

understanding the nature of diagnostic test information can help clinicians become more efficient users of such data. The next section reviews select concepts related to diagnostic testing.

■ **DIAGNOSTIC TESTING: MEASURES OF TEST ACCURACY**

The purpose of performing a test on a patient is to reduce uncertainty about the patient's diagnosis or prognosis in order to facilitate appropriate management. Although diagnostic tests commonly refer to laboratory (e.g., blood count) or imaging tests or procedures (e.g., colonoscopy or bronchoscopy), any information that changes a provider's understanding of the patient's problem qualifies as a diagnostic test. Thus, even the history and physical examination can be considered as diagnostic tests. In clinical medicine, it is common to reduce the results of a test to a dichotomous outcome, such as positive or negative, normal or abnormal. Although this simplification often suppresses useful information (such as the degree of abnormality), it facilitates illustrating some important principles of test interpretation that are described below.

The accuracy of any diagnostic test is assessed relative to a "gold standard," where a positive gold standard test defines the patients who have disease and a negative test securely rules out disease ([Table 4-1](#)). Characterizing the diagnostic performance of a new test requires identifying an appropriate population (ideally, patients representative of those in whom the new test would be used) and applying both the new and the gold standard tests to all subjects. Biased estimates of test performance occur when diagnostic accuracy is defined using an inappropriate population or one in which gold standard determination of disease status is incomplete. The accuracy of the new test in distinguishing disease from health is determined relative to the gold standard results and summarized in four estimates. The sensitivity or true-positive rate reflects how well the new test identifies patients with disease. It is the proportion of patients with disease (defined by the gold standard) who have a positive test. The proportion of patients with disease who have a negative test is the false-negative rate, calculated as $1 - \text{sensitivity}$. The specificity, or true-negative rate, reflects how well the