Arch Bronconeumol. 2013;49(11):480–490

ARCHIVOS DE BRONCONEUMOLOGIA

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Recommendations of SEPAR

Recommendations for Fitness for Work Medical Evaluations in Chronic Respiratory Patients☆

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ARTICLE INFO

Article history:
Received 11 March 2013
Accepted 18 June 2013
Available online 20 October 2013

Keywords:
Chronic respiratory disease
Fitness for work evaluation
Incapacity for work
Pulmonary function tests

ABSTRACT

Chronic respiratory diseases often cause impairment in the functions and/or structure of the respiratory system, and impose limitations on different activities in the lives of persons who suffer them. In younger patients with an active working life, these limitations can cause problems in carrying out their normal work. Article 41 of the Spanish Constitution states that "the public authorities shall maintain a public Social Security system for all citizens guaranteeing adequate social assistance and benefits in situations of hardship". Within this framework is the assessment of fitness for work, as a dual-nature process (medico-legal) that aims to determine whether it is appropriate or not to recognize a person's right to receive benefits which replace the income that they no longer receive as they cannot carry out their work, due to loss of health.

The role of the pulmonologist is essential in evaluating the diagnosis, treatment, prognosis, and functional capacity of respiratory patients. These recommendations seek to bring the complex setting of fitness for work evaluation to pulmonologists and thoracic surgeons, providing action guidelines that allow them to advise their own patients about their incorporation into working life.

Recomendaciones para la evaluación médica de la capacidad laboral en el enfermo respiratorio crónico

Palabras clave:
Enfermedad respiratoria crónica
Evaluación de la incapacidad
Incapacidad laboral
Pruebas de función pulmonar

RESUMEN

Las enfermedades respiratorias crónicas con frecuencia provocan alteraciones en las funciones y/o en la estructura del aparato respiratorio que condicionan limitaciones en diferentes actividades de la vida de las personas que las padecen. En los pacientes más jóvenes y con una vida laboral activa estas limitaciones pueden suponer dificultades para el desempeño de su trabajo habitual. El artículo 41 de la Constitución Española establece que «los poderes públicos mantendrán un régimen público de Seguridad Social para todos los ciudadanos que garantice la asistencia y prestaciones sociales suficientes en casos de necesidad». En este marco se encuadra la evaluación de la incapacidad laboral como un proceso de naturaleza mixta (médico-legal) que tiene por objeto determinar si procede o no el reconocimiento del derecho a una prestación que sustituya las rentas que deja de percibir una persona al no poder desempeñar su trabajo, como consecuencia de una pérdida de la salud.

☆ Please cite this article as: Martínez González C, González Barcala FJ, Belda Ramírez J, González Ros I, Alfageme Michavila I, Orejas Martínez C, et al. Recomendaciones para la evaluación médica de la capacidad laboral en el enfermo respiratorio crónico. Arch Bronconeumol. 2013;49:480–490.

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1579-2129/$ – see front matter

El papel de neumólogo es imprescindible en la evaluación del diagnóstico, tratamiento, pronóstico y capacidad funcional de los enfermos respiratorios. Estas recomendaciones tratan de acercar el complejo ámbito de la valoración de la capacidad laboral a los neumólogos y cirujanos torácicos, ofreciendo unas pautas de actuación que les permitan asesorar a sus propios pacientes acerca de su incorporación a la vida laboral.

Introduction

Chronic respiratory diseases, in particular chronic obstructive pulmonary disease (COPD) and asthma, lead to the loss of a significant number of working days.[1,2] Moreover, working environments themselves can often produce exacerbations of these types of disease. Every year, Spain spends more than 11 billion Euros on contributory pensions, accounting for 11% of all state pensions. Although incapacity for work claims the third biggest share in the pensions system (retirement accounts for 67% and widows pensions for 19%), this figure continues to rise.[3] The overall social and economic impact of respiratory diseases on incapacity for work in Spain has not been clearly determined, and it is up to pulmonologists to not only diagnose and evaluate these diseases in a clinical context, but also to be aware of the repercussions they may have on the working life of their individual patients and of society as a whole.

These recommendations are proposed with the following aims:

- To bring the complex setting of fitness for work evaluation to pulmonologists and thoracic surgeons.
- To provide uniform action guidelines, in accordance with international recommendations and the available scientific knowledge, which allow them to advise their own patients about their incorporation into working life.
- To provide tools that allow respiratory disease specialists to become the close liaison with the fitness for work evaluation units, resulting in a benefit for chronic respiratory patients.
- To stimulate lines of research that might improve the available evidence and strengthen the force of these recommendations.

Concepts

Various terms from the World Health Organization International Classification of Functioning, Disability and Health[4] are used in the process of evaluating the fitness for work of a patient, which should be clearly defined and distinguished from those evaluating other aspects of the patient's daily life.

Impairment

It is described as any loss or abnormality of psychological, physiological or anatomical structure or function. It is equivalent to disease and as such is treated as a strictly medical concept. This loss of function or a disease does not necessarily mean incapacity, as other factors, such as the effort demanded by the type of work, come into consideration. Thus, for example, mild emphysema does not affect the fitness for work of an office worker. Evaluation of the dysfunction caused by the respiratory disease is the main objective of these recommendations.

Activity Limitation or Incapacity

This is the effect of the impairment on the patient's life. Incapacity for work would transfer the repercussion of the disease onto work performance. This concept takes into account that the same degree of functional involvement may have different consequences for different individuals, depending on other variables such as sex, age or type of work. For example, someone with moderate COPD may be able to carry out office work but if the patient is a fireman, it may lead to incapacity for work. To establish this concept, it is essential to have knowledge of the disease and to analyze the job in question. The legal or administrative aspects are also taken into account and accompanied by a financial payment. These are the two concepts involved in the evaluation of fitness for work.

Participation Restriction or Disability

This is a generic term which includes deficits, limitations in activity and restrictions in social life. It is not used in the evaluation of fitness for work of the individual. It indicates the disadvantage or handicap that may be involved for the person suffering the disease. In the Spanish state, the evaluation of the disability, expressed in a percentage, is carried out by applying scales established in a Royal Decree (Law).[5] The possible benefits for patients with a recognized degree of disability include the following[6]: measures for promoting employment, adaptation of the job, adaptation of selection tests for accessing public employment, grants for rehabilitation treatments, accessibility and adaptation of the home, etc. These benefits are sufficiently significant for it to be important for an individual with disability to seek an appropriate evaluation.

Disability and incapacity for work are different concepts, and do not always coincide. For example, the amputation of a little finger might cause a mild disability but for a pianist, it could mean incapacity for work; in contrast, persons with severe disabilities, such as paraplegia, loss of sight, etc., may be able to do certain types of work.

Current Legislation

Article 41 of the Spanish Constitution sets down that the public authorities shall maintain a public Social Security system for all citizens guaranteeing adequate social assistance and benefits in situations of hardship. These cases include incapacity for work, and the evaluation of fitness for work is understood as a dual-nature process (medico-legal) that aims to determine whether it is appropriate or not to recognize a person's right to receive benefits which replace the income that they no longer receive as they cannot carry out their work, due to loss of health.

The adapted text of the General Social Security Act[7] contains all the provisions regarding the Social Security system of the current legal system in Spain. Among the benefits are temporary incapacity (TI) and permanent incapacity (PI). Four types of contingency are distinguished, depending on the cause of the disease: *work-related accident*: any bodily lesion suffered by a worker during or as a result of his/her job; *occupational disease:* caused by elements or substances particular to the job; *non-work-related accident:* any sudden lesion suffered by the worker outside the work setting and *common disease:* all changes in health not included under the three previous sections.

TI is managed by the Public Health Services, the INSS (National Social Security Institute), the ISM (Marine Social Institute) and the MATEPSS (Social Security work-related accidents and

occupational diseases insurance section) and has undergone various legislative modifications in recent years.[7] The status of TI is determined by duration, which will be a maximum of 365 days, and can be extended for a further 180 days if it is thought that within this additional time the patient might achieve cure or improvement which would allow them to return to work. If the patient is treated by a pulmonologist, it falls to this professional to determine the suitability of the TI and to state his/her agreement or disagreement if a return to work is proposed by the INSS or the ISM. Upon expiry of the initial 365-day period, the INSS or/and the ISM are the bodies responsible for deciding on the subsequent status, which may be medical discharge due to cure or improvement, extension of the period or proposed PI.

The INSS, by way of their Fitness for Work Evaluation Teams (EVIs), is the organization responsible for declaring the status of PI for the purposes of recognition of financial benefits.[8] The specific psychiatric and physical aptitude requirements for the different professions are governed by various legal rulings.[9,10]

When the status of PI has been established, the worker will receive periodic financial benefits for life, the amount of which will vary in function of the severity and cause of the disease in question.[7] These recommendations are focused on the evaluation of PI caused by common disease.

Classification of Permanent Incapacity[7]

Partial Permanent Incapacity

Causes a reduction of ≥33% in normal capacity for performing the worker's usual profession, but he/she may be able to carry out the basic tasks of the job.

Total Permanent Incapacity

The worker is incapable of carrying out all the basic tasks of his/her profession, but could do another job with fewer physical requirements, or, depending on the case, one in which he/she is not exposed to a certain substance or product.

Absolute Permanent Incapacity

Recognizes that it is impossible for the patient to carry out any type of job. The benefit will be equivalent to 100% of the patient's calculated basic wage.

Serious Invalidity

This is the situation of a worker affected by PI who requires the assistance of other people for the most basic life functions. The benefits will include payment for that person. The right to payment for PI derived by common disease will not be recognized for anyone aged 65 years or older.

Components of Assessment of Fitness for Work

Two very different successive actions are involved: *assessment of the impairment* which must be done by the specialist physician and is the main focus of these recommendations. It includes diagnosis of the disease, evaluation of severity and impact on capacity for work. It is important to take into consideration the effect of the job on the progress of the disease, both as a causative factor or as a risk factor for poor progress or worsening. The prognosis and the added difficulty of following certain treatments are another factors that must be included in this evaluation (Table 1). The second stage, the *proposed ruling on fitness for work* is the responsibility of the EVI of the Social Security.[9] The evaluation is made using an empirical method; in Spain there are no scales with legal value. This underlines the importance of the pulmonologist in the evaluation of the disease.

Table 1
Medical Intervention in the Assessment of Fitness for Work.

1. Diagnose the disease
2. Optimize treatment and rehabilitation
3. Rule out causal relationship or relationship triggered by occupational exposure
4. Evaluate severity of the functional involvement and exercise limitation
5. Take other factors into consideration: treatment, exacerbations, prognosis
6. Investigate energy requirements of job
7. Make medical recommendation

Diagnosis of Disease

Chronic diseases which involve a sustained loss of function, in spite of the patient having received the appropriate treatment, can lead to PI (Table 2). The disease must be certified using objective tests and this process must include the performance of at least a clinical history, work history, physical examination, chest X-ray and lung function tests.

Clinical history: In addition to the data necessary for carrying out the disease diagnosis, smoking history, frequency of exacerbations and possible hospitalizations during the course of the disease, chronic treatment and the existence of other associated diseases must be determined. It must be taken into account that dyspnea and a sensation of difficulty exercising are subjective concepts that cannot be used in an isolated manner as parameters for evaluating functional capacity.[11] *Work history* must be comprehensive, detailing the characteristics of the job, energy requirements involved and the climatic conditions in which it is performed, exposure to irritants and timetables with possible shiftwork. The determination of these data is indispensable in evaluating the effect of the job on the disease and for issuing appropriate advice. A *physical examination*, paying particular attention to the respiratory tract and the heart, provides valuable data on respiratory rate, cyanosis,

Table 2
Chronic Respiratory Disorders Causing Incapacity.

1. Obstructive ventilatory defects
COPD
Asthma
Bronchiectasis
Upper airway obstruction
2. Restrictive ventilatory defects
Diffuse Interstitial Pulmonary Disease
Rib cage disease
Pleural disease
3. Hypoventilation syndromes
Sleep Apnea Syndrome
Neuromuscular diseases
4. Changes in pulmonary circulation
Pulmonary hypertension
Chronic thromboembolic disease
5. Cancers
6. Occupational diseases
Hypersensitivity pneumonitis
Pneumoconiosis
Occupational asthma
Reactive airway dysfunction syndrome
Cancer

nail clubbing, edemas, etc. *Chest X-ray* is more useful for diagnosing the disease than for establishing the degree of functional involvement. Even in interstitial diseases, there is a weak correlation between the image and functional changes.[12] Computed tomography (CT) of the chest has a fundamental role in the study of diffuse interstitial lung diseases, in emphysema [forced expiratory volume in one second (FEV_1) and diffusing capacity are well correlated with the extent of emphysema],[13] and in bronchiectasis.

Lung Function Tests

The degree of functional involvement must be evaluated when, once all the possible treatment resources have been applied, the patient has reached a stable phase of more than 6 months' duration. The degree of pulmonary dysfunction is always expressed in comparison with reference values obtained in a healthy population. It is important to remember that pulmonary dysfunction does not necessarily imply incapacity for work, but is one of the factors (very important but not the only one) involved in the complex concept of incapacity for work. The classic techniques are spirometry, lung volume testing and carbon monoxide diffusing capacity (DL_{CO}). However, in selected cases, it is not unusual to use arterial blood gases and exercise stress testing for a more specific definition. Moreover, other specific studies such as bronchial challenge tests or sleep studies may be necessary for individuals with certain jobs.

Spirometry, Volumes, Diffusing Capacity

Spirometry is the test with the most practical significance for the study of lung function. The most useful variables are forced vital capacity (FVC), FEV_1 and the relation between them. They have been selected because the degree of involvement is easy to interpret and they are highly reproducible. Other less standardized spirometry tests with greater variability, such as mid and end-expiratory flows, are not recommended.[14] The collaboration of the subject is so important that for results to be correctly interpreted, the acceptability and reproducibility criteria of the curves, analysis of results, reference values and other technical aspects must be closely followed. The test must be carried out according to the standards of the SEPAR (Spanish Society of Pulmonology and Thoracic Surgery) guidelines.[15] Spirometry allows the appropriate diagnosis and direct quantification of most obstructive disorders. However, the diagnosis of restrictive disorders is based on a reduction in total lung capacity (TLC), which requires specific techniques (plethysmography, helium dilution or nitrogen washout). Using a reduction in FVC for the diagnosis is inappropriate because it is not pathognomonic of restrictive changes and FVC can be reduced due to many conditions, including the airway obstruction itself. DL_{CO} provides information on the anatomical and functional integrity of gas exchange via the alveolar-capillary membrane. The single breath test is the technique of choice, and should be carried out in strict compliance with the technical guidelines, after a minimum period of 6–8 h without smoking, before the use of a bronchodilator, after a period of rest and taking into account all the factors involved (hemoglobin, etc.). Its reproducibility is lower, with an inter-operator variability of 5%–10%, and even greater variability has been observed among different lung function laboratories.[16] The study by Cotes et al.[17] has been the reference for establishing fitness for work scales, depending on the values of the spirometry and diffusing capacity data.

Arterial Blood Gases

Chronic respiratory failure may be due to extrathoracic causes (changes in respiratory control, drugs, metabolic changes), neuromuscular disease or changes in the chest wall, or may be caused by lung diseases (bronchial, interstitial or vascular). Regardless of its etiology, it is associated with symptoms, long-term effects and treatment which can frequently lead to incapacity for maintaining a working life. In all diseases in which it is suspected, it must be confirmed with a determination of arterial blood gases. As it is very variable, it should be documented on 2 occasions, one month apart. The correlation of arterial blood gases with functional changes and limitations in exercise capacity is variable and has not been proven.[18] Arterial blood gases within normal values are not a symptom of a lack of severity, and the presence of hypoxemia at rest does not always imply limitations for work.

Exercise Stress Testing

Resting functional tests provide partial information about the pulmonary response to exercise. Multiple factors are involved in the capacity for exercise in respiratory patients.[19] This explains the disparity between ventilatory function and exercise stress capacity observed in various patient groups.[20] Cases with severe involvement are generally unambiguous, but in patients with mild or moderate dysfunction who report exercise limitation, the ideal situation would be to determine the energy requirements of the job and carry out a maximum stress test in the laboratory. It should be remembered that most jobs have an energy output which varies over the course of the working day, and that over an 8-h day, an individual can sustain a level of activity which does not require more than 40%–50% of the maximum oxygen consumption (VO_2max). Not all lung function laboratories are equipped to carry out stress testing, so some authors, in accordance with the results of several studies, propose estimating VO_2max from the 6-min walk test, a sub-maximum stress test that correlates well with the capacity for performing activities of daily living and exercise tolerance and can be of prognostic use in some diseases.[21,22] The causes of exercise limitation can be identified using stress tests.[23]

Sleep Studies

Although nocturnal polysomnography is the recommended method for establishing a definitive diagnosis of sleep apnea–hypopnea syndrome (SAHS), respiratory polygraphy is an acceptable alternative for making this diagnosis in patients with low or high clinical probability, although its most significant limitation is the lack of equipment validation. The equipment used must be validated for the specific task that is to be carried out in each sleep unit. The polysomnography study is indicated in borderline cases.[24]

Other Non-functional Factors

An increasing amount of data are becoming available to support the hypothesis of systemic involvement in some chronic lung diseases. This involvement is not reflected in the classic parameters of the thoracic imaging and lung function tests, although it may affect quality of life and survival. The BODE index also collects body mass index as a determinant of survival in COPD patients.[25] Various studies associate repeated exacerbations as a risk factor for poor disease prognosis[26]; this has been introduced in the most recent classifications.[27] We must not forget that smoking, the degree of regular physical activity, drugs, personality and associated diseases will also influence exercise limitation in these patients.

Recommendations:

Clinical history, work history, physical examination, chest X-ray, spirometry and diffusing capacity are all basic first-line tools for the diagnosis and functional study of respiratory diseases.

The determination of lung volumes is a test that is necessary in the study of interstitial diseases, emphysema, chest wall changes, neuromuscular diseases and whenever a restrictive ventilatory defect is suspected.

Arterial blood gas testing allows the diagnosis of respiratory failure and must be reserved for selected patients, if there is a severe ventilatory defect, changes in diffusing capacity, reduction in oxyhemoglobin saturation or suspected hypoventilation.

The exercise stress test allows the functional reserve to be determined. Its use is recommended in mild or moderate cases, symptomatic cases with high energy demands, patients who complain of dyspnea that cannot be explained by resting pulmonary function tests and in the evaluation of interstitial diseases.

We should take into account a series of limitations not directly associated with the reduction of lung function.

SAHS can be diagnosed from a respiratory polygraphy in cases where there is high clinical suspicion or for ruling it out in cases of low suspicion.

Evaluation of Severity and Impact of Disease on Working Life

Currently, the trend is toward implementing a shift from passive compensation for sickness to the active integration of workers with disease. The Organization for Economic Co-Operation and Development (OECD) recommends an emphasis on rehabilitation and re-employment in other jobs suitable for the individual's dysfunction.[28] This attitude would provide not only financial benefits, but it also confers advantages for the patient, as has been shown in some studies.[29] The reality, however, is far from the desired situation, and in general the declaration of incapacity is chosen as a protective measure.

Various scientific societies have published schemes for classifying the degree of functional involvement. The correlation between functional involvement and capacity for work has been established indirectly, taking studies which support the severity classifications and natural course of the different diseases as reference. No methodologically designed studies are available for reaching a level of evidence that would consistently support this classification. In 1982, the American Thoracic Society (ATS) proposed a scheme for characterizing impairment based on spirometry and carbon monoxide diffusing capacity.[30] Impairment was considered severe when FVC was less than 50% of the predicted value and FEV_1 and/or its ratio was less than 40%. Similarly, a carbon monoxide diffusing capacity of less than 40% was indicative of severe respiratory functional disorder. In non-severe cases (i.e., subjects with mild to moderate respiratory disease), the exercise stress test was recommended, for which VO_2max values lower than 15 ml/min/kg were considered severe impairment. In 1984, 1988, and 1993, the American Medical Association (AMA)[31] and in 1986 the ATS[32] introduced the concept of intermediate degrees of impairment caused by respiratory diseases. The classifications are similar and the same functional tests are used as in the severe cases. The AMA and the European Society for Clinical Respiratory Physiology[33] recommend using the 5th percentile (predicted value less than 1.64 × the residual standard deviation); tables for performing the calculations are provided. In general and in practice, the lower limit of the 95% confidence interval for determining absence of lung disease is considered to include FEV_1 or FVC values equal to or greater than 80% of the reference or predicted value (despite the limit of 80% being very well accepted, it must be taken into account that in adults the range of values is not proportional to their level and expressing the result in percentage of the predicted value may result in the false identification of functional disorders in elderly subjects).

Table 3
General Guidelines for the Evaluation of Fitness for Work.

Very limited fitness for work
Functional deficit: severe or very severe (Tables 5 and 6)
Therapeutic requirements
Oxygen therapy, non-invasive ventilation
Persistent severe asthma
Severe exacerbations, continuous need for care
Active anticancer treatment
Reduced survival prognosis
Cancer, PH, complicated pneumoconiosis
Limited fitness for work for moderate physical requirements
Functional deficit: moderate (Tables 5 and 6)
Therapeutic needs
Persistent moderate asthma,
Severe exacerbations, frequent need for care.
Limited fitness for work for intense physical requirements
Functional deficit: mild (Tables 5 and 6)
Persistent mild asthma
Limited fitness for work for occupational exposure to the causative agent, even with normal lung function
Simple silicosis, occupational asthma, extrinsic allergic alveolitis, berylliosis

As a pointer, some functional involvement levels and other factors involved in the evaluation of fitness for work, depending on the physical requirements and environmental peculiarities of the job, are established. (Table 3)

Specific Applications

Asthma

Asthma is a chronic inflammatory disease, which presents with bronchial hyperresponsiveness and variable air flow obstruction which is totally or partially reversible, either spontaneously or with treatment.[34] Over 25% of asthmatics have some period of incapacity for work throughout the year.[35] The initial objective should be to confirm the diagnosis of asthma. In the additional examinations it will be necessary to show obstruction and/or bronchial hyperresponsiveness (BHR) with spirometry and bronchodynamic testing. Exhaled nitric oxide (FeNO) must be used with caution as a diagnostic tool.[36] Asthma is a disease which varies over time, making it difficult to evaluate PI. The evaluation must be performed when the disease is stable and after treatment has been completed, on occasions after an exhaustive assessment using the same study methodology as for difficult-to-control asthma; an exercise stress test may even be necessary to allow the identification of cases of stress asthma, and to identify simulators or other concurrent aspects which may modify the course of the disease and its functional repercussions.[37] The following must be taken into account for the evaluation of PI in asthma: (1) FEV_1 value, compared to the theoretical value; (2) degree of reversibility in bronchodilator tests or (3) degree of BHR according to the bronchial challenge tests; (4) need for treatment; (5) degree of disease control.[38,39] For the evaluation of asthma control, questionnaires such as the Asthma Control Test (ACT) have been developed that have been validated by placing

Table 4
Evaluation of the Asthma Patient.

FEV_1 (% predicted)	>80	70–79	60–69	50–59	<50
FEV_1 Reversibility (%) or	<10	10–19	20–29	>30	
PC_{20} (mg/ml)	>8	8–0.5	0.5–0.1	<0.1	
Need for treatment to achieve control	No	Step 1	Step 2	Step 3 or Step 4	Step 5 or Step 6
Questionnaires ACT score	>22	>20	16–19	<15	
GINA classification	Intermittent	Persistent mild	Persistent moderate	Persistent severe	Persistent severe

Adapted from: Global Strategy for Diagnosis, Management and Prevention, Global Initiative for Asthma,[34] Guidelines for the evaluation of Impairment/Disability in patients with asthma. American Thoracic Society.[38]
Grade of impairment: Mild: intermittent and persistent mild asthma; Moderate: persistent moderate asthma; Severe: persistent severe asthma

cutoff points between different degrees of control.[40] An association has also been found between the clinical control of asthma and the presence of eosinophils in sputum.[41] The job performed by each specific patient will impact decisively on this evaluation. The joint use of the severity classification and control proposed by the ATS[39] and by GINA[35,42] is useful for establishing the degree of dysfunction (Table 4).

The first obligatory step recommended in the evaluation of asthmatic patients is to check treatment compliance and to exclude aggravating factors. The ATS classification along with the GINA severity and control assessment are appropriate tools for the evaluation of fitness for work and may be complemented by the determination of airway inflammation biomarkers.

Chronic Obstructive Pulmonary Disease

COPD is characterized by chronic, partially reversible obstruction of the airway, associated with an abnormal inflammatory response, essentially to tobacco smoke, and to other environmental factors to a lesser extent. In this disease, destruction of the alveolar spaces occurs concomitantly with loss of the elastic support of the lung and inflammatory narrowing with airway remodeling.[43,44] These changes lead to an increase in pulmonary resistances with decreased respiratory flow, presence of hyperinflation and abnormal gas exchange. COPD is one of the most common causes of disability.[31] The diagnosis of this heterogeneous disease is based on the presence of risk factors, clinical symptoms (cough, expectoration, dyspnea) and a FEV_1/FVC ratio lower than 0.7 in the post-bronchodilator spirometry, as a criterion for airway obstruction.[28] The diagnosis must be confirmed and the evaluation made after using all the recommended treatments, including respiratory rehabilitation. COPD assessment will include the determination of lung volumes and diffusing capacity, examinations which are particularly useful in emphysema, a common phenotype of this disease.[45] Different factors are involved in the prognosis of patients with COPD, and a multidimensional evaluation is recommended, including all the other BODE index parameters[26] (dyspnea, body mass index and exercise capacity with a 6-min walk test) and the frequency of episodes of exacerbation, according to the latest GOLD classification.[28]

Arterial blood gas determinations are indicated if FEV_1 is less than 40%, oxyhemoglobin saturation is less than 95% or if cor pulmonale is suspected. Respiratory failure would be a PI criterion for any activity.[46] VO_2max must be determined in individuals with mild or moderate deterioration (GOLD stages 2 or 3), evaluating the results and physical burden of the job for determining fitness for work.[47] The use of various questionnaires allows the presence of anxiety and depression,[47] common in patients with COPD, and the impact of the disease on activities of daily living to be determined. Osteoporosis and musculoskeletal dysfunction are conditions that frequently appear alongside COPD and can impact on the quality of life and reduce fitness for work.[48] A working environment with dust, smoke or irritants must be taken into account for suggesting a disability claim[49] (Table 5)

A multidimensional assessment, including the BODE index, frequency of exacerbations and health-related quality of life questionnaires is recommended. Systemic involvement, prognosis and need for treatment are factors to be taken into account.

The GOLD classification of severity, along with the BODE index, may be used as reference.

Bronchiectasis

Bronchiectasis is characterized by abnormal thickening of the bronchial wall with dilation of the bronchi, due to a vicious circle of transmural infection and inflammation with release of mediators. Diagnosis is made by high resolution computed tomography and the clinical symptoms can be variable. It usually presents with repeated respiratory infections, and between infectious episodes, the patients may be asymptomatic or have chronic expectoration. There may be bloody expectoration or relapsing hemoptysis, clinical signs and symptoms of bronchial hyperreactiveness, dyspnea (depending on the degree of lung function involvement), pleuritic chest pain due to involvement of the visceral pleura, asthenia and weight loss.[50] The presence and etiology of bacterial colonization impacts prognosis and severity.[51] Changes in lung function will limit fitness for work to the same degree as other chronic diseases, but the limitations that might interfere in the subject's daily activity, e.g. colonization, infectious and non-infectious complications, such as relapsing hemoptysis, the need for continuous, long-term treatment, such as physiotherapy or inhaled antibiotics and the subject's nutritional status, must also be taken into account. Accordingly, even if a significant deterioration in lung function coexists in patients with extensive locations, this is not always the limiting factor for the patient's daily life. Colonization and bronchopulmonary infections must be medically documented, and the clinical situation has to be maintained for one year for the evaluation to be carried out.

If bronchiectasis is caused by cystic fibrosis of the pancreas, in addition to lung dysfunction, the involvement of other systems and organs (gastrointestinal, endocrine, metabolic, bone) will be considered for the fitness for work assessment.

Table 5
Evaluation of the Patient With COPD.

Diagnosis	Evaluation	Severity	Associated factors
		Mild	
Clinical history[a]	6-min walk[b]	FEV_1>80%	
Physical examination[a]	Volumes[b]	DL_{CO}>80%	Age[d]
Body Mass Index[b]	Diffusion[b]	BODE 0–1	Sex[d]
Post bronchodilator spirometry[a]	High resolution CT[c]		Exacerbations[b]
Chest X-ray[a]	Arterial blood gases[b]	*Moderate*	Treatment[b]
Pulse oximetry[b]	Stress test[c]	FEV_1 80%–50%	Comorbidities[c]
	ECG[c]	DL_{CO} 80%–50%	Physical burden[b]
	Blood panel[c]	BODE 0–2	Work-related
	Act. daily living[c]	VO_2max 15–20 ml/min/kg	Irritants[b]
		FRC>120%	
		Severe	
		FEV_1 50%–30%	
		DL_{CO} 50%–20%	
		BODE 2–5	
		VO_2max<15 ml/min/kg	
		Very severe	
		FEV_1<30%	
		DL_{CO}<20%	
		BODE>5	
		Pa O_2<60 mmHg	
		Pa CO_2>45 mmHg	

Adapted from: Global Strategy for Diagnosis, Management and Prevention of COPD[27] Evaluation of impairment/disability secondary to respiratory disease. ATS.[30]
[a] Essential for diagnosis.
[b] Necessary for evaluation.
[c] Useful for evaluation.
[d] Helps in evaluation.

The patient who, as a complication of bronchiectasis, has a moderate degree of dysfunction and bronchopulmonary infections occurring every 2 months or more, or a mean of 6 episodes a year, could be a candidate for incapacity for work. If repeated episodes of pneumonia occur, the same criteria as those defined for bronchiectasis will be applied.

Therapeutic needs, frequency of hospitalizations due to exacerbations, complications and the severity of these are determining factors in the degree of incapacity for work.

Lung Cancer

For the assessment of fitness for work in the cancer patient, other parameters associated with the state of health, remission and survival prognosis, in addition to lung function, must be taken into account. The Karnofsky score has been shown to be a useful tool for the global determination of the functional status of cancer patients, for predicting their progress and survival and as an indicator of quality of life with lung cancer.[52,53] Patients with a Karnofsky score of less than 80, those with an anatomical extension higher than stage II on the TNM classification[54] at the time of diagnosis or who have required a pneumonectomy, and patients requiring maintenance chemotherapy are generally and empirically considered unable to work, regardless of their lung function, for jobs involving moderate effort.

The use of tumor staging, persistence and prognosis after treatment together with the Karnofsky scale and lung function in the evaluation of fitness for work are recommended. The limitation of lung function as a result of surgical treatment or radiation therapy will lead to incapacity to a similar degree as that caused by any other chronic respiratory disease. Immunosuppressive treatments will affect TI and may be a reason for PI when maintained on a long-term basis or if they produce sequelae.

Sleep Apnea–Hypopnea Syndrome

Some jobs require a high degree of alertness and have a high risk of accidents, and SAHS may increase the risk. To determine the capacity of the subject for carrying out this work, the symptoms, particularly excessive daytime sleepiness, will be evaluated and therapeutic compliance with CPAP treatment, which should be analyzed with a timer, will be determined. In principle, a patient who is following the treatment correctly and does not have any residual symptoms should be considered able to work.[55] In the special case of drivers, the regulations for obtaining or extending a driving license, with a maximum term of validity of 1 or 2 years, state that "persons suffering obstructive sleep apnea syndrome or related disorders, require a report from a Sleep Unit declaring that they are undergoing treatment and monitoring of daytime symptoms".[56]

Persistent excessive sleepiness is the determining factor for fitness for work.

Comorbidities, treatment adherence and job requirements are decisive factors in these patients.

Periodic check-ups in specialized units are essential for evaluating the response to treatment and for maintaining or modifying the recommendation regarding fitness for work.

Pulmonary Hypertension

Pulmonary hypertension (PH) is a common complication of chronic respiratory disease, in particular COPD and diffuse interstitial lung diseases (DILD). PH in COPD is usually mild or moderate in intensity, although it frequently increases during sleep, effort and exacerbations. These repeated elevations in pulmonary pressure can lead to the development of right heart failure.[57] Therefore, the presence of PH would suggest the need to evaluate the cardiopulmonary functional reserve by carrying out an exercise stress test.

Table 6
Evaluation in Interstitial Diseases.

Diagnosis	Evaluation	Severity	Associated factors
		Mild	
Clinical history[a]	6-min walk[b]	TLC>70%	
Physical examination[a]	Arterial blood gases[b]	DL_{CO}>70%	Age[d]
Body mass index[b]	ECG[b]	VO_2max>20 ml/min/kg	Sex[d]
Spirometry[a]	ECHO[b]		Treatment[c]
Volumes[a]	Complete Blood Count[b]	*Moderate*	comorbidities[d]
Diffusion[a]	Act. daily living[b]	TLC 70%–50%	Physical burden[b]
Chest X-ray[a]		DL_{CO} 70%–50%	Occupational
High resolution CT[a]		VO_2max 15–20 ml/min/kg	Exposure[b]
Pulse oximetry[b]		Desaturation in 6 min<88%	Prognosis[b]
		Severe	
		TLC 50%–30%	
		DL_{CO} 50%–30%	
		PaO_2<65 mmHg	
		VO_2max<15 ml/min/kg	
		Desaturation in 6 min>88%	
		Very severe	
		TLC<30%	
		DL_{CO}<30%	
		PaO_2<60 mmHg	

Adapted from: Global Strategy for Diagnosis, Management and Prevention of COPD[27] Evaluation of impairment/disability secondary to respiratory disease. ATS.[30]
[a] Essential for diagnosis.
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In DILD, PH is a factor for poor prognosis. In the case of primary pulmonary hypertension (PPH), fitness for work is determined by the symptoms and prognosis. Exercise intolerance is the main symptom in PH; exercise tolerance is independent of ventilatory function and is determined by the inability of the right ventricle to increase cardiac output in response to the metabolic demand.[58]

Only patients with NYHA/WHO classification functional status I can maintain their work activity.[59] The echocardiogram and the 6-min walk test are essential for evaluating PH.

Diffuse Interstitial Lung Disease

A very diverse group of diseases, both in terms of etiology and therapeutic possibilities and prognosis, is classified under the title of DILD. To reach the desired definitive diagnosis, clinical, radiological and histological data need to be brought together.[60] In most DILD, exercise limitation is a principal symptom right from the early stages. From a functional point of view, they are characterized by the presence of a restrictive pattern with reduction in TLC and FVC with a normal FEV_1/FVC ratio. There is also altered gas exchange with reduced DL_{CO}; this is the most sensitive parameter in the early stages of the disease and is useful for monitoring progression.[61] In idiopathic interstitial pulmonary fibrosis, it also has a prognostic value: a DL_{CO} less than 40% at the time of diagnosis implies advanced disease and when DL_{CO} values are less than 39% and 35%, life expectancy is 2 years and 1 year, respectively. Changes in FVC have been shown to be the best parameter for establishing disease prognosis. A drop in FVC of 10% in a period of 6 months implies greater mortality. The full assessment includes a standardized stress test, such as the 6-min walk test. A fall in oxygen saturation during or after the test or a distance walked of less than 250 meters at the time of diagnosis are factors with a poor prognosis.[62] The exercise stress test with evaluation of VO_2max does not provide further information for the evaluation and prognosis of the disease. In the follow-up of the disease, the 6-min walk test along with the FVC provides relevant information and has prognostic value.[63] In patients with DILD who undergo lung transplant, the same monitoring that the patient had previously (if any) will continue during the six months post-transplant. After this period, the fitness for work will be reassessed. In this case, in addition to residual respiratory capacity, it must be taken into account that immunosuppressive medication is an increased risk factor in certain lines of work.

The recommended diagnostic procedures and the severity scale are described in Table 6.

The use of X-rays, high resolution CT, spirometry, volumes and diffusing capacity is recommended for the initial diagnosis of these diseases. Exercise stress tests are an essential tool for functional evaluation. The poor prognosis of some of these diseases is a decisive factor in the assessment of fitness for work.

Respiratory Therapies

The therapeutic regimens indicated must be taken into consideration for the evaluation of PI. The need for some types of treatment generally implies a serious clinical situation or involves some limitations derived from the side effects or limitations in the patient's mobility.

Home respiratory therapies [long-term home oxygen therapy (LTOT) and home mechanical ventilation (HMV)] meet both criteria: limitations in mobility and severity.

Respiratory failure and the need for LTOT generally indicate severe clinical deterioration and are usually regarded as a cause for PI. Limitations on mobility outside the home for patients on LTOT programs have been improved by the possibility of obtaining liquid O_2 backpacks and portable concentrators. Depending on

Table 7
Occupational Respiratory Diseases Classification According to Site of Involvement.

Airways
Rhinitis
Eosinophilic bronchitis
Occupational asthma
Reactive airways dysfunction syndrome
Bronchiolitis
COPD
Cancer
Parenchyma
Pneumoconiosis
Hypersensitivity pneumonitis
Interstitial Pulmonary Fibrosis
Toxic pneumonitis, Acute lung edema
Tuberculosis
Lung cancer
Pleura
Pleural plaque
Pleural effusion
Mesothelioma
Tuberculosis

their causative disease, type of job and personal constraints, some patients can continue their active working life while receiving oxygen therapy.

Work-related or Occupational Respiratory Diseases

Inhaling certain substances in the working environment can cause almost all the types of respiratory disease which in these cases would be called occupational disease. (Table 7). Its onset is independent of age and on many occasions, its identification may mean a difficult social and employment situation. In general, once the disease has been diagnosed, work-related exposure must be discontinued, either to avoid progression or as a consequence of the resulting functional limitations. Accordingly, in most cases, it creates an inability to carry out the usual work. The benefits accorded to a case of PI due to occupational disease are greater than those derived from PI due to common disease. It is more complex to evaluate than common disease. As in the latter, a definitive diagnosis and functional assessment are required, but it is also necessary to identify a causal relationship between a specific work-related agent and the development of the disease. Difficulty in establishing this relationship in a robust manner varies between the various diseases and is the key to diagnosis.

Diagnosis can be easy, as in the case of acute diseases caused by accidental inhalation. In other cases where an immunological mechanism is involved, such as occupational asthma or hypersensitivity pneumonitis, the reference test is a bronchial challenge test, but this is not always essential for reaching a definitive diagnosis.[64] Pneumoconiosis or mesothelioma have some distinctive clinical characteristics that together with the history of work-related exposure, allow a high degree of certainty in determining the causal relationship.[65] The major difficulties arise in diseases without specific characteristics of work-related exposure which could have other etiologies, as is the case in lung cancer, interstitial pulmonary fibrosis and COPD. Knowledge of the subject's work history is the first step required for assessment and more complex cases may need to be studied in specialized units.

The General Social Security Act defines occupational disease as "disease contracted as a result of work performed in the activities specified in the table and approved by the applicable provisions and development of this law, and caused by the action of elements or substances that are specified in the table for each occupational disease".[7] Royal Decree 1299/2006 approves the table of occupational diseases in the Social Security system and established criteria for their reporting and registration.[66]

When an occupational disease is suspected, the diagnostic procedures necessary for establishing the causal relationship with the specific occupational agent with the greatest degree of certainty possible are used, and incapacity for work is determined by the functional involvement and the likelihood of disease progression if exposure to the causative agent is maintained.

Information for the Patient and Producing the Medical Report

Preventive and therapeutic recommendations form part of usual medical care. In the chronic patient, the existence of possible aggravating factors in the domestic and work setting must be investigated. It is also necessary to look into all the symptoms which could reduce the patient's capacity to perform activities of daily living, and to comply with treatment. When it is determined that the disease could produce a limitation in work performance, the PI process must be initiated as part of the treatment prescription. The evaluation of fitness for work by the EVIs is based on the experience of the assessor, without the application of specific guidelines or criteria, on the basis of the diagnosis and evaluation of the specialist physician. However, it is important that the patient is aware that the process is limited to a clinical evaluation, and that the declaration of fitness for work is the final responsibility of the INSS, acting on the suggestion of the EVIs. The responsibility of the physician is to produce a truthful report, knowing that falsification of a public document is contemplated in the Penal Code (article 397). On other occasions, the pulmonologist evaluating the patient is not their usual doctor, there is no prior doctor-patient relationship and the professional has not participated in their treatment, or it could even be a question of a report made at the request of one of the parties in a case of litigation. The physician must avoid bias in the assessment and express his/her opinion as a result of an objective examination. With these supporting data, an opinion will be issued on the capacity of the patient to carry out a certain job or else on the likelihood that the disease was caused by the job.

In the patient with chronic respiratory disease, it is recommended that a report is issued containing the detailed work history, diagnosis of the disease determined from objective, reproducible and reviewable criteria, pharmacological treatment and lifestyle recommendations, including how the disease interferes with working life. This will be accompanied by the suggestion for requesting evaluation of permanent incapacity by the EVI of the Social Security, if indicated. The same process will be followed when the report is required by the patient or at the request of official organizations.

Conflict of Interest

The authors declare no conflict of interest.

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