What Is the Best Way To Measure Lung Function?

Pulmonologists routinely use pulmonary function tests (PFTs) to help guide their care of patients with respiratory disease. Spirometry is the most commonly used PFT because it is simple and reproducible. The introduction of computerized spirometers has led to PFT reports containing multiple parameters. Because small airway obstruction is an early feature of many obstructive lung diseases, such as asthma, cystic fibrosis, and bronchiolitis obliterans, it is desirable to identify parameters that reflect flows in this area of the respiratory system. In this regard, both the forced expiratory flow at 50% of vital capacity (FEF$_{50}$) and forced expiratory flow at 25 to 75% of vital capacity (FEF$_{25-75}$) have been considered to more closely reflect small airway flow. How should a clinician decide which of these parameters is most helpful in assessing lung function? In this issue of CHEST (see page 731), Bar-Yishay et al compare FEF$_{50}$ and FEF$_{25-75}$ to provide some answers to this question by reviewing the spiromgrams of 1,350 children followed up at their center. They found that the two measures correlated very well, and that the ratio of FEF$_{50}$/FEF$_{25-75}$ ratio remained constant even in the setting of severe obstruction. To decrease the number of unnecessary parameters in spirometry reports, they recommend reporting the FEF$_{50}$ only, because it is directly measured rather than calculated using an algorithm and shows less variability.

Spirometric data can only be obtained from subjects who can comply with forced expiratory maneuvers. Although some centers have successfully obtained spiromgrams from young children, it is still difficult for this patient group to generate adequate studies. For these patients, other techniques of lung function measurement may be required to assess the presence of airflow obstruction. Forced oscillometry has been studied in young children and correlates well with spirometry. However, further studies are needed to determine its clinical utility.

Although the findings of Bar-Yishay et al are helpful in reducing the number of unnecessary parameters on a spirometry report, they still do not answer the question of what is the best way to measure lung function. Studies such as spirometry only measure selected mechanical properties of the respiratory system. In the case of a disease such as asthma, alterations in physiology are a result of underlying airway inflammation. Measurements of airflow correlate only very roughly with the presence of airway inflammation and the risk of asthma exacerbation. Daily measurement of peak expiratory flow rates has not been shown to consistently improve asthma control. Changes in the FEV$_{1}$ are directly related to the risk of a subsequent asthma attack. However, even in children with normal FEV$_{1}$, up to 25% may experience an asthma attack in the subsequent 12 months, indicating that this measure still fails to reflect underlying airway inflammation in a significant number of patients. There have been some studies indicating that FEF$_{25-75}$ may be a more sensitive marker of airflow obstruction, but whether this results in improved asthma control remains to be determined. It may be that noninvasive measures of airway inflammation will be the best way to monitor asthma control.

Despite the limitations discussed above, spirometry plays a key role in the assessment and management of patients with respiratory disease. Bar-Yishay et al have made a significant contribution to minimizing the number of unnecessary parameters on spirometry reports and making use of this study more efficient. Further work will be needed before we can answer the question of what is the best way to measure lung function.

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Urine Color Test to Monitor Isoniazid Compliance

“Pissin’ in the Wind”?

May we say this in a prominent medical journal such as CHEST? Is it audacity or truthful metaphor? For the two of us from Brooklyn, the phrase “pissin’ in the wind” means doing something that is essentially futile and possibly detrimental. Our third colleague assures us that the Japanese equivalent, “spitting in the sky,” also holds the same meaning. (Does all deep philosophy reduce down to body fluids?) However it may be, in discussing an article where urine drug screening reveals nonadherence to therapy, we believe the phrase is apt.

In this issue of CHEST, as in other journals, there are articles that discuss the search for an etiology, definitive diagnosis, or treatment of medical conditions for which these answers are at present unknown. While this is exciting and even essential for patient health, an equally important axiom is often overshadowed in these same journals: no matter how effective the medical regimen may be, if the patient does not adhere to medical therapy then, miracles aside, they will not be cured of their disease.

Tuberculosis (TB) should be the envy of every disease for which the cause and treatment remain elusive. For > 120 years, we have known the etiologic agent of TB. For > 100 years, we have known how to effectively diagnose the disease, and for > 50 years, we have had treatment regimens with a 95% cure rate when taken correctly and completely. Yet despite this almost uniquely fortuitous set of circumstances, TB continues to be one of the leading causes of mortality and morbidity in the world, and still poses a major threat to public health. Needless to say, TB medications are effective only when patients take their pills as prescribed. Not unique to TB, patient nonadherence to therapy has been observed in a variety of settings; however, this failure to comply with the treatment of a potentially fatal communicable disease is particularly important from a public health perspective, as nonadherence to treatment not only affects the afflicted individuals, but also increasingly endangers those around them through prolonged infectivity and possible development of drug resistance.

Among the most challenging and unique aspects of TB are the inordinate number of medications and prolonged length of treatment necessary to achieve a cure. Historically, adherence to TB medication therapy, when left to self-administration, has resulted in poor completion rates accompanied by high rates of relapse and the development of drug resistance. Treatment success rates of multidrug resistant tuberculosis (that is, resistant to at least isoniazid and rifampin) may fall to as low as 50%, with the cost of successful therapy rising to ≥ $400,000 (unpublished data; A.G. Holley State Hospital; Lantana, FL), as compared to approximately $1,500 for a drug-sensitive case. Therefore, given the documentation that nonadherent patients with TB can spread their disease to as many as 30 other people, from a public health as well as an economic standpoint, it is best to cure individuals with TB before they acquire resistance and spread the resistant strain to many others.

The major barrier to achieving a cure in patients with TB lies neither in medications nor therapeutics, but rather in the lack of adherence to therapy. It has been widely recognized that directly observed therapy (DOT), where a health-care worker or other individual observes a patient taking their medications, improves the completion rate of treatment in patients with TB. Even DOT, however, is not a perfect solution, and we have occasionally encoun-

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