In an earlier paper, we pointed out that a suspected disease as a diagnostic hypothesis in practice is usually evaluated by a test capable of generating a result with a likelihood ratio (LR) of 10 or higher if the disease has such a test(1) This is done, we suggest, because if such a test result is observed, the disease is inferred in a patient regardless of its prior probability with a diagnostic accuracy of 85 percent or greater. Examples of diseases which are inferred in practice in this manner are (a) acute myocardial infarction from acute ST elevation EKG changes, LR 13 (2) (b) pulmonary embolism from positive chest CT angiogram study, LR 20 (3) (c) deep vein thrombosis from positive venous ultrasound study, LR 16 (4).

This method of inference is clearly not Bayesian as a disease is not inferred from a posterior probability generated by combining a prior probability and a likelihood ratio.

This method of inference during diagnosis in practice, as we have pointed out elsewhere, is the frequentist method of (statistical) inference (5). In this method a parameter to be inferred, such as a suspected disease is formulated as a (diagnostic) hypothesis without any prior probability attached to it, so that it does not have any prior evidence for or against it.

A parameter (disease) as a hypothesis is then evaluated by a test and inferred from the frequency of accurate inferences on repeated testing as evidence. In general in statistics an accuracy level of 95 percent generated by a test of significance or by a confidence argument is considered strong evidence from which a parameter is inferred to be correct (6).

In diagnosis in practice, a frequency of 85 percent or higher appears to be considered strong evidence from which a disease is inferred in a patient. This high frequency of accurate inferences across patients with varying prior probabilities is achieved by a test result with LR greater than 10. For example, acute ST elevation EKG changes with LR of 13 leads to an accurate inference of acute MI with LR of 13 leads to accurate inference of acute MI in 85 percent patients with varying prior probabilities (7). This high frequency of 85 percent functions as evidence which is employed to infer acute MI in a given patient with acute ST elevation EKG changes regardless of its prior probability.

The frequency of accurate inference from a test result with LR greater than 10 is derived in practice from observation in large series of unselected patients with varying prior probabilities in which we suspect a disease such as is done in inference of acute MI from acute ST elevation EKG changes.

The reason the frequentist method is employed for inference in practice, we believe, is that it enables us to infer a disease accurately in any patient regardless of prior probability. This is especially important when the prior probability of a disease is low in which case the Bayesian method is likely to lead to an inaccurate inference as we see in the following real patient discussed in a clinical problem solving exercise (8).

A healthy 40 year old woman without any cardiac risk factor presents with highly uncharacteristic chest pain in whom acute MI is suspected and an EKG performed to evaluate it.

The EKG reveals acute ST elevation EKG changes from which the discussing physician correctly infers acute MI in this patient.

We suggest the frequentist method is employed for inference in this patient.

The prescribed Bayesian method is not employed as it would have led to an inaccurate inference as we discuss below.

In the Bayesian method, acute MI would be inferred to be indeterminate in this patient from the posterior probability of 50 percent generated by combining the prior probability of acute MI of 7 percent with the LR of 13 for acute ST elevation EKG changes (8).

In conclusion, the frequentist method is employed for inference during diagnosis in practice because this method leads to highly accurate inference of a disease in any patient regardless of its prior probability.

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