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REVIEW

Smoking cessation in chronic obstructive pulmonary disease

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Summary
Chronic obstructive pulmonary disease (COPD) is increasing in prevalence, and is predicted to become the third leading cause of deaths worldwide by 2020. The precise prevalence of COPD is not known, as many individuals with the disease are left undiagnosed, despite the requirement of only simple spirometry testing for disease detection. The major risk factor for the development of COPD is cigarette smoking, with 90% of deaths from COPD directly attributable to smoking. Therefore smoking cessation is the most effective means of halting or slowing the progress of this disease.

This review summarizes and compares the differential characteristics of smokers with COPD vs. those without COPD in relation to their smoking behavior and quitting attempts, and discusses the various strategies that can be used to help patients quit and improve their likelihood of long-term smoking cessation. Of the various behavioral interventions available that can increase the likelihood of smoking cessation, one of the simplest and most effective strategies that physicians can use is simply to advise their patients to quit, particularly if this advice is combined with informing the patients of their ''lung age''. We also discuss the pharmacologic therapies used to enhance the likelihood of quitting, including nicotine replacement, bupropion SR and varenicline, along with novel nicotine vaccines, which are currently undergoing clinical trials.

Abbreviations: CI, confidence interval; COPD, chronic obstructive pulmonary disease; DALYs, disability-adjusted life years; FEV_1, forced expired volume in 1 s; FVC, forced vital capacity; GOLD, Global Initiative for Chronic Obstructive Lung Disease; LHS, Lung Health Study; LRI, lower respiratory illness; NHANES, National Health and Nutrition Examination Survey; NRT, nicotine replacement therapy; OR, odds ratio; SD, standard deviation; SR, sustained release.

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Contents

Introduction

Tobacco cigarette smoking is the single most preventable cause of death worldwide and accounts for approximately 438,000 deaths each year in the US.[1–3] Smoking contributes to a number of diseases and has a major impact on four of the most common causes of death in the US: (i) coronary heart disease; (ii) cancer (lung, upper aerodigestive tract, pancreas, stomach, bladder, kidney and cervix); (iii) cerebral vascular accidents;[4,5] and (iv) chronic obstructive pulmonary disease (COPD).[5]

COPD is a disease of increasing prevalence, morbidity and mortality, but suffers from under-recognition, under-diagnosis and under-treatment. It has been defined by the Global Initiative for Chronic Obstructive Lung Disease (GOLD) as a ''preventable and treatable disease with some significant extrapulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lung to noxious particles or gases''.[6] Since COPD is defined mainly on the basis of its abnormal physiology, spirometry is essential for diagnosis by demonstrating fixed airflow obstruction, i.e., a ratio of forced expired volume in 1 s (FEV_1) to forced vital capacity (FVC) of $<70\%$ that does not fully reverse, i.e., does not increase to $\geq 70\%$, after a bronchodilator. GOLD staging of the severity of COPD is also based on spirometry: mild, moderate, severe and very severe diseases are defined by FEV_1 values of $\geq 80\%$, 50–79%, 30–49% and $<30\%$, respectively. The fact that spirometry is infrequently performed and that the major symptom of COPD responsible for limitation of physical activity, namely exertional dyspnea, does not appear, or is not recognized, until the airflow obstruction is advanced (or is incorrectly attributed to some other disease process) contributes to the under-diagnosis of COPD. Since prevalence surveys are generally based on self-report of physicians' diagnoses and COPD is generally under-diagnosed, prevalence figures are likely to underestimate the true prevalence of COPD. Therefore, while a US prevalence of 10 million is often cited,[7] the true prevalence is probably much higher. For example, data from the third National Health and Nutrition Examination Survey (NHANES III) indicated that 71.7% of those surveyed who had an $FEV_1/FVC < 70\%$ (and thus were likely to have COPD) were never given a diagnosis of COPD by their physicians; furthermore, 46.2% of those who might have been classified as having severe COPD by GOLD criteria ($FEV_1 < 50\%$ predicted) were never diagnosed with COPD.[8]

COPD often severely limits activities of daily living and impairs health-related quality of life.[9] It is associated with