Supporting physical activity and exercise in people with Neurological conditions

REBECCA RAYNER, STROKE CLINICAL LEAD
NORFOLK AND NORWICH UNIVERSITY HOSPITAL
Aims of the Presentation

- Overview of Exercise and Physical Activity
- Make you think about what you do now and what you may want to do in the future?
- Update on current evidence for a few Neuro conditions – Stroke, MS, PD, Neuromuscular disorders
- Barriers (patient and Physio)

“How do you promote Physical Activity and Exercise in people with Neuro Conditions?”
Why do we promote physical activity/ exercise?
Physical Activity vs Exercise

- How would you describe physical activity to your patients?
- How would you describe exercise?
- Do you think of them differently or the same thing?
- How would you describe the difference to your patients?
What are the 4 main categories of exercise?

What tends to be your priority when working with people with neurological conditions - why?
Types of Exercise

Strength

Flexibility

Balance

Aerobic

These are often all important in management and recovery from neurological conditions.
"If exercise were a pill, it would be one of the most cost-effective drugs ever invented”

Dr Nick Cavill, Health Promotion Consultant

“Refusing to go to the gym is not the same thing as resistance training.”
Four Principles of Exercise

1. Individual differences
2. Specificity
3. Progressive Overload & Recovery
4. Reversibility
To stay healthy, adults should try to be active daily and should do:

- at least 150 minutes of moderate aerobic activity every week
- strength exercises on two or more days a week that work all the major muscles

These guidelines, based on evidence from studies in which people with disability are often excluded.
Neurological Condition specific advice...
### Effects of Exercise therapy

<table>
<thead>
<tr>
<th>Muscle strength</th>
<th>Muscle mass</th>
<th>Muscle activation</th>
<th>Aerobic capacity (VO2-max)</th>
<th>CVD risk</th>
<th>Depression</th>
<th>Fatigue</th>
<th>Daily activity level</th>
<th>Functional capacity</th>
<th>Balance</th>
<th>QoL</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

Red arrow = Impaired in MS patients
Green arrow = Improved after exercise in MS patients

Mott & Pillothi, Nat Rev Neurol; Sep;8(9):487-97 2012
Can exercise be harmful for people with MS?

- Exercise training not associated with increased risk of relapse
- Indeed, exercise training was associated with a slightly reduced risk of relapse
- Rate of adverse events for people with MS was no higher than that associated with exercise training in healthy populations
What about the increase in symptoms with exercise?

Many people experience an increase in symptoms with exercise.

- Most common are sensory, fatigue and visual disturbances.
- Vast majority return to baseline within 30 minutes.
- Very occasionally can be up to 24 hours.
STROKE / TIA

- S.S lead more sedentary lifestyles / de-conditioning
- Physical activity and exercise (aerobic and strength training) shown to be beneficial at all stages of recovery and helps management of risk factors.
- Brief statements recommending “Physical activity” included in NICE and RCP guidelines.
- Individualised prescriptions.
<table>
<thead>
<tr>
<th>Setting/Mode of Exercise</th>
<th>Goals/Objectives</th>
<th>Prescriptive Guidelines: Frequency/Intensity/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalization and early convalescence (acute phase)</td>
<td>Prevent deconditioning, hypostatic pneumonia, orthostatic intolerance, and depression</td>
<td>➞ 10- to 20-bpm increases in resting HR; RPE ≤ 11 (6-20 scale); frequency and duration as tolerated, using an interval or work-rest approach</td>
</tr>
<tr>
<td>➢ Low-level walking, self-care activities</td>
<td>Evaluate cognitive and motor deficits</td>
<td></td>
</tr>
<tr>
<td>➢ Intermittent sitting or standing</td>
<td>Stimulate balance and coordination</td>
<td></td>
</tr>
<tr>
<td>➢ Seated activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Range of motion activities, motor challenges</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inpatient and outpatient exercise therapy or “rehabilitation”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerobic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Large-muscle activities (e.g., walking, graded walking, stationary cycle ergometry, arm ergometry, arm-leg ergometry, functional activities seated exercises, if appropriate</td>
<td>Increase walking speed and efficiency</td>
<td>➢ 40%–70% VO2 reserve or HR reserve; 55%–80% HR max; RPE 11–14 (6–20 scale)</td>
</tr>
<tr>
<td>➢ Circuit training</td>
<td>Improve exercise tolerance (functional capacity)</td>
<td>➢ 2–5 d/wk</td>
</tr>
<tr>
<td>➢ Functional mobility</td>
<td>Increase independence in ADLs</td>
<td>➢ 20–60 min/session (or multiple 10-min sessions)</td>
</tr>
<tr>
<td>Muscular strength/endurance</td>
<td>Reduce motor impairment and improve cognition</td>
<td>➢ 5–10 min of warm-up and cool-down activities</td>
</tr>
<tr>
<td>➢ Resistance training of U/L extremities, trunk using free weights, weight-bearing or partial weight-bearing activities, elastic bands, spring coils, pulleys</td>
<td>Improve vascular health and induce other cardioprotective benefits (e.g., vasomotor reactivity, decrease risk factor)</td>
<td>➢ Complement with pedometers to increase lifestyle physical activity</td>
</tr>
<tr>
<td>➢ Circuit training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Functional mobility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Stretching (trunk, upper and lower extremities)</td>
<td>Increase muscle strength and endurance</td>
<td>➢ 1–3 sets of 10–15 repetitions of 8–10 exercises involving the major muscle groups at 50%–80% of 1RM</td>
</tr>
<tr>
<td>Neuromuscular</td>
<td>Increase ability to perform leisure-time and occupational activities and ADLs</td>
<td>➢ 2–3 d/wk</td>
</tr>
<tr>
<td>➢ Tai chi</td>
<td>Reduce cardiac demands (i.e., RPP) during lifting or carrying objects by increasing muscular strength, thereby decreasing the % MVC that a given load now represents</td>
<td></td>
</tr>
<tr>
<td>➢ Yoga</td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Recreational activities using paddles/sport balls to challenge hand-eye coordination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Active-play video gaming and interactive computer games</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1RM indicates 1 repetition maximum; ADLs, activities of daily living; HR, heart rate; MVC, maximal voluntary contraction; ROM, range of motion; RPE, rating of perceived exertion (6–20 category scale); RPP, rate–pressure product; U/L, upper/lower; and VO2, oxygen uptake.

Modified with permission from Gordon et al. Copyright © 2004, American Heart Association, Inc.
Recent Research: UKSF 2018 posters

- In Sheffield – 2 workshops of 15-20 people exploring barriers: Deficient access to information, lack of accessibility support, lack of infrastructure (transport, technology, finances).

- ESD team - 57% ESD population returned questionnaire, 62% of these were achieving National exercise Guidelines. Those that weren’t identified specific individual barriers (Pain 13%, tiredness 7%, motivation 7%).

- Non-ambulatory stroke survivors (14 interviewed in Scotland) expressed need for supervised, bespoke PA programme. Low confidence/self-esteem an agreed barrier in this sample.
Parkinson’s Disease (PD)

Neurogenerative disease, estimated at 2800 per 100,000.
Cardinal symptoms – tremor, bradykinesia, rigidity, postural instability.

- Most effective in improving “Physical Capacity (strength, mobility, balance, motor control, flexibility)”, “physical and cognitive functional capacities (ADLs, level of activity)”.
- Least effective (<50%) and greater variability in improving “Clinical Symptoms of PD (UDPRS)” and “psychosocial aspects of life”.
- Not enough quality research exploring cognitive functions and depression.
Self-reported activity scores and examined associations with clinical characteristics in 383 PD subjects and 175 healthy controls in PPMI cohort.

- Activity scores 8% lower for PD subjects than healthy controls – males and younger people tended to have higher activity scores.
- Feasible to achieve AHA activity guidelines in early PD.
- Only 47% PD subjects achieved recommended PA levels.


- Patient’s should be “counselled on importance of exercise” and “engage in any activity they are willing to perform”.
Parkinson’s exercise framework

**Key messages for professionals to give the people they support**

**Investing in exercise from diagnosis onwards**
- Early intervention: Exercise can improve your ability to move and play sports in the future.
- Physical activity: Regular exercise can help maintain independence.
- Psychological benefits: Exercise can improve emotional well-being.
- Social benefits: Exercise can provide a sense of community and belonging.
- Practical benefits: Exercise can improve sleep, energy, and mood.

**Staying active**
- Physical activity: Regular exercise can help maintain independence.
- Psychological benefits: Exercise can improve emotional well-being.
- Social benefits: Exercise can provide a sense of community and belonging.
- Practical benefits: Exercise can improve sleep, energy, and mood.

**Managing complex (physical) challenges**
- Physical activity: Regular exercise can help maintain independence.
- Psychological benefits: Exercise can improve emotional well-being.
- Social benefits: Exercise can provide a sense of community and belonging.
- Practical benefits: Exercise can improve sleep, energy, and mood.

**Exercise style (bearing in mind fitness and any barriers to exercise such as travel or fatigue)**
- Target postural control, balance, and movement: Examples include Tai Chi, yoga, and Pilates.
- Target flexibility: Examples include stretching and yoga.
- Target endurance: Examples include walking, cycling, and swimming.

**Examples of exercise styles to focus on**
- Examples include: Tai Chi, yoga, Pilates, walking, cycling, and swimming.

**Movement, ability, and motivation change over time, so:**
- Pay attention to specific physical functions that focus on daily activities such as getting up out of a chair, turning in bed, and walking.
- Continue to maintain general fitness for physical wellness, feeling, and mobility.
- Work with healthcare professionals to tailor exercise programs that meet individual needs.

**Parkinson’s**

People with Parkinson’s can find more information on exercise and managing their symptoms at parkinson.org.uk/exercise
Exercising did not affect the amount of dopamine in the brain, but showed the brain cells were using dopamine more efficiently in exercise group.

Exercise improves efficiency by modifying the substantia nigra and basal ganglia.

Exercise induces and increases the beneficial neurotrophic factors, particularly GDNF (glial-derived neurotrophic factor), which reduces the vulnerability of dopamine neurons to damage.

Prolongs dopamine within synapses so signal lasts longer and increased places for dopamine to bind (D2 receptors)

How do we get in early and encourage the importance?
Neuromuscular Disorders

What are the main neuromuscular disorders you typically treat?

Main Presenting problems?

Primary Muscle weakness, atrophy, Secondary muscle weakness and/or sensory disturbance, neuropathic pain.

~70% of people with CMT, myotonic dystrophy and FSHD report severe fatigue (Kalkman et al 2005)

People with NMDs traditionally told not to exercise: Concerns about worsening the condition and more recently about eccentric exercise.
Exercise for people with peripheral neuropathy (Review)

White CM, Pritchard J, Turner-Stokes L

Therapeutic exercise for people with amyotrophic lateral sclerosis or motor neuron disease (Review)

Dal Bello-Haas V, Florence JM, Krivickas LS

Strength training and aerobic exercise training for muscle disease (Review)

Voet NBM, van der Kooi EL, Riphagen II, Lindeman E, van Engelen BGM, Geurts ACH
• Exercise in NMDs is safe
• **May** be beneficial: early positive results
• **May** be a difference in response between conditions
• Carry over into function of more traditional training?
• **May** be less able to strengthen weaker muscles

May/may not improve strength function health and well being effects must be considered to reduce other risk factors
Not enough evidence yet to ascertain if high intensity eccentric contractions are safe
Little guidance on optimal dosage
More research required!
Balance & Flexibility?

Do we/our patients typically think of this as exercise/physical activity?

How do we make sure all aspects are covered without at least 4 pages of exercises?

? Tai-chi / Multi-sensory balance training / Yoga / Community walking groups

Hopefully many things we prescribe/suggest cover more than one area of exercise.

Any thoughts?
Things to consider…

- Evidence shows that often p.w. NC work much harder (energy expenditure) during walking and other tasks due to impairments.

Do we consider this when prescribing exercise/physical activity dose?

What is our role?

Education, goal setting, prescription, sign-posting to local services

- Key differences in long term N.C vs single event recovery
What tends to be the biggest difficulties engaging p.w. NC in physical activity / exercise?
Barriers (Patient)

- Safety – big concern
- Fear of injury / worsening condition / not doing it right
- Access
- Lack of information and advice
- Lack of support
- Lack of on-going, maintenance PT
- Symptoms – Pain, fatigue, weakness
Barriers (Physio)

Limited evidence exploring what physiotherapists do and if they regularly engage people with neurological conditions in physical activity.

Study aim: to explore physiotherapists’ perspectives and current practise in engaging people with neurological conditions in PA.

- **Convenience sampling:** Members of the Association of Chartered Physiotherapists Interested in Neurology (ACPIN) and professional contacts

- Theoretical Domains Framework (TDF) used to guide both methods. The TDF is constructed of domains identified to explain behaviour and has been used to help understand factors that influence delivery of healthcare

  **Semi-structured interviews (n=14)**
  - Recruited via email sent by ACPIN to members or to professional contacts
  - Topic guide developed from previous study using TDF
  - Followed TDF during content-analysis and construct belief statements

  **Online survey (n=92)**
  - Recruited via email sent by ACPIN to members only
  - Primary outcome measure developed to determine the behaviour
  - Used Determinant of Implementation Behaviours Questionnaire (DIBQ) developed in 2014 using TDF
  - Correlations and multiple regression analysis
Rhiannon’s MRes Main Findings

- PT agree that engaging p.w.NC in PA = key part of PT role.
- Main PT goal: facilitate self-directed PA and improve patients’ self-management of their condition.
- 80% participated in discussions about PA, less set goals, addressed barriers and monitored progress.
- Main barriers - time restrictions, organisational issues within the NHS and their workplace, reduced funding and staffing, the patients’ lack of motivation and their own barriers.
- Facilitators - teamwork, local non-NHS resources, patients who are motivated and have a good support network and access to facilities.
How do you promote Physical Activity and Exercise in people with Neuro Conditions?

Tiedemann et al (2012) Predictors of adherence to a structured exercise program and physical activity participation in community dwellers after stroke. Stroke Research and Treatment Article ID 136525


https://parkinson.org/Understanding-Parkinsons/Treatment/Exercise/Neuroprotective-Benefits-of-Exercise