CLINICAL PRACTICE GUIDELINES FOR PHYSICAL THERAPY IN PATIENTS WITH PARKINSON'S DISEASE

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OUTLINE

- Definition, Epidemiology and Pathogenesis
- Symptoms
- Stages of the Disease
- Prognosis
- Physical Therapy Diagnosis
  - Clinical practice guidelines
  - Objectives
  - Evidence for conclusions and recommendations
  - Physical therapy assessment
  - Outcome measure
- Goals of treatment
- Physical therapy treatment
  - Treatment strategies
  - Guidelines in physical therapy treatment
Definition

Parkinson's disease (PD) is a degenerative disorder of the central nervous system that often impairs the sufferer's motor skills, speech, and other functions.

Epidemiology

Incidence of 4.5 to 20.5 per 100,000
Prevalence of 31 to 347 per 100,000
Estimated one in three adults older than 85 years will have PD.
DEFINITION, EPIDEMIOLOGY AND PATHOGENESIS

- **Pathogenesis**
  - Decrease in the dopamine (DA) stores of the substantia nigra of the basal ganglia
  - Consequent depigmentation of this structure
  - Presence of Lewy bodies
  - The loss of DA from the substantia nigra (SN) leads to alterations in both the direct and indirect pathways of the basal ganglia, resulting in a decrease in excitatory thalamic input to the cortex and perhaps a decrease in inhibitory surround that leads to the symptoms of Parkinson’s disease

- **Etiology**
  - Remains unknown
  - Multifactorial (toxic exposure, genetics, and aging)
SYMPTOMS

- Bradykinesia and Akinesia
- Rigidity
- Tremor
- Postural Instability
- Gait problems
- Perception, Attention, and Cognitive Deficits
- Other Symptoms (Sleep disturbances, constipation, sexual dysfunction, orthostatic hypotension)
# STAGES OF THE DISEASE

## MODIFIED HOECHN AND YAHN STAGING

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>No signs of disease</td>
</tr>
<tr>
<td>Stage 1</td>
<td>Symptoms are very mild and appear only on one side of the body (e.g. tremor, posture, locomotion, and facial expression)</td>
</tr>
<tr>
<td>Stage 1.5</td>
<td>Symptoms appear only on one side of the body but with axial involvement</td>
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<tr>
<td>Stage 2</td>
<td>Symptoms appear on both sides without impairment of balance</td>
</tr>
<tr>
<td>Stage 2.5</td>
<td>Symptoms appear on both sides and still mild, with recovery on pull test</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Symptoms are mild to moderate, some postural instability occurs, but patients are physically independent</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Symptoms are severe, the patient is severely debilitated and needs some assistance, but can still walk or stand unassisted</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Symptoms are very severe, the patient is typically wheelchair-bound or confined to a bed, unless aided</td>
</tr>
</tbody>
</table>
PROGNOSIS

- Tremor-dominated
  - Develop more slowly
  - Cognitive impairments less frequent

- Akinetic-rigid
  - Rapid course
  - Rigidity and hypokinesia
  - Balance and gait problems
Royal Dutch Society for Physical Therapy

The guidelines have been developed in accordance with the ‘method to develop and implement guidelines’

The scientific evidence has been summarized in a conclusion, including the extent of the evidence

If no scientific evidence was available, recommendations were been formulated on the basis of consensus within the guideline development group

Diagnostic and therapeutic processes
Objectives

- Describe ‘optimal’ physical therapeutic care for patients with PD with respect to effectiveness, efficiency and tailored care, based on current scientific professional, and social views
- Lead to a complete (or desired) level of activities and participation
- Prevent chronic complaints and recurrences
EVIDENCE FOR THE CONCLUSIONS AND RECOMMENDATIONS

- The guidelines are based on the conclusions found in randomized clinical trials (RCT’s), systematic reviews, and meta-analyses.
- For the interpretation of results found in the literature, differences in the study designs were taken into account.
<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Meta-analyses (systematic reviews), which include at least some randomized clinical trials at quality level A2 that show consistent results across studies</td>
</tr>
<tr>
<td>A2</td>
<td>Randomized clinical trials of moderate methodological quality (randomized double-blind controlled studies) with sufficient power and consistency</td>
</tr>
<tr>
<td>B</td>
<td>Randomized clinical trials of moderate methodological quality or with insufficient power, or other non-randomized, cohort or patient-control group study designs that involve inter-group comparisons</td>
</tr>
<tr>
<td>C</td>
<td>Patient series</td>
</tr>
<tr>
<td>D</td>
<td>Expert opinion</td>
</tr>
<tr>
<td>Level of scientific evidence of the intervention</td>
<td>Description of conclusion or recommendation in the guidelines</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<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>
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PHYSICAL THERAPY DIAGNOSIS
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WHO INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH

- Impairments
- Activity limitations
- Participation problems
## PHYSICAL THERAPY DIAGNOSIS

<table>
<thead>
<tr>
<th>Functions</th>
<th>Activities</th>
<th>Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impairments</td>
<td>Limitations in</td>
<td>Participation problems</td>
</tr>
<tr>
<td>Musculoskeletal, Cardiovascular and Respiratory</td>
<td>Mobility such as transfers and changing body</td>
<td>Interpersonal interactions and relationships</td>
</tr>
<tr>
<td>System</td>
<td>Pain</td>
<td>Education, work and employment</td>
</tr>
<tr>
<td>Sensory functions</td>
<td>position, (maintaining body position), reaching and grasping and gait</td>
<td></td>
</tr>
<tr>
<td>Mental functions</td>
<td>Other activities, such as household activities</td>
<td>Self-care and domestic life</td>
</tr>
<tr>
<td>Digestive tract</td>
<td></td>
<td>Community, social and civic life</td>
</tr>
<tr>
<td>Uro-genital functions</td>
<td></td>
<td></td>
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<tr>
<td>Sleeping functions</td>
<td></td>
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</tbody>
</table>
PHYSICAL THERAPY ASSESSMENT

- *On* or *Off* period
- Transfers
- Body posture
- Reaching and grasping
- Balance
- Gait
- Inactivity
- Falling
- Mental impairments
OUTCOME MEASURE
OUTCOME MEASURE

- Unified Parkinson’s Disease Rating Scale
- Questionnaire Patient Specific Complaints
- Questionnaire History of Falling
- Freezing of Gait questionnaire
- Retropulsion test
- Timed Up and Go test or Functional Reach Test
- Six-minute walk test
- Ten-meter walk test
- Berg balance test
PARTICIPATION PROBLEMS

- Social relations
- Work
- Hobby
- Sports
PHYSICAL THERAPY TREATMENT
PHYSICAL THERAPY GOALS

- Early phase
- Mid phase
- Late phase
PHYSICAL THERAPY GOALS

- Early phase (Hoehn and Yahr 1 to 2.5)
  - Prevention of inactivity
  - Prevention of fear to move or to fall
  - Preserving or improving physical capacity (aerobic capacity, muscle strength, and joint mobility)

- Physical therapy
  - Information and advice
  - Exercise therapy (possibly in a group)
  - Balance
PHYSICAL THERAPY GOALS

- Mid phase (Hoehn and Yahr 2 to 4)
  As in early phase, and also
  - Maintain or improve activities, especially
    - Transfers
    - Body posture
    - Reaching/grasping
    - Balance
    - Gait

- Physical therapy
  - Cognitive movement strategies and cueing strategies
  - Balance
  - Gait training
PHYSICAL THERAPY GOALS

- Late phase (Hoehn and Yahr 5)
  As in mid phase and also
  - Maintain vital function
  - Prevention of pressure sores
  - Prevention of contractures
PHYSICAL THERAPY TREATMENT

- Time of treatment
- Contra-indications
- Dual tasks
- Treatment Strategies
  - Cognitive movement strategies
  - Cueing strategies
- Clinical guidelines
PHYSICAL THERAPY TREATMENT

- Time of treatment
  - On- and Off periods
  - Cognitive moving strategies and cueing strategies

- Contraindications
  - Mental impairments, such as impairments in cognition (e.g. poor memory, dementia and severe hallucinations), personality and attention are relative contra-indications for the treatment of health problems related to PD
  - Hydrotherapy in freezing
PHYSICAL THERAPY TREATMENT

- **Dual tasks**
  - Performing two or more tasks at the same time (dual tasking or multitasking)
  - Patients with PD find it difficult to pay full attention to all tasks
  - Negative effect on gait and balance can lead to unsafe situations, in daily life as well as during the treatment
  - Avoiding performance of dual tasks, increases the safety of patients with PD and decreases falls
Treatment Strategies

- Cognitive movement strategies
- Complex (automatic) activities are transformed to a number of separate elements which are executed in a defined sequence, and which consist of relatively simple movement elements
- Complex movements are organized in such a way that the activity is performed consciously
- Movement or (part of the) activity will be practiced and rehearsed in the mind
- Performance has to be consciously controlled and can be guided by using cues for initiation
Standing Up from Chair
Moving Chair Backward
Cognitive Movement Strategies

Moving Chair Forward
Lying to Standing
Treatment Strategies
- Cueing strategies
  - Performance of automatic and repetitive movements is disturbed as a result of fundamental problems of internal control
  - So-called cues are used to complete or replace this reduced or even absent internal control
  - Cues are stimuli from the environment or stimuli generated by the patient, which increase attention and facilitate (automatic) movements
  - It is suggested that cues allow a movement to be directly controlled by the cortex, with little or no involvement of basal ganglia
  - Not all patients benefit from using cues
Cues can be generated internally (stretch, wave)

Stimuli outside the body can be divided into

- Moving stimuli (light of a laser pen, a moving foot, a falling bunch of keys)
- Non-moving stimuli (sound of a metronome, stripes on the floor, and the grip of a walking-stick)
 PHYSICAL THERAPY TREATMENT

- Rhythmical recurring cues are given as a continuous rhythmical stimulus, which can serve as a control mechanism for walking.

- One-off cues are used:
  - keep balance, for example when performing transfers
  - Initiating ADL
  - Getting started again after a period of freezing
## CUEING STRATEGIES

### Rhythmic recurring cues

| Auditory | • The patient moves on music of a walkman  
|          | • The patient moves on rhythmical ticking of a metronome  
|          | • The patient or someone else sings or counts  
| Visual   | • The patient follows another person  
|          | • The patient walks over stripes on the floor or over stripes he projects to himself with a laser pen  
|          | • The patient walks with an inverted walking-stick and has to step over the grip  
| Tactile  | • The patient taps his hip or leg  

### One-off cues

| Auditory | • Initiation of movement, for example, stepping out at the third count  
| Visual   | • Initiation of movement, for example, by stepping over some else’s foot, an object on the floor or an inverted walking-stick  
|          | • Maintenance of posture, for example, by using a mirror or by focusing on an object (clock, painting) in the environment  
| Cognitive| • Initiation of movement (and continuation of walking), for example, by focusing on the spot the wants to go to, and not on the doorway he has to go through  

Cueing strategies (to initiate and continue the activity) and cognitive movement strategies, and also avoidance of dual tasking are important in improving the ability to reach, grasp and move objects.
MULTIDISCIPLINARY TEAM

- Occupational Therapist
  - Exercise of reaching, grasping, and moving objects
  - Identify, alter any dangers and give possible adaptations in the home environment

- Speech Therapist

- Dietician
FREQUENCY AND DURATION OF TREATMENT

- Level of Evidence (3)

  + There are indications that a period of at least four weeks is needed to decrease limitations in functional activities.
  + To improve physical capacity, exercising for at least eight weeks is necessary, in which period a low frequency of treatment (e.g. once a week to adjust the exercise program) is sufficient.

Kamsma et al. 2002
IMPROVEMENT OF PERFORMANCE OF TRANSFERS

- Level of Evidence (2)
  - Application of cognitive movement strategies improves the performance of transfers
  - There are indications that the use of cues in combination with the application of cognitive movement strategies improves the performance of transfers in patients with PD

Morris et al. 2000
Level of Evidence (3)

There are indications that in patients with PD, exercise programs to improve coordination of muscle activity make the performance of activities easier. Change in posture towards flexion can often be corrected by applying feedback (mirror) or verbal feedback (also from the caregiver).

Schenkman et al. 1998
STIMULATE REACHING AND GRASPING

- Level of Evidence (3)
  - Reaching, grasping and moving objects is improved by applying cueing strategies, cognitive movement strategies and avoiding dual tasking

Morris et al. 2000
Exercise program consisting of exercising balance and training strength is effective in stimulating the balance in patients with PD.

Exercise program focused on walking, mobility of the joints and muscle strength, decrease the number of falls.

Hirsch et al. 2000
IMPROVEMENT OF GAIT

- Level of Evidence (2, 3)
  + Applying visual and auditory cues
  + Application of cues in combination with the application of cognitive movement strategies improves gait initiation and stride length
  + Arm swing, wide base, heel contact
  + Training of muscle strength
  + Training of trunk mobility

Lewis et al. 2000
IMPROVEMENT OF GAIT

- Treadmill, Level of Evidence 2
  + Gait exercises on a treadmill increase comfortable walking speed and stride length

de Goede et al. 2004
PREVENTION OF INACTIVITY AND MAINTENANCE OR IMPROVEMENT OF PHYSICAL CAPACITY

× Level of Evidence (2, 3)

+ Exercise program focused on the improvement of joint mobility combined with activity related (e.g. gait or balance) exercises improves ADL functioning

+ Program focused on the improvement of muscle strength increases muscle strength

+ Exercise program focused on the improvement of aerobic capacity improves motor skills

Comella et al. 1994
Bridgewater et al. 1997
Reuter et al. 1999
FALL PREVENTION

면서 Level of Evidence (4)

+ Balance training
+ Refer patients with PD to a course for falls prevention in the early stage of the disease, which aim at improving strength, balance (preserving the body posture) and coordination
+ Falls training (training of falling or techniques of falling) is an effective means to reduce the fear of fall or the falls risk
+ Teaching patients with PD how to stand up from a sitting position on the floor, the fear to fall decreases in these patients

Willemsen et al. 2000
Gray et al. 2000
AIDS

- **Level of Evidence (1,3)**
  - Use of a walking frame has to be advised against in case of freezing
  - In an elderly high-risk population living in institutional care, hip protectors prevent hip fractures due to falls, when the hip protectors are worn at the right moment

- **Footwear**
  - The physical therapist takes responsibility (if necessary together with the occupational therapist) for the application of, and the training in the use of the different (walking) aids

  Parker et al. 2002
  Cubo et al. 2003
CONCLUSION

- Implementation of the clinical guidelines in our daily practice (physical therapy department)
- Adequate use of the guidelines with the patient
- Reporting between physical therapists and other health care professionals
- Staying up to date with new guidelines and with new scientific studies
THANK YOU
FOR YOUR PRESENCE