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GUIDELINE PAPER

International Primary Care Respiratory Group (IPCRG) Guidelines: Management of Chronic Obstructive Pulmonary Disease (COPD)

David Bellamy^{a,*}, Jacques Bouchard^b, Svein Henrichsen^c,
Gunnar Johansson^d, Arnulf Langhammer^e, Jim Reid^f,
Chris van Weel^g, Sonia Buist^h

^a James Fisher Medical Centre, 4, Tolpuddle Gardens, Bournemouth, Hants BH9 3LQ, UK

^b Respiratory Department and allergy consultant, St Joseph's Hospital, La Malbaie, Quebec, Canada

^c L11 Familiehelsesenter, Langbølgen 11, Oslo 1150, Norway

^d Department of Public Health and Clinical Sciences, Section of Family Medicine and Clinical Epidemiology, Science Park, Uppsala 751 85, Sweden

^e HUNT Research Centre, Institute of General Practice and Public Health, Norwegian University of Science and Technology, Neptunveien 1, Verdal 7650, Norway

^f Head of Department of General Practice, University of Otago, PO Box 913, Dunedin, New Zealand

^g Department of General Practice, HAG-117 PO Box 9101, Nijmegen 6500 HB, The Netherlands

^h Oregon Health & Science University, 3181 SW Sam Jackson Park Rd, Portland, OR 97239, USA

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Summary COPD is a common and under-diagnosed disease which is increasing in prevalence worldwide. A more aggressive and optimistic approach must be adopted towards its management in primary care. This IPCRG Guideline on the management of COPD in primary care is fully consistent with GOLD guidelines. It highlights the goals of COPD treatment and the need for spirometric testing to make the diagnosis. It covers the classification of the disease according to disease severity, non-pharmacologic therapy including smoking cessation, avoidance of risk factors, patient education, pharmacologic therapy including the use of oxygen treatment, the management of exacerbations, the role of pulmonary rehabilitation, and the need for monitoring and ongoing care for COPD patients.

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Background

Primary care physicians treat the majority of patients with respiratory diseases. However, in

* Corresponding author. Tel.: +44 (0)1202 522622;

fax: +44 (0)1202 548580.

E-mail address: david.bellamy@virgin.net (D. Bellamy).

most countries, specific primary care guidelines are not available. Since clinical management which follows evidence-based guidelines yields better results for patients, it is important to have access to primary care guidelines which are specifically relevant to, and provided by, primary care. The International Primary Care Respiratory Group (IPCRG) asked primary care experts from several countries to develop primary care guidelines for the diagnosis and treatment of asthma, chronic obstructive pulmonary disease (COPD) and rhinitis. A brief summary of the expert report (which took three years to complete) was published as a handbook [1] in 2005.

This paper is devoted to the management of COPD and is specifically written for primary care health professionals. It is consistent with the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines [2], which we recommend should be consulted if a more detailed perspective is required. In addition to this section on COPD, the IPCRG guidelines consist of papers on the diagnosis of chronic respiratory diseases in primary care [3], and the management of asthma [4] and rhinitis [5]. For the specific purpose of ranking the evidence in each of these publications, we have used the so-called Three Star System of the Royal College of General Practitioners [6] in order to score the evidence of the statements made (see box).

lack of understanding about modern management, is a major hurdle to providing patients with the symptomatic relief and help that they need. A much more aggressive and optimistic approach must be adopted, since there is clear evidence that the various treatments available improve patients in a variety of ways, albeit that they are unable to cure the disease. Breathlessness can be lessened, exercise levels and quality of life improved, and the frequency of acute exacerbations decreased. However, stopping smoking is the only action that will slow the rate of disease progression.

The most important primary care objective should be to improve quality of life. Every effort should be made to reduce exacerbations since a high frequency of exacerbations has been associated with a poorer quality of life and more rapid decline in lung function.

Treatment goals

While disease prevention is the ultimate goal, once COPD has been diagnosed, effective management should be aimed at the following goals:

- Prevent disease progression
- Relieve symptoms
- Improve exercise tolerance
- Improve health status

Three Star System of the Royal College of General Practitioners:

Evidence Base	Royal College of General Practitioners. The development and implementation of clinical guidelines. Report of the clinical guidelines working group. London, 1995, RCGP [6].
*** Strong evidence	Provided by generally consistent findings in multiple, high quality scientific studies.
** Moderate evidence	Provided by generally consistent findings in fewer, smaller or lower quality scientific studies.
* Limited evidence	Provided by one scientific study or inconsistent findings in multiple scientific studies.
- No scientific evidence	Based on clinical studies, theoretical considerations and/or clinical consensus.

Introduction

COPD is a common and under-diagnosed disease which is increasing in prevalence worldwide. The disease causes persistent and progressive symptoms which can have major effects on the quality of life of the sufferer, and constitutes a heavy health and economic burden on nation states.

Sadly, despite the prevalence and seriousness of COPD, there is a widely-held view that little can be done to treat the disease other than to stop patients from smoking. This negative attitude, linked to a

- Prevent and treat complications
- Prevent and treat exacerbations
- Reduce mortality.

The aim should be to reach these goals with minimal side effects from treatment and at an affordable cost.

Classification of severity (derived from the GOLD guidelines [2])

COPD is classified as mild, moderate, severe, or very severe, based on the patient's symptoms, and

Table 1 Classification of severity of COPD

Stage	Characteristics	Comments
0: At Risk	<ul style="list-style-type: none"> • Normal spirometry* 	Cough and sputum production often precede airflow limitation by many years. Encouraging smoking cessation in patients at risk is the most important way to reduce the burden of COPD.
I: Mild COPD	<ul style="list-style-type: none"> • Chronic symptoms (cough, sputum production) • FEV1/FVC < 70% 	At this stage, the patient may not be aware that their lung function is abnormal.
II: Moderate COPD	<ul style="list-style-type: none"> • FEV1 \geq 80% predicted • With or without chronic symptoms (cough, sputum production) • FEV1/FVC < 70% 	Symptoms usually progress at this stage, with shortness of breath typically developing on exertion.
III: Severe COPD	<ul style="list-style-type: none"> • 50% \leq FEV1 < 80% predicted • With or without chronic symptoms (cough, sputum production) • FEV1/FVC < 70% 	Shortness of breath typically worsens at this stage and often limits patients' daily activities. Exacerbations are especially seen beginning at this stage.
IV: Very Severe COPD	<ul style="list-style-type: none"> • 30% \leq FEV1 < 50% predicted • With or without chronic symptoms (cough, sputum production) • FEV1/FVC < 70% • FEV1 \leq 30% predicted or FEV1 < 50% predicted plus chronic respiratory failure 	At this stage, quality of life is very appreciably impaired and exacerbations may be life-threatening.

* NOTE: All lung function measurements are post-bronchodilator values.

lung function as assessed by measurement of forced expiratory volume in 1 second (FEV1) and forced vital capacity (FVC) (Table 1). Chronic cough and sputum production often precede the development of airflow limitation by many years, and therefore attention should be paid to patients who have these symptoms and are "at risk" of COPD, but who do not yet have abnormal lung function. Note, however, that not all individuals with cough and sputum production will go on to develop COPD. The severity of COPD will determine the treatment required.

Non-pharmacologic therapy

Non-pharmacologic therapy is extremely important in COPD because it includes the only treatment—smoking cessation—that can prevent the development and progression of the disease. Patient education and exercise training are also important, as is pulmonary rehabilitation, which

can significantly improve health-related quality of life in many patients.

Smoking cessation

Stopping smoking is the only intervention that will slow the rate of progression of COPD and prolong life expectancy [7]^{***}. It will reduce the rate of decline in lung function to that of a non-smoker in most patients who stop smoking. Smoking cessation is also the single most effective action to reduce the risk of developing COPD [8–10]. Details of evidence-based smoking cessation methods are provided in Appendix A. The need for reduction of exposure to passive or secondhand smoke should also be emphasised to COPD patients.

Avoidance of other risk factors

Occupational exposure

Emphasise primary prevention, which is best achieved by elimination or reduction of exposure

to the various occupational dusts and chemicals that can cause COPD^{**}. Occupations posing the greatest risk for COPD are linked to exposure to particulate matter such as coalmining. Coal dust alone in sufficient doses can produce airflow limitation. Secondary prevention, achieved through surveillance and early detection, is also important.

Indoor and outdoor air pollution

Encourage measures to reduce or avoid indoor air pollution from biomass fuel, which is often used in developing countries for cooking and heating. Improving ventilation in homes, using stoves that are more efficient and clean than biofuels, and substituting cleaner fuel, are the most practical solutions to this problem [11].

Advise patients who live in larger cities or areas of significant outdoor air pollution to monitor public announcements of air quality, and, depending on the severity of their disease, to avoid vigorous exercise outdoors or stay indoors altogether during pollution episodes.*

Patient education

Education of COPD patients and caregivers is an essential part of good disease management [12,13]^{***}. Individualized education should be given on an ongoing basis at patient visits.

Topics for education include:

- Reducing exposure to risk factors, including tobacco smoke
- Diet—advice on weight gain where the BMI is below 20 since this increases risk of death, or weight reduction to improve mobility
- Importance of regular exercise and maintenance of cardiovascular conditioning
- Correct use of medication
- Recognizing and treating depression
- Management of exacerbations, ideally with a written action plan
- End-of-life issues, coping with severe dyspnoea, and palliative care
- Recognising and treating co-morbidities.

Rehabilitation

The goal of pulmonary rehabilitation is to reduce symptoms, improve quality of life, and increase participation in everyday activities [14–17]^{***}. Rehabilitation programs should include:

Table 2 What you can do if pulmonary rehabilitation is not available

- Start with a small amount of walking which is easily manageable
- Walk every day
- Pace yourself
- Exercise regularly and set realistic goals
- Seek education by asking advice, and read information leaflets
- Try to exercise all year, even in cold and wet weather
- Try to persevere through difficult periods
- Seek advice on weight, diet and lifestyle.

- Exercise training
- Nutrition counselling
- Education.

The program should contain a minimum of six weeks physical exercise, education, and psychosocial intervention.

Patients at all stages of disease benefit from exercise training programs, with improvements in exercise tolerance and reduction in symptoms of dyspnoea and fatigue. Effective rehabilitation programs can be conducted in inpatient, outpatient, or home settings.

If resources are minimal, benefits can still be gained (Table 2) from instructing patients to take regular exercise as appropriate to their environment. It is important to reassure patients that performing exercise to the point of breathlessness is not harmful and will, over time, increase their exercise ability. Lower limb exercises are essential, and patients should be encouraged to walk as far as they can until they are breathless.

Oxygen therapy

Long-term oxygen therapy (LTOT) administered for more than 15 hours per day to COPD patients with chronic respiratory failure improves survival, exercise capacity, and mental state, and has a beneficial impact on pulmonary arterial pressure, polycythemia (defined as a hematocrit of > 55%), exercise capacity, lung mechanics, and mental state [18,19]^{***}.

Initiate oxygen therapy for patients with 'Very Severe COPD' (Stage IV) if:

- PaO₂ is at or below 7.3 kPa (55 mm Hg) or SaO₂ is at or below 88%, with or without hypercapnia; or
- PaO₂ is between 7.3 kPa (55 mm Hg) and 8.0 kPa (60 mm Hg) or SaO₂ is 89%, if there is evidence of pulmonary hypertension, peripheral

oedema suggesting congestive heart failure, or polycythemia.

- In primary care, if a pulse oximeter is available, an oxygen saturation (SaO₂) of less than 92% should prompt referral for further investigation of the need for oxygen therapy.

The goal of LTOT is to increase the baseline PaO₂ at rest to at least 8.0 kPa (60 mm Hg) at sea level, and/or produce an SaO₂ of at least 90%, which will preserve vital organ function by ensuring adequate delivery of oxygen.

Oxygen may be administered from an oxygen concentrator, liquid oxygen, or cylinders, depending on cost and the facilities available locally. It is important that patients be carefully monitored, particularly to assess adherence with the recommendation to use oxygen for more than 15 hours each day.

There is no convincing evidence that mechanical ventilatory support, including NIPPV, has a role in the routine management of stable COPD.*

Pharmacological therapy

Although COPD cannot be cured, effective pharmacological therapy can relieve patients' symptoms, increase their ability to accomplish everyday activities, reduce the frequency of exacerbations, and improve their quality of life.

Therapy for COPD does not necessarily produce an improvement in FEV₁, although small changes may be seen in lung volume measurements such as inspiratory capacity and residual volume, which are markers of lung hyperinflation. However, such tests cannot be performed easily in primary care.

Therefore, additional subjective measures such as questions about symptoms, quality of life, and exercise tolerance, should be used to gauge the effectiveness of treatment.

Treatments available

Bronchodilators (anticholinergics and beta-2 agonists) are central to symptom management in COPD [20–22]***. They are given on a regular basis in 'Moderate' to 'Very Severe' disease, (Stages II–IV) or on an as-needed basis at all stages of the disease in order to relieve breathlessness and improve exercise capacity. For regular treatment, long-acting bronchodilators are more effective [23,24]*** and more convenient than short-acting bronchodilators, although they are more expensive.

Inhaled glucocorticosteroids are recommended in patients with 'Severe' (Stage III) and 'Very Severe' (Stage IV) COPD who have repeated exacerbations (three or more in the last three years) requiring oral corticosteroids or antibiotics. Regular treatment with inhaled glucocorticosteroids reduces the frequency of exacerbations and improves health status in this group of patients [25]***.

Therapy by severity

The management of COPD should follow a stepwise approach depending on the severity of the individual patient's disease (Table 3). Treatment should be symptom-driven.

COPD is typically a slowly progressive disease. Therefore, treatment generally needs to be maintained at the same level over long periods of

Table 3 COPD therapy by severity

Stage	Essential	Ideal
0: At Risk	<ul style="list-style-type: none"> • Avoidance of risk factors • Influenza vaccination 	<ul style="list-style-type: none"> • Avoidance of risk factors • Influenza vaccination
I: Mild COPD	<ul style="list-style-type: none"> • Add short-acting bronchodilator when needed 	<ul style="list-style-type: none"> • Add short-acting bronchodilator when needed
II: Moderate COPD	<ul style="list-style-type: none"> • Add regular bronchodilator treatment 	<ul style="list-style-type: none"> • Add regular treatment with one or more long-acting bronchodilators • Add rehabilitation
III: Severe COPD		<ul style="list-style-type: none"> • Add medium-to high-dose inhaled glucocorticosteroids if repeated exacerbations
IV: Very Severe COPD		<ul style="list-style-type: none"> • Add long-term oxygen if chronic respiratory failure • Consider surgical referral

For a detailed table summarising available COPD medications, see page 27 of the IPAG Guide [1] and page 69 of the GOLD Guidelines [2].

time and eventually “stepped up” as the patient’s disease becomes more severe.

Inhaler use

Inhaled medications are preferred in the treatment of COPD because high concentrations of the drug can be delivered directly to the airways, producing potent therapeutic effects with few systemic side effects. However, the wider availability, lower cost, and preference for oral medications in some countries needs to be considered.

Most exacerbations are caused by a viral or bacterial infection of the tracheobronchial tree, and some may be caused by an increase in air pollution [26–28]**. The cause of about one-third of severe exacerbations cannot, at present, be identified. **Figure 1** provides an overview of the management of COPD exacerbations.

Every effort should be made to prevent exacerbations, as they greatly contribute to the erosion in quality of life in COPD patients and can create a serious social and economic burden on the patient, carers, and the health care system.

Exacerbations

COPD is often associated with exacerbations of symptoms, particularly as the disease progresses.

Signs and symptoms of an exacerbation

Common signs and symptoms of an acute exacerbation of COPD include:

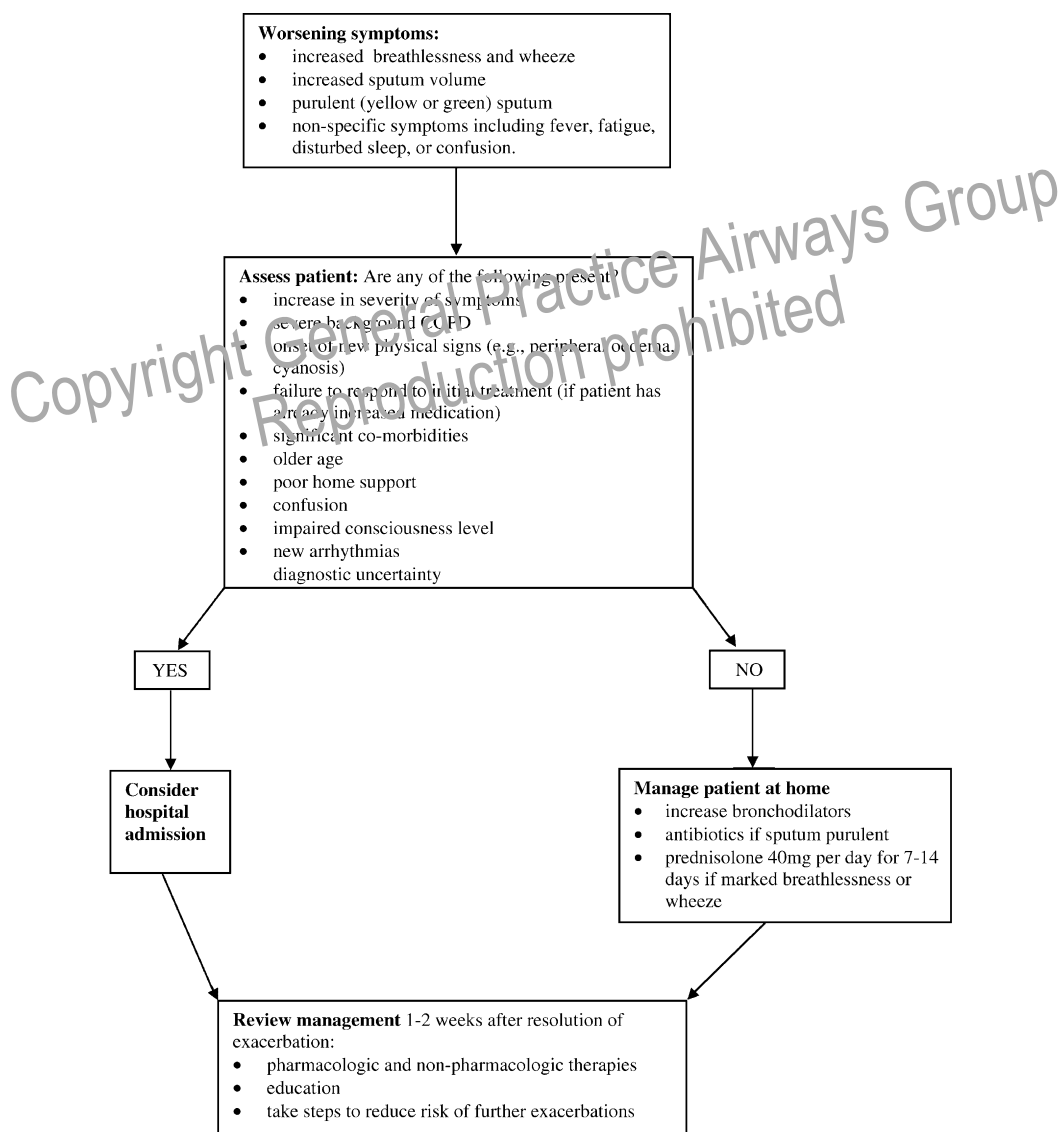


Figure 1 Flow chart for treatment of exacerbations of COPD.

- Increased breathlessness, wheeze, and chest tightness
- Increased sputum volume
- Increased sputum purulence (white becoming yellow or green; green sputum usually points to a bacterial cause)
- Non-specific symptoms such as fever, malaise, fatigue, sleepiness, and confusion.

Indications for hospital admission

The risk of dying from an acute exacerbation of COPD is closely related to the development of respiratory acidosis, the presence of serious comorbidities, and the need for ventilatory support. Patients lacking these features are not at high risk of dying, but those with severe underlying COPD often require hospitalization in any case (see Figure 1).

Patients with any of the following characteristics should be considered for hospitalisation, although none of the criteria below are *absolute* indications for hospitalisation:

- Marked increase in intensity of symptoms, such as sudden development of resting dyspnoea
- 'Severe' (Stage III) or 'Very Severe' (Stage IV) background COPD
- Onset of new physical signs (e.g. cyanosis, peripheral oedema)
- Failure to respond to initial medical management
- Significant co-morbidities
- Newly occurring arrhythmias
- Diagnostic uncertainty
- Older age
- Insufficient home support.

Pharmacologic therapy

Bronchodilators

Increase dose and/or frequency of existing bronchodilator therapy, or add a bronchodilator of another class (e.g., add an anti-cholinergic if a beta 2-agonist is already used, or a beta 2-agonist if an anticholinergic is already used) [29]^{***}. Higher doses can be administered via a spacer or, for short periods, via nebuliser where available. Both methods can be equally efficacious but when patients are severely dyspnoeic, a nebuliser can be better tolerated.

Oral glucocorticosteroids

These are used to shorten recovery time, increase the time to the next exacerbation, and improve lung function more quickly [30]^{***}. If the patient is more breathless and wheezy, add oral prednisolone 30–40 mg per day for 7–14 days.

Antibiotics

When symptoms of breathlessness and cough are increased and sputum is purulent and increased in volume, provide antibiotic cover for the major bacterial pathogens involved in exacerbations – *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Mycoplasma catarrhalis* – taking into account local patterns of antibiotic sensitivity [31,32]^{**}. In primary care it is usually necessary to administer antibiotics prior to the results of sputum culture, if sputum culture has been performed.

Follow-up after exacerbations*

After an exacerbation, the patient should be reviewed periodically until their health status returns to its pre-exacerbation level. The timing and frequency of monitoring should depend on the severity of the exacerbation.

Follow-up after an exacerbation is a good opportunity to review pharmacologic therapy and to consider stepping up treatment or adding rehabilitation, oxygen therapy, or referral to a specialist where appropriate. Smoking cessation should always be re-emphasised. Prolonged symptoms should lead to suspicion of alternative diagnoses such as lung cancer, and require further investigation. Attention should also be paid to strategies for preventing further exacerbations, such as considering the addition of inhaled glucocorticosteroids (see above) to the patient's medication regimen and emphasising the importance of regular influenza vaccination.

Follow-up and on-going care

Patient monitoring*

COPD is usually a progressive disease. Lung function can be expected to worsen over time, even with the best available care. Symptoms and lung function should be monitored to follow the development of complications, to guide treatment, and to facilitate discussion of management options. The frequency of monitoring will depend on the health care system and on the individual patient. In general, regular follow-up is needed to:

- Assess the patient's quality of life and whether treatment goals are being met
- Assess the patient's ability to cope with the disease and encourage adherence to the treatment plan
- Review side effects
- Adapt treatment to new advances in therapy.

Review is also recommended after changes in therapy have been made, to assess compliance, understanding, and side effects. This review should take place within a month of the change in treatment.

Adjusting therapy

Treatment for COPD is based on symptoms, and therapy will need to be stepped up as the disease progresses and symptoms worsen or complications develop. However, compliance with the current medication regimen should be assessed before stepping up therapy. Therapy may also be adjusted and alternative medication options tried, when side effects or efficacy are unacceptable.

Referral

Referral to a specialist should be considered if therapy appropriate to the stage of the patient's disease does not control symptoms. Surgical referral for bullectomy or lung transplantation may be considered in carefully selected patients. There is currently insufficient evidence to recommend the widespread use of lung volume reduction surgery (LVRS).

Conclusions and recommendations***

COPD is a common and important disease. Much can be done to prevent the disease and, once established, to slow or minimise further deterioration. A much more positive attitude needs to be adopted regarding the many benefits that treatments can achieve in terms of symptom relief and improving quality of life. COPD is a systemic disease, and a more holistic approach needs to be focused on associated problems such as muscle deconditioning and psychosocial symptoms associated with COPD. The main areas of management can be summarised as;

- Patient education helps in the understanding of the disease process and adherence to therapy
- Stopping smoking is the only intervention that will slow disease progression
- Bronchodilators relieve breathlessness and improve exercise ability
- Inhaled corticosteroids help to reduce the frequency of acute exacerbations

- Pulmonary rehabilitation and regular exercise significantly improves quality of life
- Every effort should be made to reduce exacerbation frequency and to treat exacerbations as promptly as possible

Potential conflicts of interest

Dr David Bellamy has no shares in pharmaceutical companies. He has received honoraria for speaking at meetings from the following companies: AstraZeneca, GlaxoSmithKline, Altana Pharma, Boehringer Ingelheim and Pfizer. He has also been paid for advisory panel work undertaken for GlaxoSmithKline, Altana Pharma, Boehringer Ingelheim and Pfizer.

Dr Bouchard has no shares in pharmaceutical companies. He has received, as a speaker, honoraria from GSK, MSD and AstraZeneca. He is a temporary member of a scientific advisory board from GSK and MSD.

Dr Svein Hoegh Henrichsen has no shares in pharmaceutical companies. He has received speakers honoraria for speaking at sponsored meetings for AZ, BI, GSK, MSD and Pfizer. He has received honoraria for advisory panel work from GSK and MSD. He has received honoraria for advisory panel work for the Norwegian Directorate for Health and Social Affairs.

Dr Gunnar Johansson has no shares in pharmaceutical companies. He has received speakers honoraria for speaking at sponsored meetings for Astrazeneca, Boehringer-Ingelheim, GSK, MSD and Pfizer. He has received honoraria for advisory panel work from Boehringer-Ingelheim, Pfizer and Astrazeneca.

Dr A. Langhammer has no shares in pharmaceutical companies or tobacco industry. He has received speakers honoraria for speaking at sponsored meeting for GSK, AZ, MSD, Boehringer Ingelheim. He has received honaria for advisory panel work for AZ, Pfizer and MSD. He was project leader of a substudy of the Nord-Trøndelag Study (HUNT2) focusing on obstructive lung diseases This study was funded by AZ through a contract between the Medical Director of AZ and the Director of the National Institute of Public Health. Dr Langhammer was employed by the National Institute of Public Health during the data collection period.

Associate Professor James J Reid (nor his family) holds no shares in Pharmaceutical Companies. He has received honoraria for advisory work from Astra Zeneca, Glaxo Smith Kline, and Altana. He has received speakers honoraria from Astra Zeneca, GlaxoSmithKline, and Pfizer.

Professor Chris van Weel has no shares in pharmaceutical companies. He has never personally received an honorarium from the pharmaceutical industry for speaking or advisory panel work. His Department of General Practice, Radboud University Medical Centre, Nijmegen, the Netherlands, has received since 1985, unrestricted research grants from GSK, AZ, Bayer, Boehringer Ingelheim, Novartis, Pfizer and Pharmacia. As the president-elect of the World Organisation of Family Doctors (Wonca) he has been involved in respiratory educational and development activities for which Wonca has been the recipient of unrestricted grants and honoraria from Boehringer Ingelheim and Altana.

Professor A.S. Buist has served on advisory boards for GlaxoSmithKline, ALTANA, Schering Plough and Merck and donates most of her honoraria to the ATS; she has participated in COPD workshops funded by AstraZeneca and GlaxoSmithKline: and is Scientific Director for the Burden of Obstructive Lung Disease (BOLD) an initiative that receives unrestricted educational grants to the Kaiser Permanente Center for Health Research from Boehringer Ingelheim, Pfizer, GlaxoSmithKline, AstraZeneca, Novartis, Chiesi, and Merck.

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Appendix A. Smoking cessation

Clinicians should enquire about smoking habits during general consultations and offer assistance with cessation wherever appropriate. Details about smoking habit should always be recorded in patient records.

Tobacco dependence is a chronic condition that warrants repeated advice and treatment until long-term or permanent abstinence is achieved. One-third of smokers have made at least three serious attempts to quit, and surveys in some countries suggest that 70% of all smokers want to stop smoking.

Even a brief, 3-minute period of counselling to urge a smoker to quit can be effective^{***}, and at a minimum this should be done for every smoker at every visit [33] (Figure A1-1). More intensive

- Raise the subject of smoking cessation in a non-threatening way.
- Assess motivation by asking questions such as "How do you feel about stopping smoking?"
- Show concern and offer appropriate advice or leaflets.
- Talking about the "risks" of smoking can be counter-productive. Instead, ask the smoker what they see as the benefits of stopping.
- Acknowledge that stopping can be difficult and offer constructive support and advice.
- Use open questions to assess the patient's readiness to quit.

Figure A1 Practical advice for helping patients stop smoking.

group or individual counselling strategies increase the likelihood of sustained quitting^{***}.

Pharmacotherapy (nicotine replacement and/or bupropion) [34] is recommended when counselling is not sufficient to help patients stop smoking^{***}. Special consideration should be given before using pharmacotherapy in people smoking fewer than 10 cigarettes per day, pregnant women, adolescents, and those with medical contraindications (unstable coronary artery disease, untreated peptic ulcer, and recent myocardial infarction or stroke for nicotine replacement; a history of seizures for bupropion).

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