Evidence-based guidelines for physiotherapy in Parkinson’s disease

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Movement Disorders in People With Parkinson Disease: A Model for Physical Therapy

People who are diagnosed with idiopathic Parkinson disease (PD) experience movement disorders that, if not managed, can lead to considerable disability. The premise of this perspective is that physical therapy for people with PD relies on clinicians having: (1) up-to-date knowledge of the pathogenesis of movement disorders, (2) the ability to recognize common movement disorders in people with PD, (3) the ability to implement a basic management plan according to a person’s stage of disability, and (4) problem-solving skills that enable treatment plans to be tailored to individual needs. This article will present a
Parkinson’s disease

Neurodegenerative
- 2nd most common
- 2nd impact QOL
- costs increasing over years

- 1.4% of people > 55 yrs
- 5 to 10% < 40 yrs!
- worldwide 6 million

- slowly progressive
- no cure (yet)
- complex
Complex disease

Motor
- Bradykinesia
- Rigidity
- Postural instability
- Tremor

Non-motor
- Cognition
- Personality
- Pain
- Fatigue
- Sensoric
- Continence
- Sleep
- Sexual
- Behavioral

Langston, Ann Neurol, 2006
Interventions

Primary disease process

Medical management

Disease signs

Compensatory strategies

Allied health care

(Deep) brain stimulation
Evidence-based guidelines

- 2004: Physiotherapy by Keus et al.
- 2009: Occupational by Sturkenboom et al.
How to implement?

Care often not well organised
→ Limited Parkinson’s specific expertise
→ Limited patient volume
→ Insufficient interaction

Prof. dr. Bas Bloem
Dr. Marten Munneke

Nijkrake et al, Mov Disord 2009
Keus et al, J Neurol 2004
ParkinsonNet
Circle of benefit

- Implementation
- Patient care
- Education
- Research
- Guideline development
- Questions
- Hypothesis
Copy & paste?

Get organised!
→ Select
→ Educate
→ Make visible
→ Communicate
→ Collaborate

.... Adjustments national context
Physiotherapy in Parkinson’s
Stages, domains & decision support
Evidence-based PT guidelines

2004
AGREE: high quality

In English, for free!
www.appde.eu

Keus, Bloem et al., Mov Disord 2007
Quick reference cards

Early phase

HY 1-2.5
- Prevention inactivity & fear
- Maintain or improve physical capacity

Mid phase

HY 2-4
- Maintain or improve activities
  - Transfers
  - Manual activities
  - Balance & posture
  - Gait

Late phase

HY 5
- Prevent pressure sores
- Support caregivers & nurses
Graded recommendations

According to the level of evidence:

<table>
<thead>
<tr>
<th>Level of scientific evidence of the intervention study</th>
<th>Description of conclusion or recommendation in the guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Supported by one systematic review at quality level A1 or at least two independent trials at quality level A2</td>
<td>‘It has been demonstrated that …’</td>
</tr>
<tr>
<td>2. Supported by at least two independent trials at quality level B</td>
<td>‘It is plausible that …’</td>
</tr>
<tr>
<td>3. Supported by one trial at quality level A2 or B, or research at quality level C</td>
<td>‘There are indications that …’</td>
</tr>
<tr>
<td>4. Based on the expert opinion (e.g. of working group members)</td>
<td>‘The working group takes the view that …’</td>
</tr>
</tbody>
</table>
Main recommendations

**Cognitive movement strategies**
Compensation to improve transfers

**Cueing**
Use of external rhythms to improve gait

**Exercise**
To improve strength, aerobic capacity, range of movement and balance

(Level 2 = ≥2 controlled studies)
Basal ganglia

- **Automatic** performance motor programs
  - conscious movement execution
  - external cues

- Regulate **simultaneous** & **consecutive** movements
  - Divide into single components to carry out consecutively

- **Meaningful** planning / organisation
  - Divide into single components/activities, external planning
Example strategy

Sit to stand

1. Hands on chair
2. Place feet correctly in chair
3. Move forward in chair
4. Flex trunk
5. Rise up from chair
Example strategy

Rolling over in bed
Main recommendations

Cognitive movement strategies
Compensation to improve transfers

Cueing
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Exercise
To improve strength, aerobic capacity, range of movement and balance

(Level 2 = ≥2 controlled studies)
Gait problems

Early phase
- Slight reduction velocity
- Reduced arm swing, unilateral
- Reduced trunk rotation
- Occasional freezing

Middle to late phase
- Reduction velocity & amplitude
- Bilateral loss arm swing
- Reduced trunk rotation
- Foot placing
- Cadance
- Stride length variability
- Freezing
Sequential movements impaired:
- automatic maintenance movement amplitude
- internal rhythm

Replace by internal or external induced stimuli

One-off or ‘continuous’

**Internal**
- Self-instructions
- Counting
- Tapping

**External**
- Auditory
- Visual
- Tactile
Selecting cues

- Tips & tricks of patients!
- Context dependent
- Patient preference
- Auditory: freezers -10% of frequency comfortable speed
- Temporal & spatial

e.g. Lim, 2005; Van Wegen 2006; Rochester 2009; Nieuwboer 2007
Example selecting cues

Video courtesy: UMC St Radboud, Maarten Nijkrake
Example selecting cues

Video courtesy: UMC St Radboud, Maarten Nijkrake
Example selecting cues

Video courtesy: UMC St Radboud, Maarten Nijkrake
Decision supporting

Quick reference cards
- History taking
- Physical assessment
- Interventions

An example....

Keus, Bloem et al., Mov Disord 2007
# Modified Patient Specific Index Parkinson’s Disease

**Selection patient relevant limitations**

<table>
<thead>
<tr>
<th>Limitation</th>
<th>Patient demand and motivation</th>
<th>Physical activity</th>
<th>Risk to fall</th>
<th>Co-morbidity</th>
<th>Treatment</th>
<th>Other factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body posture</td>
<td>possibility of an active correction of posture; pain due to postural problems; problems with reaching, grasping, and moving objects</td>
<td>frequency and duration per week compared to the Dutch Standard of Healthy Moving (at least 30 min/day for 5 days a week); when having doubts: use the LAMA physical activity questionnaire (LAPAQ)</td>
<td>fall incidents and near fall incidents (use the questionnaire History of Falling); fear to fall; if patients had near misses the past year: use the Falls Efficacy Scale (FES)</td>
<td>Pressure sores; osteoporosis and mobility-limiting disorders such as arthrosis, rheumatoid arthritis, heart failure and coro</td>
<td>current treatment (among others, medication and outcome) and earlier (allied) medical treatment type and outcome</td>
<td>mental factors: ability to concentrate; memory; depression; feeling isolated and lonely; being tearful; anger; concern for the future</td>
</tr>
<tr>
<td>Balance</td>
<td>feeling of impaired balance while standing and during activities; orthostatic hypotension; difficulty with dual tasking (motor activity, cognitive)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>personal factors: insight into the disease; socio-cultural background; attitude (among others, with regard to work); coping (among others, the perception of the limitations and possibilities, the patient’s solutions with regard to the limitations)</td>
</tr>
<tr>
<td>Reaching and grasping</td>
<td>household activities (small repairs, clean, cook, slice food, hold a glass or cup without spilling); personal care (bath, get dressed/undressed, button up, lace up shoes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>external factors: Attitudes, support and relations (of, among others, partner, primary care physician, employer); accommodation (among others,</td>
</tr>
<tr>
<td>Gait</td>
<td>use of aids; walk in the house; climb the stairs, walk short distances outside (100 m); walk long distances outside (&gt; 1 km); start; stop; turn; speed; onset of festination; onset of freezing (use the Freezing of Gait Questionnaire); relation to falls and the use of cues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

*Nijkrake et al, P&RD 2009*
PSI-PD: how to?

1. Select

2. Prioritise:
   - Important
   - Change
   - Next months

3. Score severity

Date of filling in: __________________________

Problem 1 _________________________________
How difficult was it to perform this activity during the past week?

No problem .................................................. impossible
at all
Patient

I would like to walk through my mobile home without feeling glued to the floor

Therapist

Freezing?
Fall risk?

History of Falling Questionnaire

- Frequency & circumstance
- ≥2 falls past year: fall risk!
- Near falls: 21% fall <3 months!

Near falls? Falls Efficacy Scale

- Score > 3 + 1 fall past yr = likely to fall again
- Combine with History & Diary: recklessness?
- NRS patient & caregiver

Freezing of Gait Questionnaire

- Context, severity, impact
Outcome history taking

- Function impairments: *physical capacity & cognition OK*, balance? freezing?
- Activity limitations: mobility mobile home (gait)
- Participation: social life
- Environmental factors: obstacles
- Personal factors: no limiting comorbidity, well-motivated

> Core area’s: balance & gait
# Physical examination

## Quick reference card 2: Physical examination

### Physical capacity

- **Expressing itself in reduced:**
  - Mobidity of joints
  - thoracic spinal column
  - cervical spinal column
  - other joints, namely:
    - [ ]
  - Muscle length
    - calf muscles
    - hamstrings
    - other muscles, namely:
      - [ ]
  - Muscle strength
    - trunk extensors
    - knee extensors
    - knee flexors
    - plantar flexors of the ankle
    - other muscles, namely:
      - [ ]
    - control of respiration
    - physical condition

### Transfers

- **Problems with:**
  - sitting down (chair)
  - rising from a chair
  - rising from the floor
  - getting in and out of bed
  - rolling over in bed
  - getting in or out a car

### Body posture/reaching and grasping

- **Expressing itself in:**
  - generalized flexion while sitting
  - generalized flexion while standing
  - generalized flexion while walking
  - generalized flexion while lying
  - no possibility of active correction of posture
  - pain (especially in neck, back)

### Balance

- **During:**
  - standing (eyes open / closed)
  - rising from a chair
  - turning while standing
  - walking
  - bending forward
  - dual tasking: 2 × motor activities
  - dual tasking: cognitive + motor activity
  - freezing
  - reaching and grasping

### Gait

- **Expressing itself in:**
  - problems with starting
  - problems with stopping
  - shortened stride length
  - increased stride width
  - decreased stride width
  - decreased speed
  - decreased trunk rotation
  - decreased arm swing
  - freezing
  - festination

  **Freezing can be provoked:**
  - by starting to walk
  - during walking

  **Cause:**
  - dual tasking: cognitive + motor activity
  - doorway
  - obstacles (e.g. chairs)
  - other, namely

## Measures for identification and evaluation

- Patient Specific Complaints
- Global perceived effect

## Supplementing measures for identification

- LASA Physical Activity Questionnaire
- Six-minute walk test
- Parkinson Activity Scale
- Timed Up and Go test
- No specific measuring instrument advised
- Timed Up and Go test
- Retropulsion test
- Falls Efficacy Scale
- Falls diary
- Questionnaire History of Falling
- Parkinson Activity Scale
- Timed Up and Go test
- Freezing of Gait questionnaire
- Ten-meter walk test
What evokes freezing?

• **Start** walking

• Upon **reaching** an open space or target

• Making **turns**

• Going through **narrow** passages

• Performing **multiple tasks**
BUT... Freezing reduced by attention
How to evoke freezing..

Additional: double tasking

Snijders et al., 2012
## Quick reference card 4: Treatment strategies

<table>
<thead>
<tr>
<th>Stimulation of activities</th>
<th>Stimulus</th>
<th>Goal</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfers</td>
<td></td>
<td>Perform transfers (more) independently</td>
<td>Practice transfers by using cognitive movement strategies and on/off cues for movement initiation</td>
</tr>
<tr>
<td>Body posture</td>
<td></td>
<td>Conscious normalization of body posture</td>
<td>Practice relaxed and coordinated moving; providing feedback and advice</td>
</tr>
<tr>
<td>Reaching and grasping</td>
<td></td>
<td>Improve reaching and grasping, and manipulating and moving objects</td>
<td>Practice reaching and grasping by using cues and cognitive movement strategies</td>
</tr>
<tr>
<td>Balance</td>
<td></td>
<td>Improve balance during activities</td>
<td>Practice balance, train muscle strength (see prevention of falls)</td>
</tr>
<tr>
<td>Gait</td>
<td></td>
<td>Improve walking (independently); the objective is to increase the (comfortable) walking speed; however, safety comes first</td>
<td>Practice walking by using cues for initiation and continuation of walking, give instruction and train muscle strength and trunk mobility</td>
</tr>
</tbody>
</table>

### Prevention

<table>
<thead>
<tr>
<th>Stimulation of activities</th>
<th>Stimulus</th>
<th>Goal</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inactivity</td>
<td></td>
<td>Preserve or improve physical condition</td>
<td>Provide information on the importance of moving and playing sports, training for prevention of orthostatic hypotension on trunk and leg muscles, prevention of metatarsus adductus, thoracic kyphosis, axial lordosis, and lumbar lordosis.</td>
</tr>
<tr>
<td>Pressure sores</td>
<td></td>
<td>Prevention of pressure sores</td>
<td>Give information about pressure sores prevention and correction (pressure-relieving or prescribed) active exercises to improve muscle strength and prevent contractures.</td>
</tr>
<tr>
<td>Falls</td>
<td></td>
<td>Decrease or prevent falls</td>
<td>List possible causes of falls by means of falls diary, provide information and train strength, body posture, coordination and balance, attuned to the cause of the main problems with maintaining balance and the increased falls risk; decrease the risk to fall. (if necessary) provide hip protectors.</td>
</tr>
</tbody>
</table>
Example applying cues

**Without** cue

**With** visual cue

Train: 3-4 weeks, high intensity (3/wk)
4. Re-score severity

Patient:
I would like to walk through my mobile home without being glued to the floor

Outcome: always goal related!
In conclusion

- **Core areas**: gait, transfers, dexterity, balance, falls, posture, physical capacity
- Main interventions: **cueing, cognitive movement strategies, exercise for physical capacity**
- **Patient specific** goals and interventions
- Benefits selected **measurement tools**
- The **quick reference cards guide**
Update guideline:
European collaboration
Update: European Guideline (2012)

18 countries

Publications of the years
New evidence

(Intensive) treadmill training (8)
Self vs Supervised exercise (2)
Auditory cueing for gait (2)
Transfers (2)

Intensive strength Training (2)
Complementary exercise (2)

Exercise
Cues
Cognitive movement strategies

Dance (2)
And more!
Patient involvement from start

- Writing group
- Reading Group
- Web-based (open)

Unmet needs & barriers

Key questions

Systematic literature search

Critical appraisal, conclusions

Other considerations

Recommendations

Poster: European survey

Expert opinion
Thank you!

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