

AMICA

Autonomy Motivation & Individual Self-Management for COPD patients (AMICA)

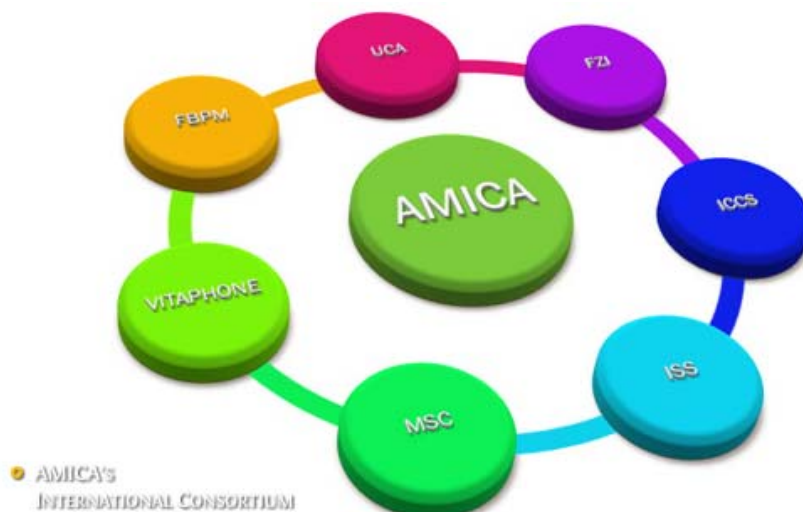
DELIVERABLE D1

MEDICAL FOUNDATIONS FOR COPD DISEASE MANAGEMENT

Workpackage WP2 – Medical Foundations for Prevention, Diagnosis & Therapy

Version		Date		Classification		Status	
Abstract							
<p>The Autonomy Motivation & Individual Self-Management for COPD patients (AMICA) is aimed at the disease management and medical care of chronic obstructive pulmonary disease (COPD) patients. AMICA is a Research and Development project sponsored under the Europeans Commission's Ambient Assisted Living programme as well as its projects members. Its official website is http://www.amica-aal.com.</p> <p>AMICA project started April 2009 and lasts for 3 years until April 2012 with a total budget of €4M. Seven partners spread across Europe are involved including medical companies and foundations (Vitaphone - Germany, I.S.S- Spain. and the Foundation for Biomedical Research Management- Spain), Academics (Institute of Communication and Computer Systems from the National Technical University of Athens- Greece, the Engineering School from Cádiz- Spain and the Research Centre for Information Technology from Karlsruhe – Germany) and an electronic design company (M.S.C.- Spain/Germany).</p> <p>This report is part of Workpackage 2. It analyses the medical foundations for the development of the AMICA solution in the technical and process oriented work packages 1,2 and 5.</p> <p>This document has been developed by FBRMC, FZI and UCA.</p>							
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EXECUTIVE SUMMARY

This report is part of Workpackage 2. It analyses the medical foundations for the development of the AMICA solution in the technical and process oriented work packages 1,2 and 5.

This document has been developed by FBRMC, FZI and UCA and it is structured as follows:

- ✓ **Section 0: Background**
- ✓ **Section 1: Medical foundations for COPD disease management**

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Deliverable 1: **Medical foundations for COPD disease management**

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BACKGROUND

The purpose of this section is to introduce the:

- ✓ AMICA Project
- ✓ Purpose, scope and context of this deliverable
- ✓ Intended audience for the deliverable
- ✓ Document Structure
- ✓ External References

AMICA Project

The Autonomy Motivation & Individual Self-Management for COPD patients (AMICA) is aimed at the **disease management** and **medical care of chronic obstructive pulmonary disease (COPD) patients**. AMICA is a Research and Development project sponsored under the Europeans Commission's Ambient Assisted Living programme as well as its projects members. Its official website is <http://www.amica-aal.com>.

It is aimed at providing medical management and medical care to patients suffering from Chronic Obstructive Pulmonary Disease (COPD). COPD is a progressive pulmonary disease characterized by reduction in airflow and is not fully reversible. COPD is the major cause of mortality and increased levels of disability, particularly in the elderly. Symptoms vary among individuals and include breathlessness, dyspnea, abnormal sputum and chronic cough. Exposure to tobacco smoke is by far the most important risk factor in the development of COPD and is associated with high levels of morbidity and mortality.

AMICA'S main objective is to develop and assess long-term COPD management solutions based on innovative Information and Communication Technologies (ICT) that:

- ✓ Allows early detection of COPD exacerbations through the use of a multifunction biomedical system able to yield continuous and sporadic data on heart, breathing and physical activity. This helps to avoid hospitalization and enhances quality of life of elderly COPD patients.
- ✓ Offers a user-friendly design for the elderly.
- ✓ Provides remote monitoring and home-based care
- ✓ Integrates a technical solution with a holistic service approach.
- ✓ Fosters prevention and self-management through immediate comprehensive feedback and efficient personalized assistance.
- ✓ Increases levels of therapy compliance providing effective incentives schemes such as health treatments abroad as an added bonus while it reduces public

health care costs and provides business opportunities on the health tourism market.

AMICA project started April 2009 and lasts for 3 years until April 2012 with a total budget of 2.783.139,48€. Seven partners spread across Europe are involved including medical companies and foundations (Vitaphone - Germany, I.S.S- Spain. and the Foundation for Biomedical Research Management- Spain), Academics (Institute of Communication and Computer Systems from the National Technical University of Athens- Greece, the Engineering School from Cádiz– Spain and the Research Centre for Information Technology from Karlsruhe – Germany) and an electronic design company (M.S.C.- Spain/Germany).

Deliverable purpose, scope and context

This report is part of Workpackage 2. It analyses the medical foundations for the development of the AMICA solution in the technical and process oriented work packages 1,2 and 5.

Audience

This document is considered as a PUBLIC deliverable report. The intended audience includes the partners affected by work packages number 1,2 and 5.

Document Structure

This document is structured as follows:

- ✓ **Section 0: Background** - provides background information about the deliverable.
- ✓ **Section 1: medical foundations for copd disease management** - includes the guidelines on COPD, risk factors and aspects about prevention and diagnosis. It also deals with the medical requirements on diagnosis and monitoring considering the German COPD guidelines. Measurable variables of therapy success and therapy adherence are also covered. Early diagnosis of exacerbations is a remarkable point within section 1 as well as the action plan to enhance early detection and management of exacerbations . Life quality and patient education close the section.

References

This document is dependent on the references cited in final section.

MEDICAL FOUNDATIONS FOR COPD DISEASE MANAGEMENT

Chronic Obstructive Pulmonary Disease (COPD) is a serious public health problem worldwide. COPD is the fourth leading cause of death in the worldⁱ, and further increases in its prevalence and mortality can be predicted in the coming decadesⁱⁱ. The prevalence, morbidity, and mortality are expected to rise, especially in countries with a rapidly ageing population and even in populations with reduced smoking ratesⁱⁱⁱ.

A study published by the World Bank/World Health Organisation reported that COPD is likely to rise from being the twelfth most burdensome disease in 1990 to the fifth in 2020^{iv}. This will place an enormous burden on the healthcare system and will also cause a loss in health related quality of life (HRQoL) for many patients with COPD.

COPD is a systemic inflammatory disease and, besides airflow limitation and hyperinflation due to loss of elastic recoil and intrinsic airway narrowing, systemic deficits such as skeletal and respiratory muscle dysfunction are prominent features. Despite optimal pharmacological treatment, many patients with COPD experience substantial functional impairment^v.

There is a growing need for other forms of treatment for COPD patients, not only to control and alleviate symptoms and complications of respiratory dysfunction but also to teach them how to carry out the activities of daily living optimally in the face of their physiological impairment.

Self-management has been defined as an “individual’s ability to manage the symptoms, treatment, physical and social consequences and lifestyle changes inherent in living with a chronic condition^{vi}”.

Worth and colleagues were the first to describe the effectiveness of a programme aimed at acquiring self-management skills and behavioural change by patients with COPD. Unfortunately this pilot study was uncontrolled and studied only a small sample of patients (n=21). Impressive reductions in the frequency of exacerbations and home visits by the family doctor were observed.^{vii}

Solomon et al assessed symptoms using the Borg Scale to measure breathlessness on a 12-point scale and the Global Assessment Scale to measure symptom severity on a 6-point scale. Borg scale scores indicated a positive effect for self-management education on breathlessness, although no statistically significant differences were observed. The Global Assessment Scale showed a reduction which was not statistically significant in symptom severity in the self-management education group^{viii}.

Watson et al’s patients scored their respiratory status in symptom diaries on a 4-point scale (usual, mild, moderate, severe); no significant between-group differences were seen in the proportion of days rated as mild, moderate, and severe^{ix}. COPD specific HRQoL using the St George’s Respiratory Questionnaire (SGRQ) showed SGRQ total scores and domain scores were all lower (indicating a better HRQoL) in the self-

management education groups, but these differences did not reach clinical significance^x

The use of different kinds of medication for COPD exacerbations has been assessed. Some studies have shown an increased use of oral steroid and antibiotics courses in the educated patients^{xi}. Gallefoos and Bakke reported on the use of short acting b2 agonists as rescue medication. In this study the educated patients received less than half the amount of rescue medication^{xii}.

A systematic review of international literature published in 2003^{xiii} found no significant differences between self-management and usual care in number of hospital admissions, emergency room visits, physician and nurse visits, days lost from work or in lung function. The reviewers concluded that data were insufficient to make recommendations and demanded more research in this area.

An updated Cochrane review published in 2007 showed a significant reduction in the probability of at least one hospital admission among patients receiving self-management education compared to those receiving usual care. Additionally, a small but significant reduction in dyspnoea was detected. Nonetheless, inconclusive or non significant results were observed either in number of exacerbations, emergency department visits, lung function, exercise capacity, doctor and nurse visits, symptoms other than dyspnoea, use of courses of oral corticosteroids and antibiotics, and the use of rescue medication and days lost from work^{xiv}.

Recently, a randomized study has shown that self-treatment of exacerbations incorporated in a self-management program leads to less exacerbation days and lower costs. In fact, patients in the self-treatment group reported fewer exacerbation days and the difference was significant in the group of patients with a high number of exacerbation days per year. Cost-effectiveness analyses showed that self-treatment saved 154 euro per patient, and a significant reduction of health care contacts^{xv}.

However, there are a number of limitations in the current literature which need to be considered. The COPD population has been defined in varying detail and included different diagnostic criteria. This could have led to heterogeneity in disease severity. The mode of the self-management education programs varied from group education to individual education to written education material only, and an action plan for self-treatment of exacerbations has rarely been used. However, it could be an important part of a self-management education program.

Most studies have not been aimed at improving selfmanagement skills or behavioural change, but self-management involves the transfer of knowledge as well as the acquisition of certain important skills by the patient leading to changes in their behaviour. This is the only way education can have a long term impact on the daily life of the patient with COPD, because knowledge of the disease does not directly lead to behavioural change^{xvi}. In addition, the effects of education can also be influenced by the fact that patients with COPD are more prone to anxiety and depression^{xvii}.

Currently the key question is if we can design more effective programs. Thus, we need to identify particular components of the educational programs which have led to improved outcomes. A recent research, which succeeded in reducing hospital admissions, showed that participants frequently used four disease-related skills which had been taught (energy conservation, use of antibiotic and prednisolone according to action plan, pursed lip breathing and regular home exercise)^{xxviii}, ^{xix}. On the other hand, for outcomes unaffected by patient education, we have to explore new ways for self-management or new program designs^{xx}.

The increase in various forms of information and communication technology can provide a new way on self-management. In fact, several studies have shown improved results on Internet-based or computer-tailored application to weight loss^{xxi}, cardiac rehabilitation^{xxii}, to increase and maintain the level of physical activity in healthy adults^{xxiii}, and improve health status^{xxiv}.

A recent randomized controlled trial comparing an internet-based versus a face-to-face dyspnoea self-management program for patients with COPD has shown that both dyspnoea self-management programs were effective in reducing dyspnoea with activities of daily living in the short-term^{xxv}.

Guidelines on COPD

There are many guidelines existing on COPD:

- European Guidelines on COPD by European Respiratory Society
<http://www.ers-education.org/pages/default.aspx?id=725>
- GOLD guidelines (GOLD = Global initiative for chronic obstructive pulmonary disease) <http://www.goldcopd.org>
- German COPD guideline
<http://www.atemwegsliga.de/download/COPD-Leitlinie.pdf>
- NICE Guidance of National Institute for Health and Clinical Excellence NHS (UK)
<http://www.nice.org.uk/CG12>
- COPD guidelines of Canadian Thoracic Society
http://www.copdguidelines.ca/home-accueil_e.php
- Guidelines of COPD Foundation (Florida)
http://www.copdfoundation.org/pros/copd_guidelines
- The COPDX Plan (Australia and New Zealand Guidelines)
http://www.copdx.org.au/guidelines/documents/COPDX_v2_18.pdf

Considering the AMICA aspect of Europeanization, COPD guidelines of European Respiratory Society should be the basal guideline for AMICA developments. In

addition, national guidelines have to be considered to fulfill the national market requirements of the disease management program.

Risk factors

According to World Health Organization WHO (<http://www.who.int/respiratory/copd/en>) the most relevant risk factors of COPD are:

- Tobacco smoking
- Indoor air pollution (such as biomass fuel used for cooking and heating)
- Outdoor air pollution
- Occupational dusts and chemicals (vapors, irritants, and fumes)

Prevention and diagnosis

Spirometry is a simple and painless test, which is used to diagnose COPD. Spirometry measures the capacity of lungs. So, it can be detected, how deeply a person can breathe and how fast air can move into and out of the lungs. COPD diagnosis should be indicated in any patient who has symptoms of a chronic cough, sputum production, dyspnea or a history of exposure to risk factors for the disease. An alternative to spirometry can be a measurement of clinical symptoms and signs such as abnormal shortness of breath and increased expiratory time. Furthermore, a low peak flow is an indicator of COPD. Nevertheless, a peak flow meter is not specific enough for a COPD differential diagnosis in comparison to other lung diseases. Preceding factors of COPD are: cough and sputum production. But it should be considered that not all patients with cough and sputum are going to develop a COPD. Last but not least it can be said that COPD is most frequently diagnosed in people aged 40 years or older, as COPD is a slowly developing disease.

<http://www.who.int/respiratory/copd/diagnosis/en/index.html>

Medical Requirements on diagnosis and monitoring considering the German COPD guidelines

Diagnosis (German COPD guidelines)

1. Indication of characteristic symptoms , existence of risk factors (most important risk factor in Germany: smoking), analysis of lung function that proves that there is a non reversible obstruction of the airways existing
2. Patient with chronic cough and sputum: examination of lung function even if there is no felt breathlessness
3. Best validated method for analysis of lung function and evaluation of COPS severity code = spirometry

4. Differential analysis between chronic obstructive bronchitis and lung emphysema: total body plethysmography and evaluation of CO-diffusion capacitance
5. In all patients with significant exertional dyspnea, high reduced FEV₁ or clinical indication of right heart stress: determination of 6-minutes-walk distance and blood gas analysis in rest and in physical stress.

BODE-scale (German COPD guideline)

A new multidimensional method for determination of COPD severity code is the BODE-index (cf. German COPD guideline).

BODE-index includes:

- B: Body-Mass-Index
- O: Obstruction
- D: Dyspnoea
- E: Exercise Capacity

Parameter	BODE-scale points			
	0	1	2	3
FEV ₁ (% target)	≥65	50-64	36-49	≤35
6-minutes-walk (m)	>350	250-349	150-249	≤149
MRC dyspnea (grade)	0-1	2	3	4
BMI (kg/m ²)	>21	≤21		

MRC=modified MRC score: 0: no dyspnea; 1: dyspnea with high physical exercise; 2: dyspnea with little physical exercise; 3: dyspnea avoids leaving the house; 4: breathless even if dress oneself;

Abbildung 1 BODE-scale

It is demonstrated, that BODE-score quartiles (0-2) – (3-4) – (5-6) – (7-10) correlate better with total COPD mortality than FEV₁.

Monitoring (German guidelines)

As COPD is a progressive disease. In stable patients without complications, symptoms and key indicators / values of airway obstruction should be monitored at least once a year. Factors, that should be monitored:

- Nicotine and toxic substance abstinence
- Lung function (at least once a year)

- Number and frequency of exacerbations
- Spirometry (IC) & bodyplethysmography (RV)
- Blood gas analysis (if $FEV_1 < 40\%$, or if there is a right heart insufficiency, or if there is a respiratory insufficiency)
- Transcription and dispensing of drugs and side-effects
- Indication of oxygen therapy
- Prevention of exacerbations (→ education)
- Quantity of sputum
- Breathlessness
- Increase of intake of drugs
- Hospitalizations (frequency, duration, emergency treatment)
- BMI
- Need of rehabilitation
- Discrepancy between dyspnea and lung function (→ education)

Indicators of bronchial infection

Bronchial infections are the one of the most frequent causes of COPD exacerbations. Indicators of a bronchial infection are:

- General feeling of illness, increased perspiration
- Sore throat, deglutition complaints, redness and turgor of oral and faecal mucosa
- Fever
- Cough (coloured sputum)
- breathlessness
- decrease of peak-flow-values
- increased use of emergency spray

[SCH08]

Prevention of infections

- healthy nutrition
- avoidance of nicotine and alcohol
- physical activity
- prevention of infections
- washing / cleaning the hands

[SCH08]

Vaccinations

- each year in autumn: influenza vaccination
- pneumococcal vaccination

[SCH08]

Self-management of the disease

The following parameters should be controlled by the patient, to determine the daily health state:

1. Breathlessness / dyspnea
2. Cough
3. Sputum
4. Physical performance
5. Need of emergency spray
6. Indicators of an infections

+ daily measurement of peak flow value (once a day)

Self-managements plan proposal

Education, adherence to treatment and inhaled technique:

Based on:

- GOLD Patient Guide: What You Can Do About a Lung Disease Called COPD (<http://www.goldcopd.com/PatientGuide.asp?l1=3&l2=2>)
- Chronic Obstructive Pulmonary Disease: Understanding NICE guidance information for people with chronic obstructive pulmonary disease, their families and carers, and the public (<http://www.nice.org.uk/nicemedia/pdf/CG012publicinfo.pdf>)
- ATS-ERS. Standards for the diagnosis and management of patients with COPD. For patients and their families (<http://www.thoracic.org/sections/copd/for-patients/index.html>)
- Controlando la EPOC. Sociedad Española de Patología de Aparato Respiratorio (http://www.separ.es/pacientes/enfermedades_respiratorias/epoc_no_significa.html)
- Proceso Asistencial EPOC. Consejería de Salud. Junta de Andalucía. (<http://www.juntadeandalucia.es/.../procesos/procesos.asp>)
- Guía EPOC para pacientes. In press.

<http://www.juntadeandalucia.es/.../procesos/procesos.asp>

Therapy

Chronic conditions

COPD is a disease that influences physical performance, life quality and psyche of the person concerned.

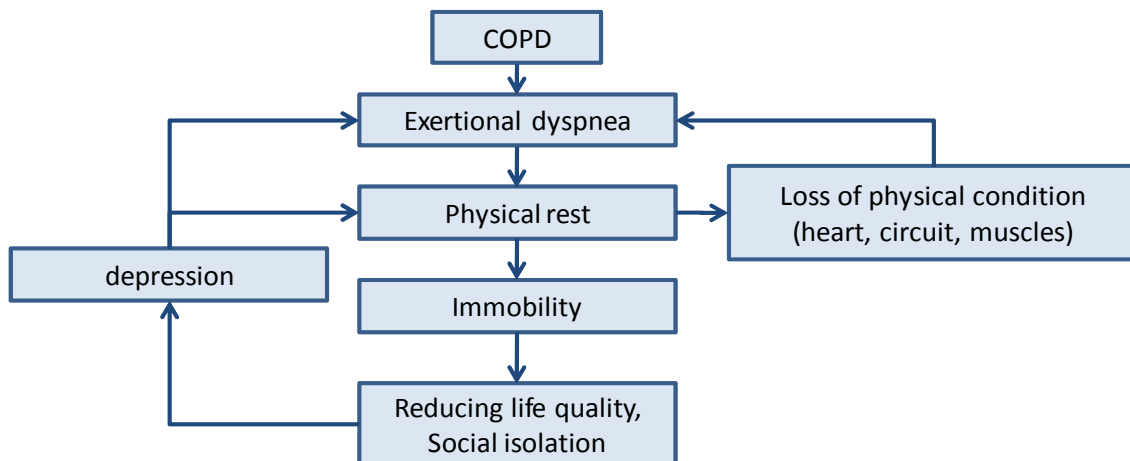


Abbildung 2 COPD influence on physical condition, life quality and psyche [German COPD guideline]

So, COPD therapy has to include all these three factors to have the expectance on long-term success.

COPD therapy step plan

Therapy treatment in dependence of COPD severity code includes abortion of negative influence factors on COPD (→ smoking!), drug therapy and oxygen supply (cf. COPD step plan). [VOE09]

Avoiding risk factors, give up smoking! Immunization: grippe + pneumococcal; need of immediately affective drugs for airway dilatation (anticholinergics or betamimeticum)			
Long term therapy with long term effective airway dilatators (anticholinergics and / or betamimeticum (possibly theophyllin); rehabilitation			
Additionally in cases of repetitive exacerbations: anti-inflammatory drugs – inhalative cortisone		Additionally / possibly long term oxygen therapy; surgery treatment	
Severity grade 1: Low	Severity grade II: Medium	Severity grad III: Severe	Severity grade IV: Very severe

Tabelle 1 COPD therapy - step plan

Application of drugs

One differs between

1. Drugs for airway dilatation:
 - a. Anticholinergics

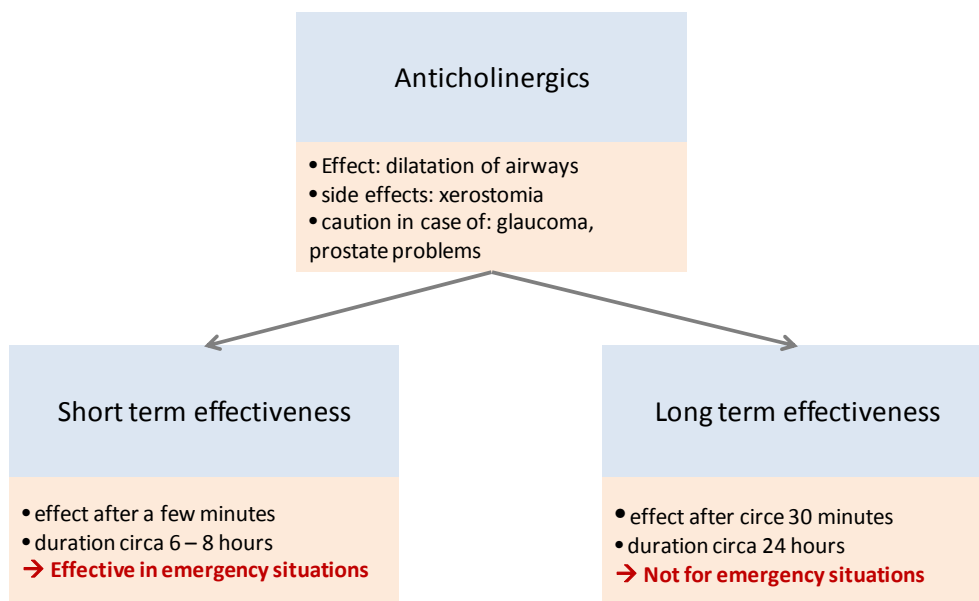


Tabelle 2 Application of anticholinergics

- a. Betamimetica
- b. Theophyllin

2. Anti-inflammatory drugs

a. Cortisone

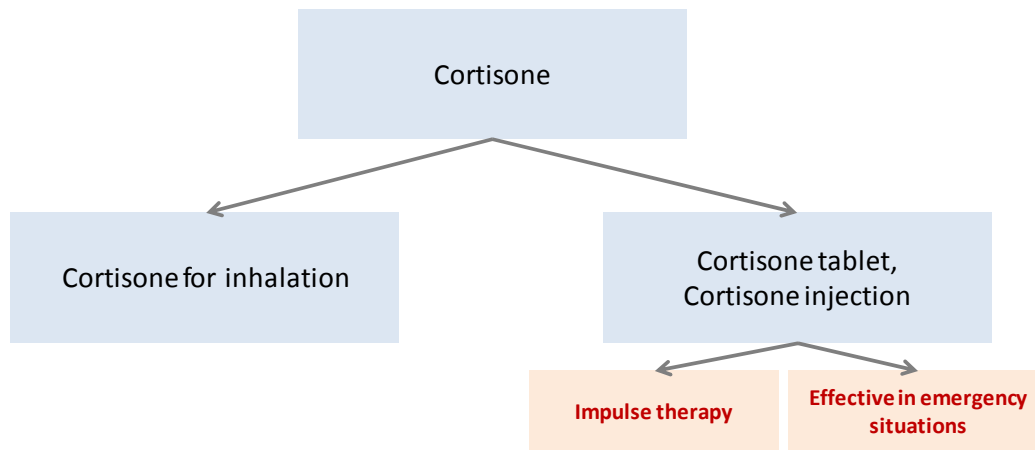


Tabelle 3 Cortisone therapy

[SCH08]

Cortisone Impulse therapy

If there is a rapid decrease in stability of airway status, the patient should begin an impulse therapy by his own:

Day	Dosing	tablets
1	40 mg	2
2	40 mg	2
3	40 mg	2
4	40 mg	2
5	20 mg	1
6	20 mg	1
7	20 mg	1
8	20 mg	1
9	10 mg	½
10	10 mg	½
11	10 mg	½
12	10 mg	½
13 ++	Stop treatment with cortisone impulse therapy	/

Tabelle 4 Cortisone impulse therapy

[SCH08]

Medical therapy requirements

component	Possibility of implementation to the patients diary AMICA
Weaning of tobacco	Inquiry, amount of CO in the blood? ☑complex pulse oximeter
Physical training	Acceleration sensor
Patient instruction	Tips, suggestions, COPD-Quiz...
Pneuma physiotherapy	Graphical and vocal animation
Ergo therapy	/
nutrition consultation	Tips, suggestions, COPD-Quiz ... + scale for surveillance
Aid accommodation	/
Social support	/
Psycho social diagnostics, advice and therapy	Questions
Social medicinal assessment	Questions

[VOG05]

Measurable variables of therapy success

component	Possibility of implementation to the patients diary AMICA
Increased, physical effectiveness	
Reduction of breathlessness	Questions
Increase of illness specific life quality	Questions
Reduction of number and length of hospitalisation	Statistical evaluation of the hospitalisations
Reduction of COPD associated fear and depression	Questions
power- and Endurance of the upper extremities	/
prolongation of life	/
Breath musculature is effective, especially in combination with a general physical training	Accelerometer
Psycho social intervention	Statistics about visitations of the COPD-forum / lungs sport-groups, participation at health tourism

[VOG05]

Physical exercises

Advantages of physical exercises

- Augmentation of physical performance
- Augmentation of life quality and self-esteem
- Reduction of feeling of breathlessness
- Practice of musculature
- Improvement of immune defense
- Prevention of osteoporosis

Requirements of risk-arm sports for COPD patients

- Respiratory tracts must be stable
- Avoidance of cold water, cold air and high altitudes
- Use of functional clothing
- Avoidance of short-time high stress
- Sufficient long time period for warm-up
- Emergency spray should be kept ready
- Avoidance of doing sports alone

[SCH08]

Further information on regular home exercise

- COPD International. <http://www.copd-international.com/Exercise/>
- Home exercises for people with COPD.
http://www.asthmanz.co.nz/files/WordDocs/Resources/Fact_sheets/Home_exercises_for_people_with_COPD.doc
- Proceso Asistencial EPOC. Consejería de Salud. Junta de Andalucía.
<http://www.juntadeandalucia.es/.../procesos/procesos.asp>

Energy Conservation

- Living with COPD. Energy conservation in day- to-day activities.
- <http://www.sk.lung.ca/copd/management/living/conservation.html>
- Proceso Asistencial EPOC. Consejería de Salud. Junta de Andalucía.
<http://www.juntadeandalucia.es/.../procesos/procesos.asp>
- Living with COPD . Conserve your energy
- http://www.lung.ca/diseases-maladies/copd-mpoc/living-vivre/energy-energie_e.php

Coping with dyspnea – breathing techniques

- Breathing techniques: COPD. http://www.lung.ca/diseases-maladies/copd-mpoc/breathing-respiration/index_e.php
- Living with COPD: pursed lips breathing <http://www.youtube.com/watch?v=jFqrWVeskR0>
- Proceso Asistencial EPOC. Consejería de Salud. Junta de Andalucía. <http://www.juntadeandalucia.es/.../procesos/procesos.asp>
- Controlando la EPOC. Sociedad Española de Patología de Aparato Respiratorio http://www.separ.es/pacientes/enfermedades_respiratorias/epoc_no_significa.html

Figure 1 visualizes some breath facilitative body positions:

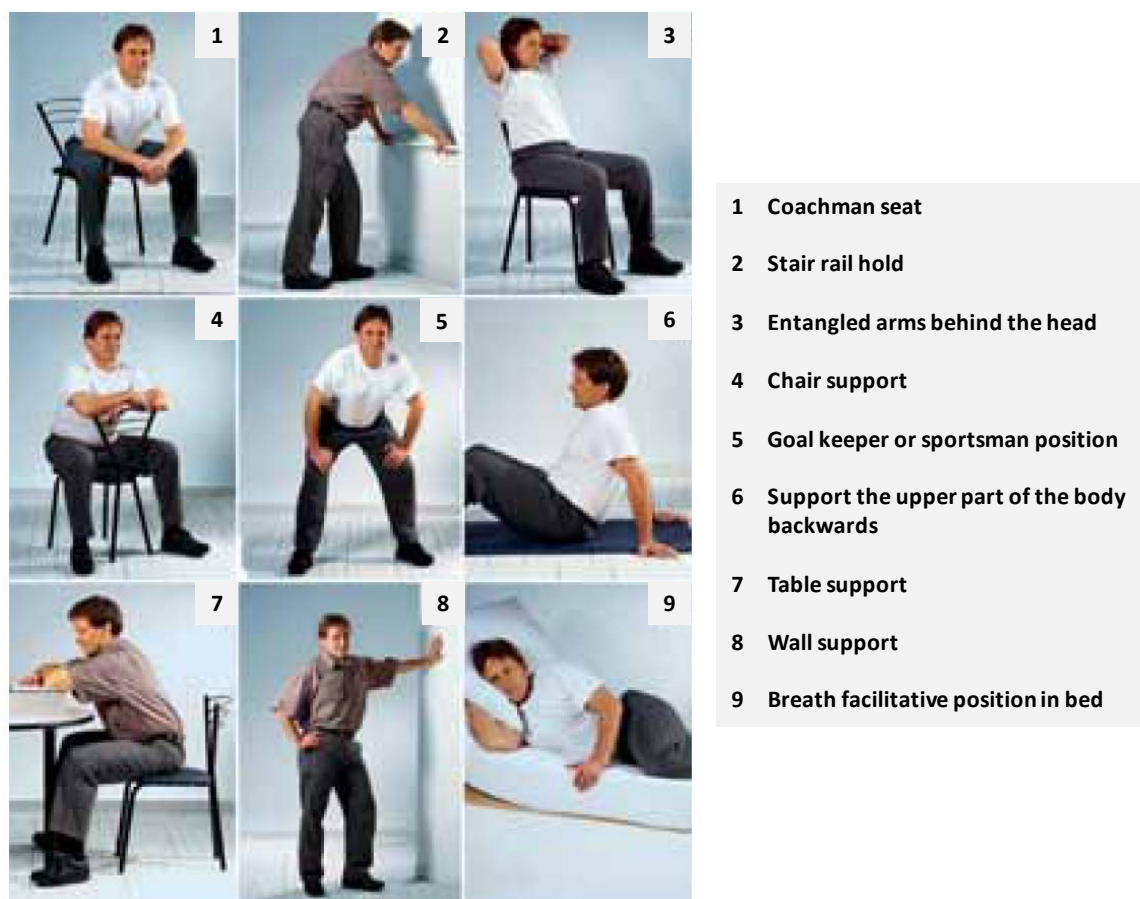


Figure 3 Breath facilitative body positions [SCH08]

Home oxygen therapy

- Global Initiative for Chronic Obstructive Lung disease

<http://www.goldcopd.com/Guidelineitem.asp?l1=2&l2=1&intId=2003>

- Guía de Práctica Clínica de diagnóstico y tratamiento de la EPOC 2009.
http://www.separ.es/doc/publicaciones/normativa/guia_epoc_2009_separ.pdf
- Proceso Asistencial EPOC. Consejería de Salud. Junta de Andalucía.
<http://www.juntadeandalucia.es/.../procesos/procesos.asp>

Therapy adherence

Compliance vs. adherence

Definition: compliance

= conformity; cooperation or obedience; accordance; the act of conforming, acquiescing or yielding; a tendency to yield readily to others, especially in a weak and subservient way (<http://www.dictionary.com>)

Definition: adherence

= the act of adhering; adhesion; the quality of adhering; steady devotion, support, allegiance or attachment (<http://www.dictionary.com>)

In the AMICA context we prefer to talk from therapy adherence, as it includes the patient as an active controlling element of his own therapy. As against the expression compliance insists on patients' obedience.

Predictors of therapy adherence

Positive predictors for therapy adherence are:

- Female gender of the patient
- Patient is over 65 years old
- Routinely visits to the doctor
 - optimized therapy attitude
 - medical advice
- small amount / frequency of medication to be taken
- Acceptance of illness
- Comorbid conditions

Negative predictors for therapy adherence are:

- Male Gender of the patient
- Patient is beneath 40 years
- Crisis in a relationship
- Social isolation
- Idleness

- Depression
- Inclination to nicotine abuse / excessive alcohol consume / general noxious lifestyle
- Lacking reconnaissance of consequences by abort/ non-compliance of therapy
- Drug indicated side effects which have a negative influence on lust for life, well-being and life-quality

[GAU01]

Variables for the Assessment of the therapy adherence

- Abidance of arranged appointments
- Therapy failures, respectively therapy shows no apparent success
- Direct inquiry concerning therapy denial (sensitivity of 55% and specificity of 87% if hypertension)
- Validation of distances regarding procuration of medication in a pharmacy, respectively inquiry of central deducted recepies (Annotation: agreement of the patient required)
- Measurement of drug level or effects of medication (directly if possible, apart from that with markers)
- Pill contributor for monitoring of quantity and moment of intake of medication

[GAU01]

Role of the relatives in COPD therapy

The relatives of a patient should be included into therapy. They can play an important role in patient motivation.

[SON09]

Psychological aspects

Psychological side effects in COPD patients:

- Anxiety
- Depressions

Important: Differ between anxiety related dyspnea and real COPD caused dyspnea.

[VOE09]

COPD comorbidities

About 75 % of COPD patients suffer from at least one or two COPD comorbidities. The most frequent comorbidities in COPD are:

- Lung cancer
- Coronary heart disease
- Sleeplessness
- Sinusitis
- Migraine
- Ulcers in stomach or duodenum

[VOE09]

Early diagnosis of exazerbations

Definition exacerbation by COPD-guideline

Exacerbation = Incident in the course of the illness, which is characterised through a change of dyspnea, the coughing and / or the sputum. This change exceeds the daily variations, it starts acute and necessitates a change of medication. [Vog 05]

Emergence / cause of exacerbations

Exacerbations emerge with a 6 times as high likelihood in winter than in summer. The probability of occurrence is especially high in the first 3 months of the year. Most common cause are viral and/or bacterial infections.

Other factors, which abet an exacerbation / necessity of hospitalisation:

- COPD in an advanced stadium
- Preceded exacerbations
- Chronic hypersecretion of mucus
- Chronic global respiratory insufficiency
- Chronic cor pulmonale
- High age
- Multi morbidity

Consequences of an exacerbation

- Higher risk of mortality
- Increased morbidity
- Impaired quality of life

Guiding symptoms to be taken into account for the detection of exacerbations

Guiding symptoms of acute exacerbations:

- Increasing dyspnoea accompanied by increased coughing, increase of quantity and viscosity of the sputum and / or yellow-green change of colour.
- Chest tightness
- Occasionally fever
- Unspecific: blur of consciousness right up to coma, insomnia, defatigation, depressions

Guiding symptoms of heavy acute exacerbations:

- Newly occurring or progredient central cyanosis
- Peripheral oedemata
- Help of the „accessory respiratory muscles “ within inspiration process
- Haemodynamical instability
- Peak-Flow-figure<100l/min
- FEV₁<1l

Life-threatening condition:

At pO₂<50 mmHg, pCO₂>70mmHg, pH<7,3

Annotation: In general every does every acute degradation of all crucial parameters point to an exacerbation.

Action plan to enhance early detection and management of exacerbations based on:

- Turnock AC, Walters EH, Walters JA, Wood-Baker R. Action plans for chronic obstructive pulmonary disease. Cochrane Database Syst Rev. 2005 Oct 19;(4):CD005074.
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- Guía de Práctica Clínica de diagnóstico y tratamiento de la EPOC 2009.
http://www.separ.es/doc/publicaciones/normativa/guia_epoc_2009_separ.pdf

- Proceso Asistencial EPOC. Consejería de Salud. Junta de Andalucía.
<http://www.juntadeandalucia.es/.../procesos/procesos.asp>

Criteria for stationary / intensive med. Treatment

Stat. / intensive treatment	Possibility of implementation to the patients diary AMICA
Acute chest tightness	Inquiry, Accelerometer
Bad state of health	Inquiry, pulse oximeter
rapid progression of symptoms	Vital parameter-history
blur of consciousness	Inquiry, pulse oximeter, speech recognition
demeanour / increase of oedemata and / or a central cyanosis	Pulse oximeter
Lacking talk about the initial therapy	Vital parameter-History
Unclear diagnosis	/
New occurring arrhythmias (tachycardia, arrhythmia)	Accelerometer
Significant comorbid conditions	Anamnesis / Inquiry
Higher life span	Inquiry
Insufficient domestic care	Inquiry

[Vog05]

Influence factors on evaluation of the patients' physical conditions

- Consideration of the season
- Anamnesis
- Stadium of COPD
- Preceding exacerbations (pattern detection in appearance and quantity)
- Age of the patient
- comorbid conditions (Cor pulmonale)
- Chronical mucus hyper secretion

Desirable features

- Detection / evaluation / monitoring of the Cor pulmonale
- Thoracale pressure ratios
- Thorax deformations
- Detection of fever (temperature measurement) for the early diagnosis of infections

Boundaries of the system

The system is not going to differentiate between stationary and intensive medicinal indication. Just as little as differential diagnostically analyses are possible. Only the relevance of calling a doctor will be considered.

Life quality

Definition: Quality of life [WHO 1993]

Quality of life is defined as an individual's perception of his / her position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, physiological state, level of independence, social relationships, and their relationship to salient features of their environment.

COPD as a chronic disease has a reducing effect on life quality. If there exist also depression and anxiety as frequent side-effects of COPD, life quality is even more constricted than because of the disease itself. This leads to a worse prognosis and faster progress in COPD and thus, also to a reduced life expectancy [SON09]. Hence, the gain of life quality should be a main objective in management of chronic diseases [ROS03].

Correlation between life quality and therapy success

Interest in contribution to therapy is the precondition of therapy success. If a therapy prospects neither healing nor an significantly increased life expectancy, it is the increase of subjective well-being and life-quality that should be of the key aspects of the therapy [ROS03]. Just in this way, therapy keeps its attractiveness also in the long run.

Influence factors on life quality in COPD patients

According to surveys, COPD patients feel their life quality negatively limited especially by:

- Dyspnea / breathlessness
- Fatigue
- Sleep associated problems

[DOG08] (cf. Figure 6).

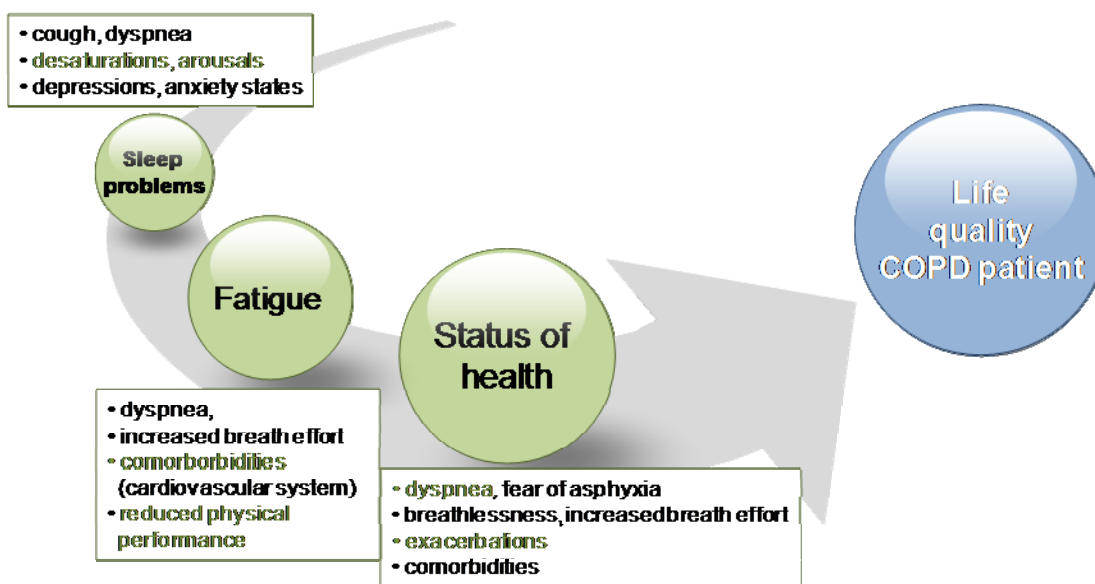


Figure 4 Key influences on life quality

Beyond that, COPD patients mentioned the following influence factors on their life quality:

- Reduced mobility
- Loss of autonomy / independency
- Depressions
- Anxiety
- Social isolation

Patient education

Psycho-education

Education of COPD-patients should include information about:

- Medications
- Side-effects
- Causes of the disease
- Influence factors on the disease
- Consequences of the disease, therapy, abortion of therapy
- Options of therapy

Relatives of the patient should be included in psycho-education or may even give a psycho-education to the patient. [SON09]

Empowerment

Empowerment is the advancement and encouragement of patients' skills and capacities. This includes:

- Motivation to application of what they have learnt, in daily life
- Activation of resources
- Self-motivation
- Consciousness of self-responsibility

[SON09]

Correct interpretation of physical health states and situations

Patients with chronic diseases such as COPD often tend to catastrophise harmless, physical symptoms. This leads to misinterpretations and erroneous alarm and emergency situations. Furthermore, patients are worried sick and avoid physical exercises as well as social contacts. They isolate and become weak in coping with their disease.

Psychotherapeutic methods such as cognitive reinterpretation and reevaluation can help. Also relaxing exercises and biofeedback can have a positive effect in such situations.

[SON09]

Possible reminder functions of patient diary

Reminder – even if they are technically supported – can help to facilitate daily life and handling with the COPD and COPD therapy. Reminder can be realised as part of the patient diary. See

- Reminder for vaccinations
- Appointments with the doctor
- Intake of medication
- Completion of sports exercises
- Necessity of the therapy adherence
- ...

Checklists

Checklists can help and give support to the patient in special situations.

E.g. checklist for hospitalization:

- For the administration
 - Name, birth name, first name, family status, religion, nationality
 - Address and phone number
 - Possibly profession, employer, health insurance:
 - Name of the family doctor
 - Confinement of the family doctor
 - Name and phone number of a relative or authorizes person
 - Money → commission for telephone, TV, ...
- For the hospital doctor
 - X-ray photographs if available
 - X-ray pass
 - Laboratory findings
 - Personal medications or a list of medications including dosing
 - Indication of allergies (e.g. on medications)
 - Indication on therapies of the actual year
- Specially for oxygen patients:
 - Oxygen pass

- Bipap pass
- Nasal cannula
- Cannula extension
- Adapter / connector
- Sports bag packed with:
 - Toiletries:
 - Toothbrush / toothpaste / toothbrush tumbler
 - Cleaning tablets and –box for false teeth
 - Soap and shower gel, hairbrush, comb
 - Possibly barrette
 - Small mirror
 - Nail care set
 - Paper tissue
 - Body cream, skin lotion
 - Hair dryer
 - Possibly shaver set
 - Clothes for one week:
 - Pyjama
 - Sox
 - Pants
 - washrag
 - towels
 - Do not forget:
 - Bath robe and / or jogging suit
 - Slippers
 - 1 Pair of sturdy footwear for physiotherapy
 - Possibly glasses / reading glasses
 - Wrist watch / alarm clock (a cheap one)

[LOT02]

Other checklists may concern:

- Emergency / dyspnea management
 - Instructed breathing exercises at breathlessness
- Travel management

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