

Remembering the meanings of sensitivity, specificity, and predictive values

Goutham Rao, MD

Department of Family Medicine, University of Pittsburgh; Family Practice Residency, University of Pittsburgh Medical Center–St. Margaret, Pittsburgh, Pa

Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) —collectively known as “test characteristics” —are important ways to express the usefulness of diagnostic tests. The 2 x 2 tables from which these terms are derived are familiar to some physicians (**Table**).

Sensitivity is the “true positive rate,” equivalent to $a/a+c$. Specificity is the “true negative rate,” equivalent to $d/b+d$. PPV is the proportion of people with a positive test result who actually have the disease ($a/a+b$); NPV is the proportion of those with a negative result who do not have the disease ($d/c+d$).

Sensitivity and specificity are fixed for a particular type of test. PPV and NPV for a particular type of test depend upon the prevalence of a disease in a population. For example, though current screening tests for HIV have high sensitivity and specificity, the low prevalence of HIV in the general population cannot justify universal screening since the majority of positive tests would be falsely positive (ie, low PPV).

■ HOW TO REMEMBER THESE TERMS

Begin by assuming that you have 4 patients. For the first 2 you know only their disease status; for the last 2 patients you know only their test result.

You know your patient’s disease status:

1. *Sensitivity*: “I know my patient has the dis-

Correspondence: Goutham Rao, MD, 3518 Fifth Avenue, Pittsburgh, PA 15261. E-mail: raog@msx.upmc.edu.

TABLE

2 x 2 table for diagnostic test results

	Disease present (+)	Disease absent (-)	Totals
Test result positive (+)	a	b	a + b
Test result negative (-)	c	d	c + d
Totals	a + c	b + d	—

ease. What is the chance that the test will show that my patient has it?”

2. *Specificity*: “I know my patient doesn’t have the disease. What is the chance that the test will show that my patient doesn’t have it?”

You have just gotten a test result and do not know your patient’s disease status:

3. *PPV*: “I just got a positive test result back on my patient. What is the chance that my patient actually has the disease?”

4. *For NPV*: “I just got a negative test result back on my patient. What is the chance that my patient actually doesn’t have the disease?”

Keeping these 4 questions in mind as you run across these frequently used terms will help you interpret diagnostic tests accurately and efficiently, without having to think about more awkward 2 x 2 tables.