A **pulse oximeter** is used to assess the percent saturation of hemoglobin in the arterial blood (S_aO_2) of pulmonary patients (figure 22.4). This noninvasive device shines a light beam through the finger or earlobe. The absorption characteristics of oxygenated and deoxygenated hemoglobin in the red or infrared region are used to assess the arterial oxygen saturation. Values for S_aO_2 below 90% indicate that the client needs supplemental oxygen to increase the driving force for diffusion of oxygen into the lungs. Frequently, a dyspnea rating scale is used to evaluate symptoms during exercise testing (8, 21). Cardiovascular, pulmonary, metabolic, and power output measurements are obtained and used to evaluate the severity of disability (see table 22.1).

FIGURE 22.4 Portable pulse oximeter used to assess a person's arterial O_2 saturation. The finger probe shines a light through the fingertip, and the absorption of light due to the pulsing arterial blood is measured. The number on the bottom of the display shows the percent saturation of hemoglobin in arterial blood (S_aO_2), and the number on the top shows the HR.

VIDEO

Watch **video 22.1**, which demonstrates arterial oxygen saturation measurement.

KEY POINT

One of the main pulmonary function tests for COPD is the FEV_1. COPD patients demonstrate a reduced ability to exhale quickly because of obstructed airways. In restrictive lung diseases, lung volumes are often reduced because the ability to expand the lungs is compromised. Exercise testing of patients with lung diseases, with appropriate monitoring of signs (hypoxemia) and symptoms (dyspnea) to assess the severity of the patient's condition, is beneficial.

Table 22.1 GOLD Classifications for Grading COPD

Grade	COPD description	Cause of dyspnea	FEV_1 (predicted)*	$\dot{V}O_2$max (ml · kg^{-1} · min^{-1})	S_aO_2
GOLD 1	Mild COPD	Fast walking and stair-climbing	≥80	>25	Normal
GOLD 2	Moderate	Walking at normal pace	≤50 to <79	>20 or >75% predicted	Above 90% at rest and with exercise
GOLD 3	Severe	Slow walking	≤30 to <49	10-20 or >30%-75% predicted	Below 90% with exercise
GOLD 4	Very severe	Walking less than one block	<30	>10 or >30% predicted	Below 90% at rest and with exercise

*Spirometric classification using the fixed post bronchodilator ratio of $FEV_1/FVC < 0.70$.

Data from the Global Initiative for Chronic Obstructive Lung Disease, a collaboration between the National Institutes of Health and the World Health Organization; www.goldcopd.org; accessed November 4, 2015.