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Editorial

The Methods of Evidence-Based Medicine for Radiologic Researches

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Editorial

Medical decision making is a term that applies to the actions physicians take many times each day. The correct application of evidence-based medicine helps physicians make much better clinical diagnostic and appropriate management decisions. Sensitivity (true positive) and specificity (true negative) are two aspects for the accuracy of a diagnostic test. For the patients' who actually have the disease or clinical condition, sensitivity is the test's ability for the positive detection. The test's ability to identify patients without disease or clinical condition is the specificity of the test. It is important to know that both sensitivity and specificity assumed no errors for the interpretations of diagnostic procedures, that is, variability in test determination is ignored for estimating values. For the determination of a diagnostic test, the estimations of sensitivity and specificity combined with a physician's judgment of suspicion. Both Positive Predictive Value (PPV) and Negative Predictive Value (NPV) are used when considering the value of a test to a physician and are dependent on the prevalence of the disease in the interested population [1]. In addition, Receiver Operating Characteristics (ROC) curve is a more efficient approach to show the relationship between sensitivity and specificity for continuous outcomes. The curve is constructed by varying the cut-off point used to determine which values of the observed variable should be considered abnormal and then plotting the resulting sensitivities against the corresponding false positive rates [2]. The Area Under the Curve (AUC) of a perfect test is 1.0 and that 0.5 is a useless test that implies no better than tossing a coin. Wilcoxon sum rank test is applied to compare whether two ROC curves are statistical significantly difference performed on the same individuals [3].

For the application of radiologic researches, Shen et al. conducted a population-based study to discuss the relationship between obesity, metabolic syndrome, and nonalcoholic fatty liver disease (NAFLD) among the elderly agricultural and fishing population in Taiwan [4]. Hepatic ultrasonography was performed by two well-trained ultrasonographist using a Toshiba Nemio (SSA-550A) ultrasound probe. The results indicated good sensitivity and specificity of BMI and waist circumference for the diagnosis of severe NAFLD (Table 1). For BMI, the estimated AUC was estimated 0.88 (95% CI: 0.82-0.94) for diagnosis of severe NAFLD and cut-off value estimated as 27.85 Kg/m^2 with 81% sensitivity (19% false negative) and 84% specificity (16% false positive). The AUC for waist circumference in the identification of severe NAFLD was 0.82 (95% CI: 0.74-0.89) and the cut-off value, sensitivity, and specificity were 90.75 cm, 77% (23% false negative), and 69% (31% false positive), respectively. In addition, Ghajarzadeh et al. proposed a systematic review and meta-analysis to determine the diagnostic accuracy of sonoelastography in evaluating salivary gland tumors using Summary Receiver Operating Characteristic (SROC) curves. The results showed that the summary sensitivity and specificity for the differentiation of benign and malignant salivary gland masses were 0.63 and 0.59 with 0.68 AUC implied Sono-elastography had moderate accuracy in differentiating benign from malignant salivary gland tumors [5].

Sensitivity and specificity based on the assumptions included diagnoses and diseases are mutually exclusive and each diagnosis is independent. In the clinical practice, the decisions of appropriate treatment are extremely influenced by the physician's interpretation of a testing. There is no doubt that higher sensitivity and specificity decrease the diagnostic mistakes that may influence patients' treatment. However, in order to avoid misleading information, we should notice that predictive values change as prevalence changes when estimating predictive values based on the same individual used to determine sensitivity and specificity. Finally, from the evidence-based medicine viewpoint, the statistical significance is presented as either a p-value or 95% confidence interval. A p-value shows the probability that an observed effect is due to sampling error and a 95% confidence interval is a range of treatment effects in which we could be 95% confident that the true effect lies [6]. The consideration of a statistically significant effects measured also should be a clinically meaningful for the measurement of primary outcomes.

Table 1: The ROC results of BMI and waist circumference as a marker of NAFLD [4].

variable	area under curve	95% CI	cut off value	sensitivity	specificity
Mild NAFLD					
BMI	0.61	0.59-0.63	24.75	0.65	0.54
Waist circumference	0.57	0.53-0.58	86.25	0.57	0.53
Moderate NAFLD					
BMI	0.76	0.73-0.78	25.35	0.77	0.61
Waist circumference	0.69	0.66-0.71	89.25	0.63	0.65
Severe NAFLD					
BMI	0.88	0.82-0.94	27.85	0.81	0.84
Waist circumference	0.82	0.74-0.89	90.75	0.77	0.69

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