Recommendations for physiotherapy in patients with COVID-19

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Royal Dutch Society for Physical Therapy (KNGF)
The Netherlands

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Outline

Global perspective

COVID–19 in Europe

Symptoms and consequences

The role of physiotherapy

Recommendations for physiotherapy
  • Acute hospital setting
  • After hospital admission or illness at home

Take home messages
Global perspective

- First outbreak in December 2019 (Wuhan, China)
- Leading to a worldwide pandemic

- >142 million confirmed cases
- >3 million COVID-19 related deaths
Variation around the globe

**Americas**
- 60,062,728 confirmed

**Europe**
- 49,820,616 confirmed

WHO, COVID-19 dashboard, 23 April 2021
Let’s take a look at the Netherlands
Data of the Netherlands

>1.4 million confirmed cases (17 million)

7000 new cases/day

People admitted to the hospital
**COVID-19 in short**

Beta-coronavirus: RNA with a protein shell

Proteins bind to cell’s ACE2 receptors → Virus’ RNA enters the cell → dividing

Incubation period: 2-14 days (average: 5-6)

Contagiousness: range 8-37 days (?)

Sohrabi et al., 2020; Letko et al., 2020; Chang et al., 2020
Symptoms of COVID-19

Most common symptoms:
- Fever
- Fatigue
- Cough
- Shortness of breath
- Weakness
- Weight loss
- Headache
- Diarrhoea, nausea, vomiting

Severity of illness:
- Mild to moderate symptoms $\rightarrow$ 80% (at home)
- Severe symptoms $\rightarrow$ 15% (hospital admission)
- Critical illness $\rightarrow$ 5% (ICU admission)

People at higher risk for severe symptoms:
- Men
- $>$ 70 years of age
- Comorbidity

Wiersinga et al., 2020; Guan et al., 2020; Felten-Barentsz et al., 2020
Impact of COVID-19

COVID-19 can lead to:
- Acute Respiratory Distress Syndrome (ARDS)
- ICU-acquired weakness
- Post-Intensive Care Syndrome (PICS)
- Impaired function of cardiovascular, respiratory, gastrointestinal and/or neurological system

Significant impact on:
- Physical functioning
- Mental health
- Cognitive functions

Wiersinga et al., 2020; Belli et al, 2020; Carfi et al., 2020
Persistent symptoms after COVID-19

Hospitalised and non–hospitalised patients:

• Study in the Netherlands and Belgium
• 2113 patients with persistent complaints (5% hospitalised)
• Assessed symptoms (n=29) after 3 months

Results
• 14 symptoms on average
• 97% reported >5 symptoms
• Fatigue: 95% (T0) → 87% (T1)
• Shortness of breath: 90% (T0) → 71% (T1)
Health status

Goërtz et al., 2020
Persistent symptoms after COVID-19

After 6 months
• 239 patients were followed over time
• Health status, functional status, quality of life

Results
• Number of symptoms decreased from 15 to 6
• No symptoms: 5%
• Persistent symptoms were frequently reported
  • Fatigue & dyspnoea were most reported
  • Moderate–poor Health status
  • Moderate–severe Functional limitations
  • Impaired QoL
Goërtz et al., 2020; Vaes et al., 2021
Patient journey in the Netherlands

Urgent need for guidance among PTs regarding treatment of patients after COVID-19
Recommendations for Hospital-Based Physical Therapists Managing Patients With COVID-19

Karin M Felten-Barentsz, Roel van Oorsouw, Emily Klooster, Niek Koenders, Femke Driehuis, Erik H J Hulzebos, Marike van der Schaaf, Thomas J Hoogeboom, Philip J van der Wees
Hospital-Based Physiotherapy

**Physical Therapy Management Goals**

Safety- and staffing recommendations need to be taken into account.

**COVID-ward (Section 2)**
- **Respiratory support**
- 1. Improve vital capacity
- 2. Stimulate secretion mobilization and evacuation
- 3. Maintain respiratory muscle strength
- **Active mobilization**
- 4. Maintain physical activity / performance deconditioning

**ICU (Section 1)**
- **Respiratory support**
- 1. Discuss respiratory muscle training in case of prolonged weaning
- 2. Prevent muscle contractures and muscle mass
- 3. Start as soon as possible with reconditioning

**Hospital discharge**
- Initiate, refer and hand over physical therapy management, if indicated.
Critically ill patients (ICU admission)

Phase 1: Unconscious patients
- Deep sedation, mechanical ventilation
- Focus on maintenance joint mobility and prevention contractures

Phase 2: Conscious patients, able to cooperate
- Prolonged weaning → discuss respiratory muscle training in team
- Active mobilisation to prevent deconditioning and muscle weakness
- Bed mobility activities
**COVID Ward**

**Respiratory support**

<table>
<thead>
<tr>
<th>Goal</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve vital capacity</td>
<td>Breathing control, thoracic expansion</td>
</tr>
<tr>
<td>Secretion evacuation</td>
<td>Active cycle of breathing techniques</td>
</tr>
<tr>
<td>Respiratory muscle strength</td>
<td>Inspiratory and expiratory respiratory muscle training</td>
</tr>
</tbody>
</table>

**Active mobilisation**

<table>
<thead>
<tr>
<th>Goal</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve physical functioning</td>
<td>Bed mobility activities</td>
</tr>
<tr>
<td>Stimulation of activity</td>
<td>Activities based on patients’ needs, preferences, and physical functioning</td>
</tr>
</tbody>
</table>
Discharge

- Physiotherapy treatment is recommended to be continued after discharge

- Discharge information:
  - Anamnestic information
  - Patient’s clinical question
  - Goals
  - PT treatment
  - Recovery process
  - Current limitations in functioning and daily life activities
  - Other involved healthcare professionals

Recommendations for Physical Therapists Management of COVID-19 ©

Karin Menders, Emily Klooster, Niek Koenders, Femke van der Schaaf, Thomas J Hoogeboom, Philip J
After hospital admission or illness at home

KNGF position statement

Recommendations for physiotherapy in patients with COVID-19

Based on the Dutch language 'KNGF-Standpunt versie 2.0'

27 July 2020
Clinical recommendations

• Important role in rehabilitation of patients with **limitations in daily life functioning**
  - Reduced functional/exercise capacity
  - Reduced physical activity

• Patients who were critically, severly, moderately or mildly ill

• Patients with and without comorbidities, old and young

• Always follow your national guidelines on safety, infection control and transmission prevention
Physiotherapy treatment

To improve:
- Muscle strength and balance
- Exercise endurance
- Breathing and relaxation

Recommendations:

- For the **first 6 weeks** after hospital discharge or illness at home
  - Gradually increase daily life functioning

- For the **period after these 6 weeks**
  - Improving and increasing activity levels
# Red and yellow flags

<table>
<thead>
<tr>
<th>Red flags</th>
<th>Yellow flags</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stop and consult a doctor:</strong></td>
<td>Dysfunctional breathing</td>
</tr>
<tr>
<td>Heart frequency in rest (&lt;40) or (&gt;130) BPM</td>
<td>Fear of physical activity or exercise</td>
</tr>
<tr>
<td>Respiratory rate (&gt;40/\text{min})</td>
<td>Fear for shortness of breath</td>
</tr>
<tr>
<td>Oxygen saturation in rest (\leq 90)%</td>
<td>Sleeping problems</td>
</tr>
<tr>
<td>Oxygen saturation during exercise (&lt;85)%</td>
<td>Post-traumatic stress syndrome</td>
</tr>
<tr>
<td>Heart arrhythmia</td>
<td>Negative beliefs or concerns about symptoms</td>
</tr>
<tr>
<td>Painful and swollen limbs</td>
<td></td>
</tr>
<tr>
<td>Acute dyspnea</td>
<td></td>
</tr>
<tr>
<td>Recent myocardial ischemia</td>
<td></td>
</tr>
<tr>
<td>Excessive sweating, feeling unwell, anxiety</td>
<td></td>
</tr>
<tr>
<td><strong>Stop and repeat at a later stage:</strong></td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td></td>
</tr>
<tr>
<td>Exhaustion (Borg Scale Fatigue (\geq 5) out of 10 while resting)</td>
<td></td>
</tr>
<tr>
<td>High blood pressure while resting ((\geq 180/100\ \text{mmHg}))</td>
<td></td>
</tr>
</tbody>
</table>
First 6 weeks - Assessment

- Determine limitations in physical functioning

- Assess functional outcomes
  - *Daily functioning*
  - *Muscle strength*
  - *Balance*
  - *Mobility*
  - *Exercise capacity*

- Monitor reactions and body functions
  - *Perceived shortness of breath and fatigue*
  - *Oxygen saturation*
  - *Heart rate*
## Core set: Functional outcome measures

<table>
<thead>
<tr>
<th>Construct</th>
<th>(very) low exercise tolerance levels</th>
<th>Increased exercise tolerance levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Daily living activities</strong></td>
<td>Patient Specific Functioning Scale (PSFS)</td>
<td>PSFS</td>
</tr>
<tr>
<td><strong>Muscle strength – lower extremity</strong></td>
<td>Short Physical Performance Battery (SPPB): repeated stand up from chair test</td>
<td>SPPB: repeated stand up from chair test</td>
</tr>
<tr>
<td><strong>Muscle strength – upper extremity</strong></td>
<td>Grip strength</td>
<td>Grip strength</td>
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<tr>
<td><strong>Balance</strong></td>
<td>SPPB: balance test</td>
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<tr>
<td><strong>Mobility</strong></td>
<td>SPPB: 4-mtr timed walk test</td>
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</tr>
<tr>
<td><strong>Exercise capacity</strong></td>
<td>-</td>
<td>6-min walking test</td>
</tr>
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</table>
First 6 weeks - Treatment

• Advice and coaching

• Exercise prescription and exercise therapy
  - Daily life activities
  - Maximum score 4/10 Borg Scale
  - Monitor oxygen saturation (prior/during/after)

• Gradually increase
  - Muscle strength
  - Balance
  - Endurance

• Desaturation (<85%) = STOP
Example: increase muscle strength

**Examples of exercises to gradually increase muscle strength and balance**

<table>
<thead>
<tr>
<th>lower extremities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency</strong></td>
<td>2–3 days per week, to increase and maintain muscle strength</td>
</tr>
<tr>
<td><strong>Intensity</strong></td>
<td>maximum score of 4 out of 10 on the Borg Scale CR10 for Shortness of Breath and Fatigue, estimation: 40–60% of 1RM</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Closed chain, open chain and dynamic exercises, possibly with own body weight as resistance.</td>
</tr>
<tr>
<td><strong>Time/duration</strong></td>
<td>per exercise 2–5 sets of 8–15 repetitions with at least 2 minutes rest between sets</td>
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After 6 weeks - Assessment

- Evaluate and assess physical functioning
- Evaluate and (re)set treatment goals
- Monitor reactions and body functions
  - Perceived shortness of breath and fatigue
  - Oxygen saturation
  - Heart rate
# Core set: Functional outcome measures

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<td>Grip strength, 1RM</td>
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<td>Mobility</td>
<td>SPPB: 4-mtr timed walk test</td>
</tr>
<tr>
<td>Exercise capacity</td>
<td>6MWT, CPET*</td>
</tr>
<tr>
<td>Resp.muscle strength</td>
<td>Maximal Inspiratory Pressure, Maximal Expiratory Pressure (if indicated)</td>
</tr>
</tbody>
</table>
After 6 weeks - Treatment

- Coach and support

- Exercise prescription and exercise therapy
  - Physical functioning
  - Maximum score 6/10 Borg Scale
  - Monitor oxygen saturation (prior/during/after)

- Further improve
  - Daily life activities
  - Physical activity
  - Exercise capacity

<table>
<thead>
<tr>
<th>Borg Scale CR10 for Shortness of Breath/Dyspneu</th>
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</tr>
</thead>
<tbody>
<tr>
<td>0     nothing at all</td>
<td>0     nothing at all</td>
</tr>
<tr>
<td>0,5   very very slight</td>
<td>0,5   just noticeable</td>
</tr>
<tr>
<td>1     very slight</td>
<td>1     very light</td>
</tr>
<tr>
<td>2     slight</td>
<td>2     light</td>
</tr>
<tr>
<td>3     moderate</td>
<td>3     moderate</td>
</tr>
<tr>
<td>4     somewhat severe</td>
<td>4     somewhat heavy</td>
</tr>
<tr>
<td>5     severe</td>
<td>5     heavy</td>
</tr>
<tr>
<td>6     very severe</td>
<td>6     extremely heavy</td>
</tr>
<tr>
<td>7     very severe</td>
<td>7     very heavy</td>
</tr>
<tr>
<td>8     extremely severe, maximal</td>
<td>8     extremely heavy, maximal</td>
</tr>
<tr>
<td>9     very very severe</td>
<td>9     very very heavy</td>
</tr>
<tr>
<td>10    extremely severe, maximal</td>
<td>10    extremely heavy, maximal</td>
</tr>
</tbody>
</table>
Example: improve exercise capacity

<table>
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<th>Examples of exercises to gradually increase exercise capacity</th>
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<tr>
<td><strong>Aerobic endurance training</strong></td>
</tr>
<tr>
<td>Frequency: 2–3 days per week, to increase and maintain exercise endurance</td>
</tr>
<tr>
<td>Intensity: maximum score of 6 out of 10 on the Borg Scale CR10 for Shortness of Breath and Fatigue, lower limit of oxygen saturation level of 85% during exercise and/or physical activity; estimation: 60–80% of maximum bike or walk test result</td>
</tr>
<tr>
<td>Type: endurance, preferably on a treadmill or stationary bike*</td>
</tr>
</tbody>
</table>
| Time/duration: Total duration of the session: 20–60 minutes  
Per session at least 10 minutes of continuous activity |

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<tr>
<th><strong>Interval training</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency: 2–3 days per week, to increase and maintain exercise endurance</td>
</tr>
<tr>
<td>Intensity: maximum score of 6 out of 10 on the Borg Scale CR10 for Shortness of Breath and Fatigue, lower limit of oxygen saturation level of 85% during exercise and/or physical activity; estimation: 75% of maximum bike or walk test result</td>
</tr>
<tr>
<td>Type: endurance, preferably on a treadmill or stationary bike*</td>
</tr>
</tbody>
</table>

* In case a treadmill or stationary bike is not available, walking outdoors can be considered if deemed safe.
Recap of first 6 weeks and after 6 weeks

First 6 weeks:
- Focus on **gradually** increasing **daily life** activities
- **Low intensity**
- Improve **physical activity**
- Borg Scale 4 out of 10
- Probably have to slow the patient down

After 6 weeks:
- Focus on **further improving** activities
- Focus on **participation** in society or community
- **Increase intensity**
- Improve **exercise capacity**
- Borg Scale 6 out of 10

Always monitor and evaluate!

Every patient is unique
Interprofessional collaboration

• Collaboration with other physiotherapists

• Collaboration with other healthcare professionals
  • General practitioner
  • Dietician
  • Occupational therapist
  • Speech and language therapist
  • Psychologist
  • ...
  • ...
  • ...
  • ...
Take home messages

- Many patients perceive complaints after COVID-19
- Also those with mild symptoms of the infection
- Complaints can be persistent and affect daily life
- Old and young people can experience severe complaints
- Also patients who were not admitted to a hospital can have impaired functions
- Physical functions are impaired frequently
  - Physiotherapy plays a key role in the recovery of patients
  - Caution with intensity of activity and exercise is needed
  - Gradually improving daily life activities is the first focus
  - After 6 weeks intensity can be improved
  - Monitor, measure and evaluate
- Know what you do, and do what you know
Work in progress

- New evidence
- Increasing clinical experience
- Physiotherapy recommendations will be revised soon
- Multidisciplinary clinical practice guidelines are being developed
KNGF position statement

Recommendations for physiotherapy in patients with COVID-19

Based on the Dutch language ‘KNGF–Standpunt versie 2.0’

27 July 2020
KNGF Position statement authors

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KNGF project group
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Thank you for your attention
References

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- **Vaes AW**, Goërtz YMJ, van Herck M et al. 2021, Recovery from COVID-19: a sprint or marathon? 6 months follow-up data of online long COVID-19 support group members, ERJ Open Research
- **Driehuis F**, de Bie RA, van der Wees et al. 2020, KNGF Position statement: Recommendations for physiotherapy in patients with COVID-19, KNGF, Amersfoort, the Netherlands