

SIMPLE TEST STATISTIC FOR COMPARISON OF PREDICTIVE VALUES OF TWO DIAGNOSTIC TESTS

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Diagnostic tests play important role in medical practice. Translation from a laboratory based test to a medical practice tool often requires comparison to another diagnostic test. In this presentation we consider diagnostic tests with a binary result (positive/negative) and with available gold standard for presence or absence of disease. Measures often used to evaluate diagnostic tests are sensitivity, specificity, positive predictive value, and negative predictive value. Sensitivity is the probability of positive diagnostic test in the diseased population (as identified by the gold standard). Specificity is the probability of negative diagnostic test in the non-diseased population. Positive predictive value (PPV) is the probability of disease when the diagnostic test is positive and negative predictive value (NPV) is the probability of no disease when the diagnostic test is negative. For data from a paired study design in which each subject receives two diagnostic tests, the comparison of sensitivities of these two diagnostic tests can be performed with the McNemar's test which is quite simple to compute. Similarly, two specificities can be compared this way. Only rather recently appropriate statistical tests for comparison of two positive (or negative) predictive values in a paired design were discussed by Leisenring W, Alonzo T, and Pepe MS (Biometrics 2000, 56:345-35), and Wang W, Davis CS, and Soong S (Statistics in Medicine 2006, 25:2215-2229). However, the presented test statistics have rather complicated formulations and really require use of a statistical package to facilitate computations; general estimating equations with identity working correlation matrix for the former, and weighted least squares with complicated contrast matrices for the latter. Hence, in contrast to availability of a simple McNemar's test formula for comparison of two sensitivities or two specificities, there is no simple form of a test statistic for comparison of two predictive values. This presentation proposes such an intuitively transparent "paper and pencil" simple formulation of test statistic for comparison of two PPVs and test statistic for comparison of two NPVs.