care and Health, Community Rehabilitation, South Gloucestershire, Bristol, United Kingdom.
[6] Hong Kong Childrens' Hospital, Hong Kong, Hong Kong.
[7] Somerset Foundation Trust NHS, Somerset, United Kingdom.

Rehabilitation using virtual gaming for hospital and home-based training for the upper limb in acute and subacute stroke (RHOMBUS II)

Results of a feasibility randomised controlled trial

Tom Butcher[1,2], Alyson Warland[2], Victoria Stewart[2,3], Basaam Aweid[3], Arul Samiyaappan[4], Elmar Kal[2], Jennifer Ryan[5], Dimitrios A Athanasiou[6], Karen Baker[6], Guillem Singla-Buxarrais[7], Nana Anokye[2], Carole Pound[8], Francesca Gowing[2], Meriel Norris[2], Cherry Kilbride[2]

Trial design

Feasibility randomised controlled trial.

Methods

Stroke survivors with upper-limb weakness recruited from in-patient or early supported discharge (ESD) stroke teams. Data collected and intervention delivered on the Stroke Unit and participants' homes. Intervention group received usual care plus the Neurofenix platform for seven weeks; the control group received usual care only.

- **Objectives** Determine the safety, feasibility and acceptability of the Neurofenix platform.
- **Outcomes** Data collected at baseline before randomisation and seven weeks. Safety assessed through adverse events (AEs), pain, spasticity and fatigue. Feasibility assessed through training and support requirements and acceptability through intervention fidelity, a satisfaction questionnaire and semi-structured interviews.
- **Randomisation** Computer-generated, allocation sequence concealed by opaque sealed envelopes, 2:1 ratio.
- **Blinding** Participants and assessors not blinded; statistician blinded for data processing and analysis.

Results

N=24 randomised, intervention group (n=16) (13 women; mean (SD) age 66.5 (15) years; median (range) 9.5 (1–42) days post-stroke). Control group (n=8) (4 women; mean (SD) age 64.6 (13.6) years; median (range) 17.5 (4–23) days post-stroke).

N=3 withdrew before the seven-week assessment, n=21 (intervention group n=15; control group n=6) included in analysis.

No significant group differences in fatigue, spasticity or pain scores. Median (IQR) time to train participants was 98 (64) minutes over one to three sessions. Participants trained with the platform for a median (range) of 11 (1–58) hours, equating to 94 minutes extra per week.

No significant difference between groups in the total number of AEs.

Conclusion

The Neurofenix platform is safe, feasible and well-accepted and supports increased intensity in early upper-limb stroke rehabilitation.

Trial registration number: ISRCTN11440079
Funding This work was supported by The Stroke Association and MedCity grant number SA MC 21\10001.

1 Northumbria University, Newcastle upon Tyne, United Kingdom.
2 Brunel University London, London, United Kingdom.
3 Hillingdon Hospitals NHS Foundation Trust, London, United Kingdom.
4 Central and North West London NHS Foundation Trust, London, United Kingdom.
5 Royal College of Surgeons in Ireland, Dublin, Ireland.
6 Neurofenix, London, United Kingdom.
7 Neurofenix, Atlanta, Georgia, USA.
8 Bournemouth University, Poole, United Kingdom.

What makes a good neuro physio?

Developing competencies for neurological physiotherapy: a Delphi study)

Gary Morris[1,2], Molly Courtenay[1]

Introduction

Accessing good neurological physiotherapy is very important for people with neurological conditions as it can help reduce disability and improve quality of life. Currently physiotherapists who want to specialise in neurology have a lack of guidance on what education and training they should complete.

The aim of this project was to produce a framework of educational competencies for neurological physiotherapy.

Methods

An 'expert panel' was assembled which took part in a three-round Delphi study. The expert panel (n=26) included physiotherapists (from clinical, research, education and leadership backgrounds), people with neurological conditions, representatives from support organisations and multidisciplinary team members. The panel members participated in three online survey rounds in which statements were qualitatively developed (Round 1) and quantitatively rated using a five-point Likert scale (Rounds 2 and 3) to produce a consensus framework of neurological physiotherapy competencies.

Results

Nine hundred and ninety-nine individual competency statements were generated in Round 1 which were analysed and voted on in Rounds 2 and 3 to produce a framework of 82 individual competencies. The competencies cover six practice domains including knowledge and skills, communication and team working, research and education, leadership and management, and health promotion.

Conclusion

This educational framework can be used by individual physiotherapists, employers and educational providers to structure neurological physiotherapy training and development programmes with the aim of enhancing clinical practice and improving patient care.

---

1 Cardiff University, Cardiff, United Kingdom.
2 Hywel Dda University Health Board, Cardigan, United Kingdom.

Neuromuscular electrical stimulation for shoulder rehabilitation in people with stroke

A systematic literature review of reviews – work in progress

Praveen Kumar, Nia Phillips, Monica Muresan, Sophie Fishel, Mei Smith, Erin Whitehead, Rachel Thomas
University of the West of England, Bristol, United Kingdom

Background

There are 1.3 million stroke survivors in the UK and 100,000 people have strokes each year. Out of the 80% of people with stroke (PwS) who lose upper-limb function, only 12% make a recovery. Reduced upper-limb (UL) function is devastating to patients and is associated with increased dependence, loss of confidence, depression, social withdrawal and reduced quality of life. Electrical stimulation (ES) is a well-established intervention for motor rehabilitation and the 2023 stroke clinical guidelines in the UK recommend its use for glenohumeral subluxation (GHS) in PwS. Several studies have been published that investigated the effectiveness of ES for UL rehabilitation in stroke and have reported short-term benefits in motor function and activities of daily living. A recent systematic review highlighted variability in the parameters and equipments used for stimulation purposes. This makes it challenging for clinicians to implement this into routine clinical practice.

Aims

To investigate the most effective parameters and the most used outcome measures in ES NMES for shoulder rehabilitation in PwS.

Methods

A systematic literature review (SLR) of reviews will be undertaken using the PRISMA guidelines. A systematic online search will be conducted of CINAHL, MEDLINE and AMED via EBSCO, Cochrane, Scopus databases using key terms (ES, shoulder, stroke, rehabilitation). The search will be supplemented by hand searching relevant journals and citation tracking of the retrieved papers. All primary studies published in English fulfilling the review's inclusion criteria will be included. Five reviewers will be involved in the data extraction and independently appraising the methodological quality of the selected studies. Any discrepancies will be resolved following discussions.

Results

The results will be presented using a PRISMA flow chart. A data extraction table will be presented and the findings will be critically discussed.

Functional Electrical Stimulation and Leg Cycle Ergometry in outpatients with multiple sclerosis

A service evaluation

Shereen Louw[1], Sally Davenport[2]

Background

Functional Electrical Stimulation Leg Cycle Ergometry (FES LCE) has shown to be safe and effective in people with multiple sclerosis (pwMS). However, integrating it into local physiotherapy outpatient services faced challenges like poor adherence, high discontinuation rates and logistical issues. This service evaluation aimed to explore factors affecting implementation and adherence and the influence of baseline mobility impairment severity on patient outcomes.

Methods

A mixed-methods service evaluation (January to July 2023) was conducted involving pwMS using FES LCE. Data gathered included routine quantitative data-patient demographics, clinical presentation and RTI Datalink ergometer training recordings, and qualitative measures involving questionnaires and interviews. PwMS were grouped by mobility levels:

- **Group 1** moderate to severe mobility limitations
- **Group 2** mild mobility limitations

Results

Over six months, eleven pwMS with deteriorating mobility engaged in the FES LCE programme, with two discontinuations. The clinical team and patients who completed found the programme acceptable and appropriate. Influencing factors included: one-to-one appointments, regular reassessments and communication, flexible appointment times and self-monitoring training. While the suggestion of reduced supervision raised safety and adherence concerns, patients preferred once-a-week sessions due to busy schedules and post-training fatigue. All patients achieved moderate-intensity training and had clinically significant improvements in balance, mobility and fatigue.

Conclusions

FES LCE was beneficial, with supervised sessions considered acceptable and appropriate. Personal and logistical factors affected implementation. Once-a-week training was feasible and desirable. Pre-enrolment patient education may aid in determining the feasibility, appropriateness and suitability of the programme, and improve compliance and adherence to the programme. Further research is warranted for mostly unsupervised FES LCE training, focusing on safety, acceptability and feasibility for both service users and clinical services.

---

[1] Manx Care, Douglas, Isle of Man.
[2] UCL, London, United Kingdom.

Perspectives of exercise and healthcare professionals on community-based exercise for adults with neurological physical disability

A systematic review

Rory Bradley[1], Katy Pedlow[2], Lucia Rasmey[2], Karen McConnell[3]

Background

Previous reviews have identified that adults with neurological physical disabilities (AwNPDs) face barriers to participating in community-based exercise (CBE). To date, there has been no secondary research identifying perspectives of exercise professionals and Hhealthcare professionals who may deliver CBE services.

Aims

This systematic review aimed to summarise the evidence base on perspectives associated with CBE for AwNPD from the viewpoint of exercise and healthcare professionals.

Methods

Studies were eligible for inclusion if they were any form of primary research providing healthcare and exercise from professionals' perspectives on CBE for AwNPDs. Quantitative studies were 'qualitised' using a convergent integrated approach. Extracted data were then analysed using thematic analysis. Methodological quality was assessed using the standard quality assessment criteria for evaluating primary research papers from a variety of fields (QualSyst).

Results

Nine studies were selected for this review following a systematic search. Qualitative (n=6) and quantitative (n=2) studies scored a moderate to high level of methodological quality whilst the one mixed methods study scored a moderate to low level. Themes included barriers faced by exercise professionals regarding provision of services (long waiting lists, time constraints in appointments) and training related barriers (lack of training and need for in-person training). Subthemes included the relationship and responsibilities between professionals.

Conclusion

Positive attitudes from exercise and healthcare professionals towards CBE for AwNPDs were identified. This review has identified specific barriers faced by these professionals which should be considered alongside barriers faced by other stakeholders in future research for a comprehensive understanding and for effective public involvement.

---

[1] Ulster University, Belfast, United Kingdom.
[2] Ulster University, Derry, United Kingdom.
[3] Queens University, Belfast, United Kingdom.

It is all about the bones

Katrina Buchanan
National Hospital for Neurology and Neurosurgery, London, United Kingdom

Background
With an ageing population and longer life expectancies, osteoporosis (OP) is increasingly becoming a global health concern. Half of women and one in five men aged over 50 will experience an osteoporotic fracture in their lifetime. Fractures due to osteoporosis result in vast socioeconomic costs, pain and increased disability. Yet, many of them could be prevented with earlier identification and intervention. People with neurological conditions have a much greater risk of developing osteoporosis and, as healthcare professionals at the centre of their long-term management, we can play a crucial role in better screening and education.

Aims/purpose
After observing a spate of fragility fractures in our patient group we initiated this project with the aim of increasing our therapy department's knowledge of OP and reducing the risk of fragility fractures happening again. Our secondary aim has become to raise awareness of OP amongst therapists working across healthcare settings in the UK.

Methods
A review of the literature on how neurological disorders effect bone health was completed, UK guidelines on management of OP were reviewed, team and profession specific discussions took place to identify gaps in knowledge and meetings with bone health experts were completed to gain expert opinion.

Results
As a result of this project, we have an increased understanding and awareness of OP in our patient group and have developed tools to aid with screening, assessing and managing risk, education and medical liaison.

Conclusion
The impact of this project is that on a daily basis we are now giving advice to our patients that we hope will have a long-term impact on their bone health, and reduce their risk of fracture, which is not only painful, but can also impact on daily life, reduce independence, and lead to additional life-changing disability.

Overcoming the challenges of delivering stroke rehabilitation research in the community

Rob Jones
Sirona Care and Health, Bristol, United Kingdom

Background
Community stroke rehabilitation teams are still transforming in response to the National Stroke Service Model and national clinical guidance. In this setting, research is often less well-resourced than in the acute, and, with competing demands, fitting it in is challenging.

Aims/purpose
To identify obstacles and challenges to research in the community and support in overcoming these.

Methods
- Personal reflection: experience as Principal Investigator in two community stroke rehabilitation intervention studies.
- Analysis of feedback from clinicians, participants and partners.

Results
- **Partnership** Staff complained that it was difficult to fit research into their busy roles. They wanted to know the wins and relative costs in time/efficiency. Early and sustained partnership with lived experience and the third sector brought significant reward.
- **Communication** Documentation was sometimes poorly designed causing inefficiency and frustration. Staff wanted 'at-a-glance' documents with pictures and video links.
- **Perceptions** Even a small inefficiency or issue can quickly develop negative perceptions within the team. Managing these promptly was deemed 'time well spent'.
- **Co-ordinator** Staff valued regular concise prompts but didn't want to be 'pestered'. Few staff had time to engage.

Conclusion
Understanding clinicians' roles and context is vital to tailoring support and communication. Feedback should guide the tailoring of concise communication (utilising video links and photos). Early and sustained involvement with lived experience and local third sector should be sought.

The accessibility of all documentation should be carefully designed (with lived experience, SALT and other guidance), with easy-read and aphasia friendly formats. Actively managing early interactions (dealing quickly with issues) will also foster positive perceptions and drive successive recruitment. If a dedicated, paid-for co-ordinator is impossible, a link person or champion can help to identify issues early and focus limited resources.

Fitting in community research needs assertive steps to develop positive perceptions and drive successful recruitment but can entice future researchers.

Understanding patient learning in a stroke rehabilitation setting

An ethnographic exploration

Sally Davenport[1], Elizabeth Cassidy[2], Faith Gibson[3,4], Eleanor Main[1]

Background and purpose
Learning is fundamental to recovery following stroke but little is known about how stroke survivors learn in the rehabilitation setting, how learning contexts are communicated and what impact they have on engagement with rehabilitation. This research used ethnographic methods to explore learning and being a learner in rehabilitation.

Methods
An ethnography with observation and shared conversations with stroke survivors to explore learning within a neurorehabilitation setting in the early to late subacute stages post stroke. Objectives were to explore what it was like to learn/be a learner, where and how the learning occurred and what factors shaped the level and direction of the learning effort.

Findings
Observation over 53 days and serial conversations with 14 stroke survivors showed that recovery involved a complex process of new learning that was imposed by the sudden change to health status. The participants were not passive recipients of their treatment but instead tried, often on the basis of very limited knowledge and understanding, to make sense of what they were experiencing. They looked for alignment between the teaching they received and what they expected and wanted to learn. Where and when this was present, the curriculum of rehabilitation made sense to them. Coherence between teaching and learning positively impacted rehabilitation engagement and emotional well-being.

Conclusion
This work has improved understanding of learning from the perspective of stroke survivors and advanced the theory of learning in neurorehabilitation. Findings suggest that engagement with learning activities such as rehabilitation-based practice may be compromised when there is a mismatch between patients' learning expectations and clinicians' planned content. An openly inviting, visible and unifying rehabilitation curriculum that aligns expectations and delivery may enhance engagement. The concept of a rehabilitation curriculum is new and requires further exploration and development to determine its value within practice.

---

1 Physiotherapy Group, UCL GOSICH, London, United Kingdom.
2 Freelance Academic and Research Supervisor, London, United Kingdom.
3 Great Ormond Street Hospital, London, United Kingdom.
4 School of Health Sciences, University of Surrey, Guildford, United Kingdom.

Acceptability of rehabilitation exercise videos to improve home exercise programmes for people with stroke attending group exercise classes

A service evaluation project

Praveen Kumar[1], Stella Fisher[2],
Rebecca Sheehy[2]

Background

Clinical guidelines for stroke recommend that people with stroke (PwS) should complete at least three hours of rehabilitation every day and should stay active for at least six hours/day after discharge from the hospital. In collaboration with a local charity Bristol After Stroke (BAS), we have been running a group exercise (one hour) and education (one hour) class called 'Next Steps' to support PwS in the community. To date, 300 PwS have attended our 'Next Steps' classes since 2016. Based on user feedback, we developed several short (15 minutes) bite-size evidence-based rehabilitation exercise videos. Our videos are novel because they show:

- Real patients doing the exercises under the guidance of an experienced physiotherapist.
- A range of exercises addressing the needs of patients with mild and moderate stroke.

Aim

The purpose of this service evaluation project was to assess the acceptability of the rehabilitation exercise videos by PwS attending the 'Next Steps' classes.

Methods

Over a one-year period, 32 PwS attended our 'Next Steps' class. Following pre-assessment, they attended the seven weeks, group exercise class (one hour/week) and, based on their person-centred goals and abilities, they were offered five or six exercise videos (15–20 minutes each). Participants were asked to continue the exercises at home and maintain a log. Of the 25 PwS who engaged with the videos at home, exercise adherence was evident in 75% of participants who practised exercise daily, at least for an hour. All participants reported they found the videos helpful, were easy to follow, increased the impact of attending the course (confidence improved) and they were happy to continue using the videos at the end of the 'Next Steps' class.

Conclusion

This service evaluation found that the videos were acceptable by PwS because they show real patients exercising, giving them confidence to exercise themselves, improving their functional independence.

---

[1] University of the West of England, Bristol, United Kingdom.
[2] Bristol After Stroke, Bristol, United Kingdom.

A qualitative analysis exploring factors that affected implementation of Functional Electrical Stimulation and Leg Cycle Ergometry for outpatients with multiple sclerosis

Shereen Louw[1], Sally Davenport[2]

Introduction

Engaging in physical activity and exercise becomes an increasing challenge for people with multiple sclerosis (MS). Although Functional Electrical Stimulation (FES) and Leg Cycle Ergometry (LCE) has been reported safe and effective for people with MS, clinical studies have reported poor adherence, high discontinuation rates and logistical problems with implementation. Using qualitative methods, this evaluation aimed to explore factors affecting implementation and adherence to an FES LCE outpatient exercise programme.

Method

Questionnaires explored patients and staff experience and perceptions of the service delivery of an FES LCE programme. Follow-up semi-structured interviews were held with patients to gain a deeper understanding of the questionnaire responses and explore early implementation outcomes of acceptability, appropriateness, feasibility and fidelity.

Results

An analysis of eleven patients and three staff questionnaire responses reported high programme acceptability and appropriateness. Factors influencing patient acceptance impacted on their adherence to the programme and included having one-to-one appointments, supervision, reassessments, appointment times, communication and self-monitoring training parameters. All patients reported having busy routines, family or work commitments, and that post-training fatigue affected their routine. These factors affected feasibility for patients. Reduced supervision raised additional concerns regarding safety and adherence by both patients and staff.

Conclusion

Supervised FES LCE was acceptable and perceived as appropriate. Personal and logistical factors affected implementation. Once a week training was feasible. Factors should be explored pre-enrolment and providing patient education could improve adherence to the programme.

---

[1] Manx Care, Douglas, Isle of Man.
[2] UCL, London, United Kingdom.

Functional Electrical Stimulation Leg Cycle Ergometry for people with multiple sclerosis

Service evaluation on patient outcomes.

Shereen Louw[1], Sally Davenport[2]

Introduction

Multiple sclerosis (MS) is characterised by a variety of physical, cognitive and/or emotional symptoms. Functional Electrical Stimulation Leg Cycle Ergometry (FESLCE) has been shown to be safe and beneficial for people with MS and moderate to severe mobility impairments. These findings do not apply to people with MS and mild mobility impairments (able to walk more than 100 metres). This service evaluation explored the relationship between patient outcomes and patient demographics and clinical characteristics in a real-world outpatient clinical setting.

Method

Retrospective data analysis captured demographics, training observations and patient outcomes routinely collected by the service. People were stratified by their baseline level of mobility using Patient Determined Disease Steps (PDDS). Nonparametric methods were used to calculate between-group differences: Fisher's exact method for categorical data and Mann Whitney U test for continuous data.

Results

Of the twelve people eligible for FES LCE, eleven enrolled, and nine completed the six-week programme. There was no statistically significant difference between mobility-defined strata in terms of gender, type of MS, time since diagnosis, or FES LCE familiarity at baseline. All patients trained at moderate intensity on the Borg scale. The Berg Balance Scale (BBS) and the Dynamic Gait Index (DGI) showed clinically significant improvements for all patients, with no statistically significant differences between the groups ($p=0.082$) and ($p=0.345$), respectively. On the MSIS-29, all patients had clinically significant improvements in fatigue, but there was no statistically significant difference between groups ($p = 0.712$).

Conclusion

The data demonstrated a strong association between FES LCE and improved balance, mobility and fatigue patient outcomes, and no statistically significant difference for people with mild or moderate to severe mobility impairments. This suggests that FES LCE may be equally beneficial for people with MS and mild or moderate to severe mobility impairments.

---

[1] Manx Care, Douglas, Isle of Man.
[2] UCL, London, United Kingdom.

Optimising self-efficacy and self-management during interactions within community rehabilitation and support services

Katherine Jackson
Teesside University, Middlesbrough,
United Kingdom

Introduction

A relational approach to self-management for people with progressive neurological conditions recognises the importance of interactions with health and social care professionals, which promote self-efficacy. The reality of self-efficacy, self-management and self-management support can be understood by learning from experts by experience, who use community rehabilitation and support services.

Aim

To qualitatively explore how self-efficacy and self-management can be optimised during interactions within community rehabilitation and support services for people with progressive neurological conditions.

Method

A participative qualitative study with people with progressive neurological conditions (co-researchers). Recruitment of six participants with Parkinsons' disease and four with multiple sclerosis. Data collected using retrospective Life Grid tool and two individual interviews per person. Reflexive thematic analysis using inductive and deductive coding by researcher and co-researcher. Co production of recommendations for optimising self-efficacy and self-management.

Results

The participatory methods facilitated the co-creation of new knowledge about specific, personal self-efficacy, individual self-management and community-based support. Four themes (and twelve subthemes) were identified: Embrace expertise of people with progressive neurological conditions; Enhance access to breadth and depth of community-based rehabilitation and support; Understand who people are and how they think; Mandate for quality interactions within all health and social care settings.

Conclusion

People with progressive neurological conditions propose the following recommendations for optimising self-efficacy and self-management:

- Embrace the power of multidimensional peer support and experiential knowledge of multimodal physical activity
- Expand connectivity between public health, primary care, voluntary agencies
- Develop mechanisms to facilitate continuity and responsiveness (single point of contact, online/telephone/face to face)
- Facilitate conversations about specific self-efficacy for self-management (self-referral, physical activity, access to purposeful activities, access to information).

The findings highlight that quality interactions which are respectful of individual personality, values, beliefs, personal self-efficacy and meaning and purpose should be mandatory.

Attitudes and perceptions of Irish health care professionals regarding functional neurological disorder

A national survey

Roisin Vance[1,2], Sarah Clarke[1],
Fiadhnait O'Keeffe[3,4], Toni Galligan[1],
Anne Doherty[5], Cora Flynn[6], Eric Kelleher[7],
Laffan Aoife[8], Colin Doherty[8,9], Diane Gillan[1,2,9]

Background

Functional neurological disorder (FND) is a common and disabling condition. Limited access to services for FND poses challenges both for patients and their health care providers. This survey explored the attitudes, experiences, support and training needs of health care professionals (HCPs) who provide care to individuals with FND in Ireland.

Methods

A broad range of HCPs working with patients with FND in Ireland partook in an anonymous online twelve-item survey. Participants were recruited via professional bodies and snowballing convenience sampling. Descriptive and inferential statistics were employed to analyse data.

Results

A total of 314 HCPs working in Ireland completed the survey. 80% were female and over half worked in their current role for more than ten years. 75% of the sample encountered three or less individuals with FND per month. Identified service-related challenges to effective patient care included insufficient clinic time, lack of confidence explaining the diagnosis, and the need for greater access to specialist support. Data revealed persisting negative attitudes towards FND patients among a proportion of respondents. The majority of respondents did not feel they received adequate education on FND, with the exception of neurologists, 65% of whom felt adequately trained. The majority of respondents (85%) also felt that people with FND did not have access to appropriate FND services in Ireland.

Conclusion

This study indicates that there is a significant need to improve FND education among HCPs in Ireland, in addition to developing appropriately resourced, integrated, multidisciplinary care pathways for the FND patient group.

---

[1] Beaumont Hospital, Dublin, Ireland.
[2] Royal College of Surgeons, Dublin, Ireland.
[3] St Vincents Hospital, Dublin, Ireland.
[4] University College Dublin, Dublin, Ireland.
[5] Mater Hospital Dublin, Dublin, Ireland.
[6] St Vincents Hospital, Dublin, Ireland.
[7] University College Cork, Cork, Ireland.
[8] St Jame's Hospital, Dublin, Ireland.
[9] Trinity College Dublin, Dublin, Ireland.

Connect and conquer

A health, community and charity embedded partnership programme to increase exercise and physical activity provision for people living with Parkinson's

Sophia Hulbert[1], Rob Harrison[2], Lynne Osborne[1]

Background

The essential role of physical activity and exercise for PwP is undisputed. However, PwP remain less active than their counterparts. The healthcare climate supporting the required activity provision, coupled with the promotion of sustainable, person-centred approaches throughout health and social care, are shown to be effective solutions for long-term condition self-management.

Intervention

Through focus groups and workshops, PwP state activity provision should take place in the community and outside the health sector.

In partnership with Active Cornwall, we devised a free online training package offered to all activity and exercise providers in the county. Training includes six mini-modules co-designed with PwP to increase awareness of Parkinson's, understand the condition, symptoms and importance of exercise and learn how best to support PwP.

Trained providers are advertised as 'Parkinson's friendly activity providers' to PwP via a community database. Partnership with Parkinson's UK hubs enables a reduction in the cost of the activities, providing an incentive for PwP to try new things, make new friends and foster behaviour change.

Regular Connect & Conquer events bring trained providers and PwP together in a local leisure centre to demonstrate mini taster sessions, meet each other and build peer support within local communities.

Outcome

Fifty providers ranging from yoga, walking, surfing, dance, swimming, boxing, aerobics, climbing and many more have been trained. Three Connect & Conquer events have run across the county, in the social setting.

Partnership between the NHS Trust and Active Cornwall has established a high-quality, evidenced based and sustainable approach to continual training of new 'Parkinson's friendly providers'. This builds greater awareness of Parkinson's and the importance of exercise within the exercise community. Most importantly it provides choice, opportunity and access to a range of activities for PwP to self-manage their condition in a highly active and enjoyable way.

---

[1] Cornwall Partnership NHS Foundation Trust, Bodmin, United Kingdom.
[2] Cornwall County Council, Truro, United Kingdom.

Development of an upper limb treatment pathway for the Integrated Community Stroke Service (ICSS)

Zoë M Pascucci
Integrated Community Stroke Service, Sirona Care and Health CIC, Bristol, United Kingdom

Background

Research indicates that therapists need to find ways to deliver more intensive therapy to support upper limb recovery. Stroke survivors need to have enough functional recovery to use their affected upper limb in day-to-day tasks or there is a risk that they will stop using their upper limb once treatment ends.

The upper limb pathway was developed to provide a guide for physiotherapists and occupational therapists to support their clinical reasoning in selecting the best available evidence-based treatment for upper limb recovery in the community setting at any point in the service users' stroke journey.

The pathway was developed with a dedicated group of therapists as part of an upper limb project group through rigorous review of the current evidence, attendance at conferences and training courses, VIATherapy app and stroke guidelines in the UK, Australia, Canada and America.

The pathway is split into active and non-active upper limb treatments and provides clinicians with an easy-to-follow flow chart to determine which treatment modalities will benefit their patient. Each modality has a resource pack to aid delivery.

Aim

To improve therapists' clinical reasoning and confidence in providing effective evidence-based upper limb treatment programmes through the implementation of the ICSS upper limb pathway.

Method

Therapists attended training sessions and completed a semi-structured questionnaire to identify their confidence levels in upper limb assessment and treatment.

Results

Therapists' confidence improved in terms of treatment choice and predicting upper limb recovery.

Discussion

Overall therapists increased their confidence in identifying treatment choices with the use of the upper limb pathway. This pathway can be used as a basis for developing further training resources within the ICSS to improve therapists' knowledge and confidence of treatment options. A service evaluation is needed to evaluate the use of the pathway and outcomes for service users.

The Echo Rehabilitation project

Integrated system collaboration to improve community neurological rehabilitation provision in a rural area

Angela Gibbon
Cornwall Partnership NHS Foundation Trust, Liskeard, United Kingdom

The community neurological rehabilitation team (CNRT) in Cornwall provides domiciliary therapy for complex neurological patients. It currently has 26% of the recommended staffing with reduced efficiency due to limited clinical space and rural geography. This can result in a six-month wait to access rehabilitation, with a therapy intensity of one to two sessions per month once achieved. The Cornwall Council Echo Centre is a day centre for adults with physical disabilities, accessed through local authority funding assessment which can be lengthy.

This publication describes a collaboration between these system partners to successfully overcome these challenges. The aims of the project were to increase self-efficacy of participants with independent management of their long-term neurological conditions (LTNC), establish an appropriate support pathway post programme and as a test of collaboration concept.

CNRT therapists trained the Echo support workers in the principals of neurological rehabilitation. Fifteen people with LTNC from the CNRT caseload attended the Echo Centre weekly for 14 weeks. Goals and treatment plans were developed with the therapists, who monitored the functional activities led by the support worker staff. The North and East Integrated Care Area funded the pilot. EQ-5D-5L, long-term conditions questionnaire (LTCQ), functional scales and stakeholder feedback were completed at 0, 14 and 26 weeks.

Thirteen participants improved their functional outcome by 5–292%. LTCQ scores improved by 71% and EQ-5D-5L by 26% on average. The therapy team were ten times more efficient and provided 17 times the therapy intensity at 40% of the cost. Thematic analysis of focus groups demonstrated highly positive feedback from all stakeholders. Individuals on the project continue to access community groups together; two have started volunteering and one was able to reduce his care package, resulting in a £12k system cost saving. Work is ongoing to secure substantive funding to continue the project.

Instructions for authors on submission to *Synapse*

STRUCTURE

Your paper should be compiled in the following order:

- title page
- abstract
- keywords
- main text introduction, materials and methods, results, discussion
- acknowledgments
- declaration of interest statement
- references
- appendices (as appropriate)
- table(s) with caption(s) (on individual pages)
- figures
- figure captions (as a list)

Please do not include author's name on the blind-manuscript.

Please include another file with title of paper, authors' names, corresponding authors, disclosure statement – conflict of interest – as a separate file.

AUTHOR DETAILS

Please ensure everyone meeting the International Committee of Medical Journal Editors (ICMJE) *requirements for authorship* is included as an author of your paper. All authors of a manuscript should include their full name and affiliation on the cover page of the manuscript. Where available, please also include ORCiDs and social media handles (Facebook, Twitter or LinkedIn). One author will need to be identified as the corresponding author, with their email address normally displayed in the article PDF. Authors' affiliations are the affiliations where the research was conducted. If any of the named co-authors moves affiliation during the peer-review process, the new affiliation can be given as a footnote. Please note that no changes to affiliation can be made after your paper is accepted.

All authors submitting to medicine, biomedicine, and health sciences, allied and public health journals should conform to the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals*, prepared by the International Committee of Medical Journal Editors (ICMJE).

PEER REVIEW AND ETHICS

Synapse is committed to peer-review integrity and upholding the highest standards of review. Once your paper has been assessed for suitability by the editor, it will then be double blind peer reviewed by independent, anonymous expert referees.

Complying with ethics of experimentation

Please ensure that all research reported in submitted papers has been conducted in an ethical and responsible manner, and is in full compliance with all relevant codes of experimentation and legislation. All papers which report in vivo experiments or clinical trials on humans or animals must include a written statement in the methods section. This should explain that all work was conducted with the formal approval of the local human subject or animal care committees (institutional and national), and that clinical trials have been registered as legislation requires. Authors who do not have formal ethics review committees should include a statement that their study follows the principles of the *Declaration of Helsinki*.

Consent

All authors are required to follow the *ICMJE requirements* on privacy and informed consent from patients and study participants. Please confirm that any patient, service user, or participant (or that person's parent or legal guardian) in any research, experiment or clinical trial described in your paper has given written consent to the inclusion of material pertaining to themselves, that they acknowledge that they cannot be identified via the paper and that you have fully anonymised them. Where someone is deceased, please ensure you have written consent from the family or estate.

Using third-party material in your paper

You must obtain the necessary permission to reuse third-party material in your article. The use of short extracts of text and some other types of material is usually permitted, on a limited basis, for the purposes of criticism and review without securing formal permission. If you wish to include any material in your paper for which you do not hold copyright, and which is not covered by this informal agreement, you will need to obtain written permission from the copyright owner prior to submission.

WORD LIMITS

Please include a word count for your paper. Word limit guidance is provided below:

- **Qualitative studies/ Systematic literature reviews** – 5,000 words
- **Quantitative studies** – 3,000–4,000 words
- **Case reports** – 2,000–3,000 words
- **Service/Quality improvement programmes** – 3,000–4,000 words.

STYLE GUIDELINES

Please use UK spelling style consistently throughout your manuscript.

Please use double quotation marks, except where "a quotation is 'within' a quotation". Please note that long quotations should be indented without quotation marks.

All articles should be well organised and written in simple, clear, correct English. The positions of tables and charts or photographs should be appropriately titled and numbered consecutively in the text.

Formatting your manuscript

- **Papers** may be submitted in Microsoft Word formats.
- **Figures** should be saved separately from the text and should be high quality (1200 dpi for line art, 600 dpi for grayscale and 300 dpi for colour, at the correct size). Figures should be supplied in one of our preferred file formats: EPS, PS, JPEG, TIFF, or Microsoft Word.
- **Tables** should present new information rather than duplicating what is in the text. Readers should be able to interpret the table without reference to the text. Please supply editable files.
- **Units** Please use *SI units* (non-italicised).
- All **abbreviations** must be explained.
- **References** should be listed alphabetically, in the Harvard style eg: Pearson MJT *et al* (2009) Validity and inter-rater reliability of the Lindop Parkinson's disease Mobility Assessment: a preliminary study Physiotherapy 95 (2) pp126-133.
- **Spacing** The main document should be double-spaced, with one-inch margins on all sides, and all pages should be numbered consecutively.
- **Font** The text should appear in 12-point Arial font. Normally, only two categories of heading should be used. Major ones should be typed in capital letters in the middle of the page and underlined; sub-headings should be typed in lowercase and also underlined. Headings should not be numbered.

SUBMITTING YOUR PAPER

To submit your work, email your manuscript and all supporting files to:

Synapse@acpin.net and cc in *secretary@acpin.net*

What you need to submit

1. Covering letter to the editor in which you have to declare that the work submitted to *Synapse* has not been published elsewhere and is not submitted to another journal simultaneously.

2. Blind manuscript should include:

- Title page title of manuscript
- A structured abstract of 250 words. You may structure your abstract with the following headings: (a) Background or introduction, (b) Objective or purpose, (c) Methods, (d) Results, and (e) Conclusion.
- Between three and five **keywords**.
- Main body with following headings: main text introduction, materials and methods, results, discussion; acknowledgments; declaration of interest statement; references; appendices (as appropriate); table(s) with caption(s) (on individual pages); figures; figure captions (as a list).

3. Title page with author's details

- Title
- List of authors followed by affiliation

Corresponding author: name, position, work address, email, phone details

Please include professional and academic qualifications for all authors and their current positions. For original research papers, include a brief note about each author that indicates their contribution, and a summary of any funds supporting their work.

- **Funding details**. Please supply all details required by your funding and grant-awarding bodies.
- **Disclosure statement**. This is to acknowledge any financial interest or benefit that has arisen from the direct applications of your research.

SHARING YOUR PUBLISHED WORK

On acceptance, we recommend that you keep a copy of your accepted manuscript. If your manuscript is rejected, then you are free to submit to any other journal.

Using your eprints to share your article

We want you to share your article, highlight the importance of your research, and ensure it has impact. Every *Synapse* author who publishes in a subscription journal gets **ten free eprints** to share with colleagues as soon as their article is published on *Synapse Online*.

This **includes all named authors**. So, if you collaborated on a paper with three other researchers, this means you get ten free eprints each.

For further information please contact the *Synapse* editor:

- Dr Praveen Kumar: *synapse@acpin.net*

acpin

Synapse

Official journal of the **Association of Chartered Physiotherapists in Neurology**

www.acpin.net

AUTUMN 2024

Editor
Dr Praveen Kumar
synapse@acpin.net

Editorial advisory committee
Members of the ACPIN Board and national committees as required.

Design
kwgraphicdesign
44 (0) 1395 260398
kw@kwgraphicdesign.co.uk

Key aspects to *Synapse's* publication and dissemination strategy are :

1. To provide a platform for publication of high-quality research studies.
2. To provide peer-review feedback for novice researchers.
3. To have special/supplementary editions on specific topics/areas/student related projects.
4. To have a clearly defined editorial board.
5. To have a review board that includes both national and international reviewers. (This includes academics, researchers, clinicians, ACPIN members, non-ACPIN members/experts in the field of neurology/neurological rehabilitation, physical medicine and rehabilitation).

Reviewers

We would like to express our thanks to the following reviewers:

Dr Sarah Moore
Prof Cathy Bulley
Dr Clare Belmont
Prof Cherry Kilbride
Gavin Church
Renee Groenevelt
Dr Angie Logan
Jakko Brouwers
Dawn Knibbs
Shae Jackson
Prof Jenny Freeman
Dr Stephen Ashford
Hilary Cox
Charlotte Warner

acpin

Connecting knowledge and practice

Synapse

AUTUMN 2024

OFFICIAL JOURNAL OF THE ASSOCIATION OF
CHARTERED PHYSIOTHERAPISTS IN NEUROLOGY

WWW.ACPIN.NET