tion, but does not necessarily quantitatively reflect the severity of inspiratory impairment in all individuals with COPD. The degree of inspiratory impairment should logically be an important factor in the prediction of exercise ventilation in COPD.3

In addition, the FEV1 does not take into account nonventilatory factors that can limit exercise in patients with COPD. As many as one fourth to one third of patients with COPD may have nonventilatory limitation of exercise.3,4 Nonventilatory factors include the age-dependent maximum cardiac frequency and submaximal patient effort. A patient whose observed cardiac frequency approaches within two standard deviations of predicted maximum cardiac frequency manifests a possible cardiac rate limitation of exercise. The cardiac frequency response to exercise is, in turn, influenced by many factors which vary from patient to patient with COPD including the nature of leisure activity (state of aerobic fitness) and the presence of subclinical primary or secondary cardiac disease which may not be manifested at rest. Effort responses are more difficult than cardiac frequency responses to evaluate objectively. Borg scale effort responses in patients with COPD at incremental exercise have been published5 and represent one means of assessing effort.

My preference would be for predicted values for ventilatory responses to exercise to be derived from study populations with VLE and without possible maximum cardiac frequency or submaximal effort limitation of exercise. Ideally, the study population should have convincing VLE and convincing absence of other possible limiting responses.

The above opinions imply that the equation 37.5 × FEV1 may also be too low for a group with VLE tested on exercise systems like that of Carter and associates. The methods of Carter and associates, as presented, did not address cardiac frequency responses or effort responses as inclusion criteria. In addition, the range for the ratio of exercise ventilation to maximum voluntary ventilation (MVV) seems too large (0.82-2.16) to provide convincing confirmation of VLE. Finally, the relatively low power increment of 10 watts may not have stimulated maximum ventilation in all subjects before the onset of pedalling fatigue, particularly in those in the study with the least amount of airflow obstruction. Consideration of these concerns may or may not have validated a different equation.

The gold standard for confirming VLE is demonstration of a rise in arterial carbon dioxide partial pressure (PaCO2) to abnormal values. Placement of an arterial catheter often falls outside the spirit of a noninvasive exercise study for clinical purposes. The silver standard for confirming VLE resides with the 12 s MVV. This measurement may need to be repeated with coaching at variable tidal volumes and breathing frequencies and should preferably be made on the same instrument used for exercise testing.6 Prediction of exercise ventilation from resting pulmonary function parameters presently occupies the bronze position in my opinion and should be used primarily as an indication to accept or repeat MVV measurements before commencing exercise testing.

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The Long-term Ventilator Patient
A Potentially Disenfranchised Medical Population

Prospective payment has produced a financial bias against chronic ventilator patients that could present access problems to medical care. Two studies that emphasize the magnitude of this problem were published in the March issue of Chest.1,4 Both studies had the same message despite different study designs. The message is that there is a greater than $20,000 loss per patient over hospital costs under the present prospective payment system.

Gracey et al,1 in a multicenter study, evaluated 150 Medicare patients with medical and surgical diagnosis for greater than 48 hours. Their study included patients in both university and community hospitals. The loss by the hospital over costs were profound. They suggest a new DRG classification should be applied to any patient who requires prolonged mechanical ventilation.

In our study, published in the same issue of Chest, we found a loss of a similar amount in 95 Medicare patients who received a minimum of three days of continuous ventilator support. We recommended three possible different approaches to recognizing the cost of care for such payments in the Diagnosis-Related Group (DRG) payment system:
• Develop a new DRG classification for patients requiring prolonged mechanical ventilation
• Provide exemption from the DRG Prospective Payment System for hospitals which have dedicated respiratory care units in the same way that psychiatric and rehabilitation units are now exempt
• Provide a DRG payment adjustment for chronic ventilator patients. This could be a per-diem or percentage add-on to the DRG rate.

The payment for hospital inpatient care on a Diagnosis-Related Group (DRG) basis is not an inherently flawed concept, but its equity depends upon costly patients being offset by less costly ones. The issue is whether the DRG system underpays for the care of entire categories of patients. If that is the case, then the DRG system is flawed, because it creates perverse incentives that seriously bias the access to care for certain categories of patients such as the ventilator-dependent patients.

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