Final Recommendation Statement

Chronic Obstructive Pulmonary Disease (COPD): Screening

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Recommendation Summary

Summary of Recommendations

Population	Recommendation	Grade (What's This?)
Adults	The USPSTF recommends against screening adults for chronic obstructive pulmonary disease (COPD) using spirometry.	

Go to the Figure for a summary of this recommendation and its impact on clinical practice. Table 1 describes the USPSTF grades and Table 2 describes the USPSTF classification of levels of certainty about net benefit.

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Rationale

Importance: Chronic obstructive pulmonary disease is the fourth leading cause of death in the United States, and it affects more than 5% of the adult U.S. population.

Detection: Chronic obstructive pulmonary disease is characterized by airflow limitation that is not fully reversible, is usually progressive, and is associated with an abnormal inflammatory response of the lung to noxious particles or gases. The diagnosis is based on objective airflow limitation, defined as an FEV_1-FVC ratio less than 0.70 with less than 12% reversibility, in association with risk factors (such as smoking history) and/or symptoms (such as chronic sputum production, wheezing, or dyspnea).

Good evidence indicates that history and clinical examination are not accurate predictors of airflow limitation. Fair evidence indicates that most individuals with airflow obstruction do not recognize or report symptoms. Fair evidence also indicates that fewer than 10% of those identified by screening spirometry have severe or very severe COPD, using current diagnostic criteria.

Benefits of Detection and Early Treatment: All individuals with COPD, including those with mild or moderate illness, would benefit from smoking cessation and annual influenza vaccination. However, fair evidence shows that providing smokers with spirometry results does not independently improve cessation rates. And although fair evidence suggests that influenza vaccination reduces COPD exacerbations, no studies have examined whether performing spirometry increases influenza vaccination rates.

Good evidence suggests that pharmacologic therapy prevents exacerbations (worsening of symptoms, requiring medical care) but does not affect hospitalizations or all-cause mortality among symptomatic individuals who have been smokers in the past ("ever smokers"), who are 40 years of age or older, and who have severe or very severe COPD (FEV_1 <50% of predicted).

Fair evidence shows that both pharmacologic therapy and pulmonary rehabilitation improve respiratory-related health status measures, but the relationship of these measures to clinically meaningful functional outcomes is not well established. Fair evidence also shows that supplemental oxygen reduces mortality in individuals with resting hypoxia.

Whether individuals who do not recognize or report symptoms but meet spirometric criteria for a diagnosis of severe to very severe COPD would benefit from pharmacologic treatment to the same degree as symptomatic individuals, or at all, is not known. Benefits experienced by individuals who do not recognize or report symptoms are unlikely to be greater than those in symptomatic individuals.

The evidence suggests that the potential benefit of spirometry-based screening for COPD is the prevention of 1 exacerbation or more by treating patients with previously undetected airflow obstruction. By definition, an exacerbation requires medical care. Although an unknown proportion of patients who present with clinical symptoms of an exacerbation does not receive a COPD diagnosis, the incremental benefit of early detection over clinical diagnosis for the remainder of patients would, at most, be a deferral of the first exacerbation.

These incremental benefits are judged to be no greater than small.

Harms of Detection and Early Treatment: The opportunity costs (time and effort required by both patients and the health care system) associated with screening for COPD using spirometry are large even in populations at higher risk. The physical performance of spirometry has not been associated with adverse effects. Fair evidence indicates that spirometry can lead to substantial overdiagnosis of COPD in "never smokers" older than age 70 years, and that it produces fewer false-positive results in other healthy adults.

Good evidence suggests that pharmacologic therapies are associated with adverse effects, including oropharyngeal candidiasis, easy bruising, dry mouth, urinary retention, and sinus tachycardia.

These harms are judged to be no less than small.

USPSTF Assessment: The USPSTF concludes that there is at least moderate certainty that screening for COPD using spirometry has no net benefit.

Clinical Considerations

Patient Population

This recommendation applies to healthy adults who do not recognize or report respiratory symptoms to a clinician. It does not apply to individuals with a family history of α_1-antitrypsin deficiency. For individuals who present to clinicians reporting chronic cough, increased sputum production, wheezing, or dyspnea, spirometry would be indicated as a diagnostic test for COPD, asthma, and other pulmonary diseases.

Risk Assessment

Screening for COPD would theoretically benefit adults with a high probability of severe airflow obstruction who might benefit from inhaled therapies. Risk factors for COPD include current or past tobacco use, exposure to occupational and environmental pollutants, and older age. However, even in groups with the greatest prevalence of airflow obstruction, hundreds of patients would need to be screened with spirometry to defer 1 exacerbation. For example, under the best-case assumptions about response to therapy, an estimated 455 adults between 60 and 69 years of age would need to be screened to defer 1 exacerbation.

Screening Tests

Spirometry can be performed in a primary care physician's office or in a pulmonary testing laboratory. The USPSTF did not review evidence comparing the accuracy of spirometry performed in the primary care versus referral settings.

Other Approaches to Prevention

Regardless of the presence or absence of airflow obstruction, all current smokers should receive smoking cessation counseling and be offered pharmacologic therapies demonstrated to increase cessation rates. All patients 50 years of age or older should be offered influenza vaccine annually. All patients 65 years of age or older should be offered pneumococcal vaccine.

Useful Resources

The USPSTF strongly recommends that clinicians screen all adults for tobacco use and provide tobacco cessation interventions for those who use tobacco products. The USPSTF recommendation on counseling to prevent tobacco use,[1] along with supporting evidence, is available on the USPSTF's Web site (Primary Care Interventions to Prevent Tobacco Use in Children and Adolescents: August 2013).

Other Considerations

Research Needs

Further research is needed into the efficacy of various treatments for adults with airflow obstruction who do not recognize or report symptoms, for never smokers, and for smokers younger than 40 years of age. Studies are also needed on whether primary care screening for respiratory symptoms can detect patients with a clinical diagnosis of severe or very severe COPD. In addition, studies are needed to assess the diagnostic accuracy of spirometry performed in primary care compared with specialty care settings. Studies should also assess what proportion of patients with previously undiagnosed airflow obstruction who present with a first COPD exacerbation does not receive a clinical diagnosis of COPD.

Discussion

Burden of Disease

Two good-quality, population-based studies measured the prevalence of spirometric airflow obstruction in representative samples of a general U.S. population.[1, 2] The prevalence of airflow obstruction consistent with COPD increased with age, affecting 2.6% of all persons 50 to 59 years of age and 4.2% of those 70 to 74 years of age. Airflow obstruction was more common in current or past smokers. Among current smokers, mild or moderate degrees of airflow obstruction (calculated from National Health and Nutritional Examination Survey data,[2, 3] after Wilt and colleagues[4]) were nearly 10 times as prevalent as severe airflow obstruction (19.8% vs. 2.1%).

Scope of Review

The evidence review for this USPSTF recommendation[5] updated and supplemented a previous systematic review that had examined high-quality evidence on the prevalence and risk factors for airflow obstruction; randomized, controlled trials investigating whether providing spirometry results affected smoking cessation rates; and randomized, controlled trials testing the effectiveness of inhaled COPD therapies.[4] The evidence review also examined randomized, controlled trials for benefits of screening on morbidity and mortality outcomes; high-quality evidence on harms of spirometry; systematic reviews of harms of COPD therapies; and systematic reviews of benefits and harms of influenza and pneumococcal vaccinations.

Accuracy of Screening Tests

Because spirometry is used as a confirmatory test as well as a screening test for COPD, no gold standard exists for comparison to provide precise estimates of sensitivity and specificity. Two cross-sectional studies that performed spirometry tests in adults with no history of tobacco use or respiratory disease suggest that spirometry yields some false-positive results and that the number of false-positive results increase in patients older than 70 years of age.[6, 7] However, no studies have tested current COPD diagnostic criteria, which require at least 2 abnormal spirometry measurements that do not differ by more than 5%.

Effectiveness of Early Detection and Treatment

No controlled studies have compared clinical outcomes between screened and nonscreened populations. Randomized, controlled trials of pharmacologic therapies have generally enrolled patients with clinically detected COPD; this population is unlikely to be similar to a population with spirometric screening-detected COPD. Patients identified through screening do not recognize or report symptoms, and, on the basis of prevalence studies, most would be expected to have mild or moderate COPD. A systematic review and meta-analysis of randomized, controlled trials of treatment found small improvements in exacerbations, health status measures, and mortality only in symptomatic patients with severe COPD.[8]

The hypothesis that early detection of COPD with spirometry, alone or as part of a multicomponent intervention, leads to improved smoking cessation rates has been tested in several randomized, controlled trials. Two randomized, controlled trials that evaluated the independent effect of spirometry found no statistically significant difference in cessation rates between smokers who were provided spirometry results and control participants.[9, 10]

Opportunity costs (time and effort required by both patients and the health care system), anxiety associated with false-positive results, and adverse effects from appropriately or inappropriately prescribed medications are all potential harms of screening for COPD using spirometry. Several good- or fair-quality meta-analyses have concluded that inhaled COPD therapies are commonly associated with minor adverse effects. Evidence of their association with major adverse effects (myocardial infarction, hip fracture, pneumonia) is inconsistent.

Estimate of Magnitude of Net Benefit

In patients similar to those in the randomized, controlled trials, inhaled COPD therapies can result in an absolute reduction in exacerbations. Using estimates obtained from population-based studies, one can determine the number of patients needed to screen with spirometry to defer the first exacerbation in various age groups. Assuming that patients who do not recognize or report symptoms benefit to the same degree as patients in the randomized, controlled trials, and that benefits of therapy are similar across all age groups, the number needed to screen ranges from 400 (in patients age 70 to 74 years) to 2500 (in patients age 40 to 49 years). Limiting screening spirometry to smokers older than 40 years of age, as advocated by some groups, produces a number needed to screen of 833 to defer the first exacerbation.

Weighing this benefit against potential harms, there is at least moderate certainty that screening for COPD using spirometry has no net benefit.

How Does the Evidence Fit with Biological Understanding?

Aside from smoking cessation, COPD therapies produce modest benefits. To date, trials of COPD therapies have enrolled few patients with screening-detected COPD; thus, whether these modest benefits of treatment would be realized by patients with severe COPD detected with screening spirometry is not possible to determine. Since 4 out of 5 cases of COPD result from tobacco use, an early intervention strategy of providing evidence-based therapies proven to increase smoking cessation rates and smoking abstinence is likely to be more effective than an early detection strategy of performing spirometry on patients who do not recognize or report respiratory symptoms.

Recommendations of Others

The American College of Physicians recommended in 2007 that "spirometry should not be used to screen for airflow obstruction in asymptomatic individuals," including those with COPD risk factors.[11]

The Global Initiative for Chronic Obstructive Lung Disease updated its consensus guideline in 2007. Although the guideline did not address population-based screening using spirometry, it recommended that clinicians consider a diagnosis of COPD "in any patient who has dyspnea, chronic cough or sputum production, and/or a history of exposure to risk factors for the disease" and that the "diagnosis should be confirmed by spirometry".[12]

In 2004, the American Thoracic Society and the European Respiratory Society recommended performing spirometry on all persons with tobacco exposure, a family history of chronic respiratory illness, or respiratory symptoms.[13]

Members of the U.S. Prevenetive Services Task Force

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