# BASIC STATISTICS IN MEDICAL PRACTICE

Pages with reference to book, From 276 To 277

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**Screening**

A screening test is used to separate a large group of apparently well persons from those who have a high probability of having the disease under study, so that they maybe given a diagnostic work- up and, if diseased, brought to treatment. Screening is applied to groups, and is in reference to one disease. Screening tests have one criterion, and there is one cut-off point, beyond which patients are classified as positive (diseased). These tests are interpreted by this single objective eriterion, rather than by a subjective judgement or evaluation of a number of symptoms signs, and laboratory fmdings, as in diagnosis. Screening test results are arbitrary and final. Diagnosis is applied to single patients who are sick.[1] All diseases are considered. Diagnosis is not final, but is modified in light of new evidence. Diagnosis is the sum of all the evidences. Screening and diagnosis are not competing, but are different procedures, and difterent criteria are applied to each.Validity: Validity is the ability of a screening test to provide an indication of which individual3 have the disease and which do not. Validity has two components: sensitivity and specificity. Sensitivity is the ability to identify correctly those who have the disease. Specificity is the ability to identify correctly those who do not have the disease. These components are determined by comparing the results obtainedbythe screening testwith those derived fromsome definitive diagnosis procedure. The extent to which the screening results agree with those derived by the more definitive tests provides a measure of sensitivity and specificity. Sensitivity is the ability of the screening test to give a positive fmding when the person tested truly has the disease. It is expressed as a percentage:

| Test or Examination | Disease present | Disease absent |
|---|---|---|
| Positive (Indicating disease is probably present) | A (true positive) | B (false positive) |
| Negative (Disease is probably absent) | C (false negative) | D (true negative) |
| Totals | A + C | B + D |

Sensitivity is defined as the percent of those who have the disease. It is calculated by the formula:

$$\frac{\text{Person with the disease detected by screening test}}{\textbf{Total number of persons tested with the disease}} \times 100$$

Specificity is the ability of the test to give a negative finding when the persons tested are free of the disease under study. It is also expressed as a percentage

Persons without the disease who are negative to the Screening test x 100
Total number of persons tested without the disease

| Screening test results | True diagnosis Diabetic | Non-diabetic | Total |
|---|---|---|---|
| Positive | 66 | 98 | 164 |
| Negative | 84 | 9,752 | 9,836 |
| Total | 150 | 9,850 | 10,000 |

$$\text{Sensitivity} = \frac{66}{150} \times 100 = 44\%$$

$$\text{Specificity} = \frac{9752}{9850} \times 100 = 99\%$$

**Computation of Sensitivity and Specificity**

In order to construct such a table from data given, in a narrative form, it is recommended that you fill in marginal totals first, before the individual cells.

A general representation of a screening matrix Sensitivity is defined as the percent of those who have the disease. It is calculated by the formula:

Sensitivity = A/A+c x100

Specificity is defined as the percent of those who do not have the disease and are so indicated by the test:

Specificity D/B+D x100

**Example:** Table shows the results obtained in a screening test for diabetes used on 10,000 persons. The cut-off level employed was 130mg of blood glucose per 100 ml or above as positive for diabetes.

**REFERENCE**

1. Morton, R. F. and Hebel, J. R. A Study Guide to Epidemiology and Biostatistics. University Park Press, Baltimore, 1983, PP. 59.65.