

## A Short Note on Accuracy in Diagnosis

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**Received:** December 6, 2021; **Accepted:** December 20, 2021; **Published:** December 27, 2021

**Citation:** Mark L (2021) A Short Note on Accuracy in Diagnosis. J Nurs Health Stud Vol. 6 No. 4:e011.

### Editorial Note

Diagnostic and biomarkers have been validated during the last decades, and this will still be a prominent field of exploration in the future because of the need for personalized drug and treatment. Strict evaluation and accurateness is needed whenever we opt at validating any potential diagnostic tool, and the first demand a new testing system must fulfill the diagnostic exactness. The testing procedure should be authenticated on a reasonable population, including people with mild and severe disease, therefore supplying a similar spectrum. Sensitivities and particularity aren't prophetic measures. Predictive values depend on disease frequency, and their conclusions can be transposed to other settings only for studies which are based on a suitable population (e.g. screening studies). Likelihood rates should be an optimal choice for reporting diagnostic accurateness. Diagnostic accurateness measures must be reported with their confidence intervals. We always have to report paired measures (perceptivity and particularity, prophetic values or liability ratios) for clinically meaningful thresholds. How important discriminative or predictive power we need depends on the clinical diagnostic pathway and on misclassification (false positives/ negatives) costs.

An adding number of diagnostic tests and biomarkers have come available during the last decades, and the need for individualized drug will strengthen the impact of this phenomenon in the future. Accordingly, we need a careful evaluation of any potential new testing procedure in order to limit the potentially negative consequences on both health and medical care expenditures.

### Diagnostic accuracy measures

The discriminative capability of a test can be quantified by several measures of diagnostic accurateness:

- Sensitivity and specificity;
- Positive and negative predictive values (PPV, NPV);
- Positive and negative likelihood ratios (LR, LR-);
- The area under the receiver operating characteristic (ROC) wind (AUC);
- The diagnostic odds rate (DOR);
- The overall diagnostic accurateness.

While these measures are frequently reported interchangeably in the literature, they've specific features and fit specific investigation questions. These measures are related to two main classifications of issues

- Classification of people between those who are and those who aren't diseased (demarcation);
- Estimation of the post-test probability of a disease (prediction).

While discrimination purposes are substantially of concern in health policy decisions, predictive measures are most useful for predicting the probability of a complaint in an individual once the test result is known. Therefore, these measures of diagnostic accurateness cannot be used interchangeably. Some measures largely depend on disease frequency, and all of them are sensitive to the spectrum of the complaint in the population studied. It's therefore of great significance to know how to interpret them, as well as when and under what circumstances to use them.

When we conduct a test, we've a cutoff value indicating whether an individual can be classified as positive (above/ below the cutoff) or negative (below/ above the arrestment), and a gold standard (or reference system) which will tell us whether the same individual is ill or healthy. Therefore, the cutoff divides the population of examined subjects with and without complaint into 4 groups

- True positive (TP) = subjects with the disease with the value of a parameter of interest above/ below the cutoff;
- False positive (FP) = subjects without the disease with the value of a parameter of interest above/ below the cutoff;
- True negative( TN) = subjects without the disease with the value of a parameter of interest below/ above the cutoff;
- False negative (FN) = subjects with the disease with the value of a parameter of interest below/ above the arrestment.

### Overall diagnostic accuracy

Another global measure is the so- called 'individual diagnosis', expressed as the proportion of appropriately classified subjects (TP TN) among all subjects (TP TN FP FN). Individual delicacy is affected by complaint frequency. With the same perceptivity and particularity, the diagnostic accuracy of a particular test increases as the disease prevalence decreases.