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Georgia Southern Examines Methods for Improving the Estimate of Diagnostic Odds Ratio

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Diagnostic odds ratio is defined as the ratio of the odds of the positivity of a diagnostic test results in the diseased population relative to that in the non-diseased population. It is a function of sensitivity and specificity, which can be seen as an indicator of the diagnostic accuracy for the evaluation of a biomarker/test. The naïve estimator of diagnostic odds ratio fails when either sensitivity or specificity is close to one, which leads the denominator of diagnostic odds ratio equal to zero. We propose several methods to adjust for such situation. Agresti and Coull’s adjustment is a common and straightforward way for extreme binomial proportions. Alternatively, estimation methods based on a more advanced sampling design can be applied, which systematically selects samples from underlying population based on judgment ranks. Under such design, the odds can be estimated by the sum of indicator functions and thus avoid the situation of dividing by zero and provide a valid estimation. The asymptotic mean and variance of the proposed estimators are derived. All methods are readily applied for the confidence interval estimation and hypothesis testing for diagnostic odds ratio. A simulation study is conducted to compare the efficiency of the proposed methods. Finally, the proposed methods are illustrated using a real dataset.

“Methods improving the estimate of diagnostic odds ratio,” was recently published in Communications in Statistics – Simulation and Computation.

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