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Sensitivity x PPV is a recognized test called the clinical utility index (CUI+)

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Dear Sir

I was pleased to see the article by Ostergaard et al published in *EjE* (2010; 25:151-154). Few psychiatrists have taken an interest in the statistics of screening but it is clearly an important area for all clinicians interested in diagnostic tests. However, I was surprised that the authors propose to label the product of sensitivity and positive predictive value (se x PPV) "screening marker index" when I developed and named this test over four years previously. Our group and other independent researchers have extensively cited this test with its original name, the "clinical utility index" (CUI) in at least 10 peer reviewed articles to date.¹⁻¹¹ we have also made its validation freely available online¹² and included it in several book chapters.¹³

May I use this opportunity to highlight my rationale for developing this test. The authors are correct that the Youden index has modest clinical value as it simply averages the product of sensitivity and specificity, giving both equal weight and ignoring the relative importance of false positives or false negatives. I developed the clinical utility index in 2007 in order to take into account both occurrence and discrimination. Both are important aspects of test performance for clinicians. Further it is vital to realize that test results can be valuable both when positive and negative. The product of sensitivity and PPV is only a useful calculation when a positive result of a test is under scrutiny. A mirror image calculation namely specificity x NPV is recommended when a negative test is under scrutiny. In the case of a high PPV or high NPV, a correction is needed for occurrence of that test in each respective population. Take for example the occurrence of all five symptoms from DSM-IV as a "test" for depression. In those who test positive (that is those who suffer all five symptoms) let us say the PPV is hypothetically 88% but often actually having all five symptoms is rare (say 28%) in clinical practice. Any test with a high PPV will be devalued if it occurs rarely in true cases. Clinically relevant rule in accuracy can be considered a product of the PPV and sensitivity and in this example the CUI+ for all five symptoms is $0.88 \times 0.28 = 0.32$. Now consider the calculation needed for ruling-out a diagnosis. For example the absence of the symptom loss of drive might have a high NPV of 96% but might only be absent (negative) in 70% of non-depressed patients. Thus the negative clinical utility index (CUI-) would be $0.96 \times 0.70 = 0.67$. To help with the application of this index I proposed scores can be converted into qualitative grades as follows: excellent utility ≥ 0.81 , good utility ≥ 0.64 and satisfactory utility ≥ 0.49 and poor utility < 0.49 .³ These principles apply to any test whether psychological, symptom based or biological.

I hope these clarifications are useful and that the authors will respect my original name for this test.

Alex Mitchell

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The authors reply:

We thank Dr. Mitchell for his interest in our paper (1), which presents an index completely identical to his original "clinical utility index" (2,3). When reviewing the literature on medical screening during our work on the "screening marker index" in the summer of 2009, we unfortunately did not discover the published papers using the index developed by Dr. Mitchell. We sincerely apologize for this misunderstanding. The index calculated as the product of sensitivity and positive predictive value shall of course be referred to as the clinical utility index, as defined by Dr. Mitchell.

The fact that the clinical utility index became of interest to both Dr. Mitchell and us, quite independently, supports the need for its use (4).

Best regards

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