Letter to the Editor

Standardized Predictive Values

To the Editor:

The predictive value of a diagnostic test is highly dependent upon disease prevalence. Disease prevalence, however, varies widely from patient to patient. Since patients in whom the diagnosis is unclear are the ones most likely to get a diagnostic test, it is helpful to standardize the predictive value of a diagnostic test to a disease prevalence of 50%. Even more useful would be to present predictive values standardized to disease prevalences of 25%, 50%, and 75%.

I thank the authors for their thoughtful analysis of how to best present the predictive value of a test. They emphasize that the predictive value of a test varies significantly as the disease prevalence changes. In my previous Letter to the Editor on this topic (1), I proposed that researchers not only present the raw, unadjusted predictive value of a diagnostic test, but also present the predictive value of the test based upon a standardized 50% disease prevalence.

What the authors propose, in brief, is that researchers use the Predictive Summary Index (2) which standardizes predictive values based on the estimated disease prevalence in a large population. They suggest that this is a more useful way to determine the overall gain in information from a diagnostic test than my proposal to standardize predictive values to a prevalence of 50%.

While using the Predictive Summary Index (PSI) may be useful for making population-based policy decisions, it adds little useful information to practicing clinicians attempting to apply research findings to individual patients. The primary reason for this is because disease prevalence is not a fixed value but varies widely from individual patient to patient.

Since diagnostic tests are most frequently ordered when the diagnosis is unclear (ie, the pretest likelihood of disease is around 50%), standardizing predictive values to a prevalence of 50% may be more meaningful to the practicing clinician than using the PSI.

For example, after doing a history and physical, I will estimate the likelihood of disease based on a wide range of variables unique to my patient. When the disease of interest is very highly likely, or very unlikely, then additional diagnostic testing is not helpful. On the other hand, if the unique characteristics of my patient do not clearly indicate a specific diagnosis, this is when I order additional diagnostic tests. In this situation, I do not clearly know whether my patient has, or does not have, the disease of interest, ie, my clinical judgment is that the likelihood of disease is in an intermediate range. When my level of diagnostic certainty is no better than a coin flip, what is most useful is the predictive value of a test standardized to a disease prevalence of 50%.

Population prevalence can vary widely due to the demographic group(s) included. Was the patient presenting for the first time to a rural family physician, or presenting to a subspecialist at a tertiary care center after an extensive workup? Is the patient male, or female? Diabetic or not diabetic? Prediabetic? How old is the patient? What is the family history? What is the patient's occupation? Where does the patient live? These factors are all taken into account when doing a history and physical. Generating a PSI value for each demographic would not only be nearly impossible, but also confusing and impractical for practicing clinicians to apply. However, if I knew the predictive value of a diagnostic test standardized to disease prevalences of 25%, 50%, and 75%, then I could reasonably estimate its value to the individual patient in front of me.

The PSI may be useful when looking at populations; however, standardizing predictive values to a 50% disease prevalence may be more useful to clinicians treating individual patients.

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REFERENCES

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