Recommendations for the Management of COPD*

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Three sets of guidelines for the management of COPD that are widely recognized (from the European Respiratory Society [ERS], American Thoracic Society [ATS], and British Thoracic Society [BTS]) are reviewed and compared. None of the documents uses classic evidence-based documentation, and, in many instances, the recommendations are empiric because of a lack of scientific evidence. Overall, there is strong agreement between the documents. All three guidelines recommend inhaled bronchodilators as first-line therapy. Anticholinergics are noted to be well tolerated, although potential problems with β_2-agonists are mentioned. The ERS and BTS suggest that inhaled corticosteroids may be of value in patients documented to be steroid responders, whereas the ATS does not recommend their use at all. All three guidelines support the use of oxygen and pulmonary rehabilitation. There are varying levels of disagreement between the guidelines related to the role of spirometry, stratification of disease severity, and the use of theophylline and systemic corticosteroids. Other differences include the role for nebulizers and metered-dose inhalers, secretion clearance methodologies, and the treatment of acute COPD exacerbations and acute respiratory failure. All three guidelines agree that more research is needed to improve our understanding and management of COPD.

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Abbreviations: ATS = American Thoracic Society; BTS = British Thoracic Society; ERS = European Respiratory Society; F_{IO_2} = inspired oxygen concentration; MDI = pressurized metered-dose inhaler

Over the last several years various national and regional professional organizations have published guidelines for the management of COPD. As might be expected, the documents vary in length, detail, and referencing. Of the various guidelines, three reach a large audience and are commonly quoted. These include the consensus statement of the European Respiratory Society (ERS) published in August 1995,[1] the American Thoracic Society (ATS) standards statement published in November 1995,[2] and the guidelines of the British Thoracic Society (BTS) published in December 1997.[3] The purpose of this article is to review, compare, and contrast the various aspects of these documents.

Development of the three guidelines (ERS, ATS, and BTS) has been discussed in the previous papers. Although recommendations are based on scientific information as much as possible, none of the documents provides classic evidence-based documentation, and, in many instances, the recommendations are empiric because of a lack of scientific information. Overall, there is strong agreement between the three sets of guidelines with many common themes and recommendations, even in the face of inadequate scientific evidence. Such agreement provides a convincing foundation for the care of COPD patients based on sound clinical judgment while awaiting more scientific evidence. All of the guidelines acknowledge and agree on the importance of COPD, the disease burden of COPD on patients and healthcare resources, the progressive nature of COPD, and the importance and need for guidelines. In addition, they all provide consistent information on COPD pathology, pathophysiology, definitions, epidemiology, risk factors, and differential diagnosis. Importantly, all of the guidelines highlight areas requiring further investigation and encourage research in these areas.

Guideline goals are most clearly defined in the BTS statement with an intent for early and accurate diagnosis, best control of symptoms, prevention of deterioration, prevention of complications, and improved quality of life. By comparison, the ERS goals are to inform health professionals, reverse a widespread nihilistic approach to management of COPD

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patients, and improve their quality and length of life. No goals are specifically stated for the ATS document, although goals within the rehabilitation section suggest they are to lessen airflow limitation, prevent and treat secondary medical complications, decrease respiratory symptoms, and improve quality of life. The audiences toward which the guidelines are directed are also somewhat different, with the ERS guidelines more focused on respiratory specialists, whereas the ATS and BTS documents address a broader audience ranging from general practitioners to intensivists. The ATS document is the most comprehensive, with extensive discussion and detail, whereas information in the ERS and BTS documents is presented as more of an overview.

Diagnosis

All three documents attest to the importance of cigarette smoking and its history in the diagnosis of COPD. The ATS document also suggests information on past episodes of acute chest illnesses is important, whereas the BTS document suggests a history of childhood respiratory illnesses is important. All of the documents emphasize the importance of symptoms, especially dyspnea, cough, and sputum, in the diagnosis of COPD. Wheezing is also noted in all three documents with an emphasis that wheezing does not equal asthma. There is also agreement related to physical examination in the diagnosis of COPD with an emphasis on prolonged exhalation, hyperinflation, decreased breath sounds, wheezing, and abnormalities associated with more severe disease. Importantly, only the BTS document highlights the poor sensitivity of the physical examination in the diagnosis of COPD.

There is some disagreement between the recommendations for diagnostic testing (Table 1). All three documents emphasize the need for spirometry with pre- and postbronchodilator testing, yet do not define how information from the bronchodilator response is to be used and indicate that bronchodilator treatment should be independent of the bronchodilator response. Multiple other pulmonary function tests have varying recommendations (Table 1). Arterial blood gases and chest radiographs are generally recommended, and all three guidelines do not recommend routine sputum evaluation. Evaluation for α_1-antiprotease deficiency is not recommended by the BTS, but is recommended for patients with early, severe disease by the ERS and ATS, with the ATS document highlighting the importance of early diagnosis and need for therapy.

Table 1—*Comparison of Recommendations for Diagnostic Laboratory Evaluation in COPD

Laboratory Evaluation	ERS	ATS	BTS
Spirometry	+	+	+
Pre- and postbronchodilator	+	+	+
Treatment independent of response	+	+	+
Pre- and postcorticosteroid	Moderate or severe disease	Inadequate response to Rx	Moderate or severe disease
Airways resistance	—		
Airway hyperresponsiveness	If asthma suspected		—
Lung volumes	Moderate or severe disease	Rarely needed	Assessing surgical patients
Diffusion capacity	+	Disproportionate dyspnea	—
Respiratory muscle function	Disproportionate dyspnea		Assessing difficult patient
Exercise testing	Disproportionate dyspnea		
Oxygen saturation			
Resting	Moderate or severe disease		Severe disease
With activity			
Nocturnal	OSA suspected		—
ABG	Moderate or severe or saturation < 92%	Stage II or III disease†	Severe disease
Chest radiograph	+	+	Moderate or severe disease
Chest CT	Bullae	Bullae	—
Sputum	—	—	—
QoL questionnaire	—		
ECG	Moderate or severe disease		±
Hemoglobin	Moderate or severe disease	If hypoxemic	Severe disease
α_1-Antiprotease concentration	Early severe disease	Early severe disease	—

*OSA = obstructive sleep apnea; ABG = arterial blood gas; QoL = quality of life; Rx = therapy.
†ATS stage II or III disease is defined as $FEV_1 < 50\%$ predicted.

Disease Staging, Monitoring, and Screening

In all three guidelines, disease severity is staged on the basis of spirometry measurements, using the FEV_1. In each case, patients are categorized as mild, moderate, or severe (Table 2). However, there are marked differences with poor overlap and comingling between the different disease stages, resulting in agreement only at the extremes of mild and severe disease.

There are also differences in recommendations for frequency of monitoring of spirometry (Table 3). The ERS recommends spirometry on a yearly basis in patients with mild disease and every 6 months in patients with moderate to severe disease. The ATS suggests "periodic" assessment, and the BTS suggests evaluation "at intervals." A recommendation for assessing rate of decline in FEV_1 is also provided by the ERS and BTS, with both cautioning that 4 to 5 years of monitoring is required to define the rate of decline in FEV_1 for an individual. The ATS does not discuss rate of decline in FEV_1.

All three guidelines discuss problems with delayed recognition of COPD and the importance of screening patients for risk factors, especially cigarette smoking and occupational exposures, with a need for intervention to decrease the risk for disease. Only the BTS advocates the routine use of spirometry to screen for patients with COPD, especially in smokers and those with occupational risk (Table 3). No statement for or against spirometry screening is provided in the ERS or ATS documents.

Management of Stable COPD

There is good agreement between the guidelines on the medical management of stable COPD, with all documents providing general management algorithms. Cigarettes and smoking cessation are emphasized by all three guidelines, with the ATS guidelines providing a smoking-cessation protocol plus more practical information. Influenza immunization is recommended by all, but only the ATS recommends pneumococcal vaccination.

There are some differences in the recommendations for pharmacologic management between the three guidelines. All recommend inhaled bronchodilators as first-line therapy, with the ERS and BTS offering no preference between anticholinergic agents or β_2-agonists for initial therapy. The ATS suggests initial therapy with an anticholinergic drug if regular therapy is needed and initial therapy with a β_2-agonist if therapy as needed is all that is required. All discuss the value of combination therapy with a β_2-agonist and anticholinergic agents, with the simplicity associated with having both agents in a single metered-dose inhaler (MDI) mentioned by the ATS and BTS. The ERS and ATS suggest a possible role for long-acting agents in patients with nighttime or early morning symptoms, whereas the BTS recommends limited use of long-acting agents until more information is available. The ERS and ATS note the positive safety profile of anticholinergic drugs, even at high doses, and all three documents note potential problems with using β_2-agonists. The ATS places more value on the use of theophylline when inhaled bronchodilators are not adequate, with much less support for this by the ERS and BTS.

All three guidelines emphasize the need to document corticosteroid responsiveness before long-term use, do not recommend corticosteroids for patients who are not steroid responders, and encourage use of the lowest dose possible in patients who are steroid responders and need corticosteroids. The ERS and BTS recommend the use of inhaled corticosteroids to replace or reduce oral corticosteroids in patients who are steroid responders and require long-term corticosteroids. The ERS also suggests a role for inhaled corticosteroids in patients with mild disease who are "fast decliners" in FEV_1. The ATS does not recommend the use of inhaled corticosteroids until more information is available.

MDIs are recommended over nebulizers by all three guidelines. Mucokinetic agents are generally not recommended, although the ERS is somewhat noncommittal. Routine antibiotics and respiratory stimulants are not recommended in any of the documents. Appropriate psychoactive drugs are suggested by all, as is the judicious treatment of cor pulmonale. α_1-Antiprotease replacement therapy is recommended for appropriate candidates by the ATS, but not recommended by the ERS or BTS.

Table 2—*Comparison of Recommendations for Staging of Disease Severity in COPD*

Disease Severity	ERS	ATS	BTS
FEV_1, % predicted			
Mild	≥70	≥50	≥60
Moderate	50–69	35–49	40–59
Severe	<50	<35	<40

Oxygen and Pulmonary Rehabilitation

The importance of oxygen therapy in selected patients and the various oxygen systems and delivery methods are discussed in all three guidelines. Differences in assessment of oxygenation are noted,

Table 3—*Comparison of Recommendations for Role of Spirometry in COPD*

Role of Spirometry	ERS	ATS	BTS
Screening			Smokers, occupational risk
Diagnosis			
Peak expiratory flow	−	−	−
Spirometry	+	+	+
Pre- and postbronchodilator	+	+	+
Hospital monitoring			
Peak expiratory flow	+	−	+
FEV_1	−	−	+
Outpatient monitoring			
Every 6 months	Moderate or severe disease		
Yearly	Asymptomatic mild disease		
"Periodic" or "at intervals"		+	+
Progression requires 4–5 years of data	+		+

with the ATS and BTS recommending oximetry at rest and with activity, whereas the ERS only suggests resting oximetry in patients with moderate to severe disease. Nocturnal oximetry is recommended only with evidence of polycythemia and cor pulmonale by the ERS and ATS and not at all by the BTS. Formal nocturnal sleep studies are not recommended unless sleep apnea is suspected.

An overview of pulmonary rehabilitation is provided by all three guidelines with varying indications for rehabilitation ranging from patients with muscle weakness (ERS) to increased health-care utilization, symptoms, and reduced function on optimal medical management (ATS) to moderate to severe disease (BTS). Education, psychosocial support, nutritional assessment, and lower extremity exercise are recommended and inspiratory muscle training is not recommended by all three guidelines. Upper extremity training and breathing retraining are supported by the ATS. Home mechanical ventilation on an elective and nonelective basis are discussed by the ERS and ATS, with modest support for both by the ERS, but with positive support for nonelective and negative support for elective noninvasive ventilation by the ATS. No recommendations are provided by the BTS.

Indications for Specialist Referral

Only the BTS provides recommendations for referral of a COPD patient for specialist care. BTS indications include suspected severe COPD, cor pulmonale, oxygen therapy, nebulizer therapy, assessment of corticosteroids, bullous disease, disease with < 10 pack-years, rapid decline in FEV_1, disease with age < 40 years, uncertain diagnosis, symptoms disproportionate to FEV_1, and frequent infections. The ATS suggests that COPD patients with stage II and III disease ($FEV_1 < 50\%$ predicted) be seen by a specialist, and the ERS does not make any recommendations.

Acute/Emergency Evaluation

As with initial diagnosis, recommendations by the three guidelines for the symptomatic and physical examination evaluation of the COPD patient in acute distress are very similar. Unlike the ERS and BTS, the ATS document does not mention vital signs as part of the evaluation. On the other hand, the ATS emphasizes a need for evaluation of comorbid conditions, which is not mentioned by the ERS or BTS. All three documents recommend the measurement of arterial blood gases, a chest radiograph, and ECG. A WBC count, serum biochemistries, peak flow, and spirometry are recommended by the ERS and BTS, but not the ATS. Theophylline concentration is highlighted by the ATS, but not mentioned by the ERS and BTS. Sputum Gram's stain is recommended by the ERS, with sputum culture recommended in all three guidelines.

Hospitalization, ICU, and Discharge Criteria

All three documents provide recommendations for hospitalization, with the ATS and BTS criteria listed in a table and the ERS recommendations easily identified in their acute management algorithm. The specific recommendations are quite different. ERS criteria are based on objective criteria related to vital signs and laboratory and spirometry values, whereas ATS criteria are based on clinical end points. BTS criteria for hospitalization tend to be a combination of objective and clinical end points.

As with hospitalization criteria, ATS criteria for ICU admission are based on clinical outcomes, but with specific guidelines related to hypoxemia, respiratory acidosis, work of breathing, and need for ventilatory support. Neither the ERS nor BTS provide specific criteria for ICU admission. However, the ERS lists life-threatening criteria based on arterial blood gases and the presence of confusion, coma, or cardiac or respiratory arrest, whereas the BTS discusses respiratory failure, the need for mechanical ventilation and criteria for mechanical ventilation based on hypoxemia and respiratory acidosis. Overall, much more information is provided by the ATS as compared with the ERS and BTS related to ICU issues.

Only the ATS provides criteria for discharge from the hospital. The BTS does describe desirable clinical outcomes during management of COPD that can be construed as discharge criteria. No mention of discharge criteria is provided by the ERS.

Acute Hospital Management

As with chronic management of COPD, there is significant agreement on the management of acute exacerbations of COPD. However, there are more areas of disagreement (Table 4). All three guidelines highlight the need to look for exacerbations, with the ERS listing frequent causes of acute exacerbations. There is again a reticence about the use of theophylline by the ERS and BTS. The ERS emphasizes the use of IV corticosteroids, with lesser degrees of support on the part of the ATS and BTS. Both the ERS and BTS support the use of nebulizers, whereas MDIs with spacers are advocated by the ATS. Chest physiotherapy is not supported by the ATS and BTS, whereas alternative secretion clearance methods are raised by the ATS. ATS and ERS recommendations on oxygen titration focus on prevention of the deleterious effects of hypoxemia, with alternative ventilatory support advocated in patients who develop hypercapnia. The BTS provides much stricter controls on oxygen supplementation, advocating the use of Venturi masks for more precise control of inspired oxygen concentration (FIO_2) and limitation of FIO_2 to 28% until arterial blood gases can be drawn, and suggesting more cautious adjustments in FIO_2 to minimize the development of acute respiratory acidosis. The BTS suggests a role for respiratory stimulants in the treatment of reversible causes of respiratory acidosis, which is not recommended by the

Table 4—*Comparison of Recommendations for Management of Acute Exacerbations of COPD

Acute Management	ERS	ATS	BTS
Look for cause of exacerbation	+	+	+
Antibiotics	Simple, inexpensive	Simple, inexpensive	Simple, inexpensive
Culture	Directed if poor response	Culture directed if severe	Expensive brands rarely needed
Bronchodilators			
β_2-Agonist vs anticholinergic	Either	β_2-agonist	Either
Combined	+	+	+
β_2-Agonist/anticholinergic			
Theophylline	Only after failed steroids	If inhaled Rx inadequate	If inhaled Rx inadequate
Corticosteroids	+	Only if failed other Rx	Steroid responders, already on steroids, or failed inhaled Rx
Use of nebulizer	+	−	+
Diuretics			If JVD and edema present
Mucokinetics	−	−	
Other secretion clearance methods			
Chest physiotherapy	±	−	−
IPPB	−	−	−
PEP, huff cough, etc.		±	
Suctioning		−	
Psychotropics/narcotics	−	Avoid under or over Rx	
Oxygen			
Titration as needed	Monitor ABG	Monitor ABG	−
Use of Venturi mask	−	−	+
Fixed limitation	−	−	28% max until ABG in ER
Limitation based on pH	±	−	Avoid pH < 7.26
Respiratory stimulants	−	−	Doxapram
Noninvasive ventilation	+	+	+
Endotracheal intubation/ventilation	+	+	+

*JVD = jugular venous distension; IPPB = intermittent positive-pressure breathing; PEP = positive expiratory pressure therapy; ER = emergency room. See footnote for Table 1 for other abbreviations.

ERS and ATS (Table 4). All guidelines support the appropriate use of noninvasive and invasive mechanical ventilation.

In the hospital, monitoring of oxygen saturation is suggested by all three guidelines. The ERS and ATS also advocate monitoring of arterial blood gases. Monitoring of airflow limitation using peak flows and spirometry is strongly encouraged by the BTS, and peak flow monitoring is suggested by the ERS (Table 3). The ATS does not recommend in-hospital monitoring of airflow.

Other Areas

All three guidelines discuss surgery in COPD. Only the ATS provides information on preoperative evaluation of COPD patients. The ATS also provides more detailed information on various surgical interventions for COPD. Information about air travel, advance directives, and living wills is provided in all three documents.

Conclusion

Consensus on the diagnosis and management of COPD has been reached, with solid guidelines provided by the ERS, ATS, and BTS. Although there are individual differences, strong agreement between the guidelines supports their value. Specific recommendations that have the greatest divergence include testing during the initial diagnostic evaluation, criteria for severity of disease, spirometry screening, and monitoring of patients, criteria for referral to specialists, and acute management of COPD related to the use of nebulizers, oxygen titration, and the treatment of acute respiratory acidosis. Additional effort should now be invested to build consensus between the various professional organizations. In addition, more scientific information on COPD management is needed, and ongoing research into these areas should be actively encouraged.

References

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