Problem solving

Screening
- Impaired mucus clearance
- Infections
- Pulmonary function tests
- Recurrent respiratory infections
- Exacerbations with hypersecretion
- Adherence to treatment
- Mucus quality and quantity
- Impaired cough:
  - airway collapse,
  - muscle weakness
- Causes of exercise limitation / inactivity
- Causes of impaired cough
- Motivation / self-management
- Optimal medical treatment
- Sufficient referral data

Physiological assessment
- Dysnea
- Impaired exercise performance
- PA
- Pulmonary function tests
- and exercise test
- Exertional dyspnea
- Poor physical activity in daily life (MRC ≥ 2), < 30 min/day
- Comorbid conditions (cardiovascular disease)
- Exercise performance and physical activity
- Respiratory and peripheral muscle function
- Quality of life
- Exercise performance, physical activity
- Muscle strength, Quality of life

Case history
- Referral
- Referral physician
- Number of respiratory infections with mucus retention - Symptoms

Physical activity
- Health education
- Self-management
- Forced expiration
- Cough
- Adjuncts (PEP, PD)
- Exercise training
- Muscle training
- Breathing exercises
- Exercise performance, physical activity, Muscle strength, Quality of life

Analysis
- Referral physician

Treatment
- Number of respiratory infections with mucus retention - Symptoms

Outcome

PA = physical activity; PEP = positive expiratory pressure; PD = postural drainage.
Dyspnea, impaired physical activity and physical fitness

Spirometry / MRC-score / Physical activity (<30 min./day)

- FEV₁ ≥ 50% pred. MRC-score < 2
  - No physical therapy
  - Advice:
    - Increase physical activity
    - Adapted sports activity
    - Regular sports activity

- FEV₁ ≥ 50% pred. MRC-score ≥ 2
  - • Cyclery ergometry*

- FEV₁ < 50% pred. MRC-score ≥ 2
  - • Multidisciplinary Assessment

Advice:
- Increase physical activity
- PT intake physical activity programme

- • Physical activity programme
- • Adapted sports activities

- W_{max} ≥ 70% pred. VO₂_{max} ≥ 80% pred.
- W_{max} < 70% pred. VO₂_{max} < 80% pred.

- • Multidisciplinary Rehabilitation

* The 'Primary care physicians guideline' and 'Transmural guideline for COPD' only recommend exercise testing in patients with increased cardiovascular risk. The 'ACSM guideline' recommends exercise testing in any elderly subject, while the 'Physical therapy in COPD guideline' recommends exercise testing in any COPD patient.

MRC = Medical Research Council dyspnea score
FEV₁ = FEV₁ = positive expiratory pressure

Royal Dutch Society for Physical Therapy
Impaired exercise performance/dyspnea

- Cardio-circulatory
- Ventilatory
- Oxygen transport in the lungs
- Peripheral muscle strength
- Anxiety
- Motivation
- Self-esteem

- Respiratory muscle weakness
- Hyperinflation
- Hypoxemia/Hypercapnia during exercise?

- Endurance training
- Interval training
ev. suppl. O₂
- Muscle training
- Counseling
- Body positioning
- Rollator
- NIV
- Active expiration
- EMS
- Nutrition
- Relaxation
- Education

IMT = inspiratory muscle training; NIV = non-invasive ventilation; EMS = electrical muscle stimulation; PLB = pursed lips breathing; ev. = eventually.
Impaired Mucus Clearance

- Hypersecretion?
  - Physically active?
    - Yes
      - Cough/Huff effective? 
      - Treatment compliance?
    - No
      - See Flow Chart 'Impaired Exercise Performance' (see figure 3)
      - Inadequate technique? 
      - Non-compliance?
    - Yes
      - Teach coughing/huffing/breathing exercise dependent on severity and causes of obstruction
      - Education - improve compliance
  - No
    - No indication for physical therapy

- Airway collapse?
  - Yes
    - Evaluation: treatment effective?
    - Yes
      - 'Stop' treatment
      - Report to referring physician
    - No
      - Other treatments:
        - Postural drainage, PEP
        - Flutter
        - Percussion/Vibration
      - Re-assessment
      - Confirm indication with referring physician
  - No
    - No indication for physical therapy
    - Inadequate technique? 
    - Non-compliance?

PEP = positive expiratory pressure.

Royal Dutch Society for Physical Therapy