

It is important in prescribing a course of action for a process in medicine or in any other field, we believe, to take the following 3 steps:

1. Specify the goal to be achieved by prescribing the action
2. Analyze the process to find out which action is appropriate for it.
3. Study the result of applying the action to the process to see if it is effective in achieving the specified goal.

A prescription is to be considered successful only if the prescribed action is employed routinely for the process in practice.

We shall now illustrate this method of prescription with the example of prescription of an antibiotic for pneumonia.

1. The goal of this prescription is specified to be recovery of patients with pneumonia.
2. On analyzing the process of pneumonia, we find it is caused by an infection which responds to an antibiotic.
3. On studying the result of giving an antibiotic to patients with pneumonia, we find most of them to recover.

This prescription is successful as it is employed routinely in practice.

When we look at the prescription of the Bayesian method for diagnosis, we note it cannot be considered successful because it is not employed routinely for diagnosis in practice.

We shall now examine why this prescription is unsuccessful by seeing if the 3 steps for prescription mentioned earlier were taken in this case or not.

1. There is no specification of the goal to be achieved, that is diagnostic accuracy in every individual patient, in this prescription.
2. The process of diagnosis has not been analyzed in this prescription. Such an analysis would have revealed that the goal in diagnosis of diagnostic accuracy in every individual patient regardless of prior probability of a disease cannot be achieved by the Bayesian method with its notion of prior

probability as prior evidence. Therefore the Bayesian method is not suitable for diagnosis in principle.

3. The result of applying the Bayesian method in terms of its diagnostic accuracy has not been studied.

Thus we find none of the 3 steps which are essential for a successful prescription have been taken in the case of prescription of the Bayesian method for diagnosis. It has been prescribed on grounds of its rationality defined in terms of not losing a bet placed on a Bayesian diagnosis with odds based on its probability, which in our judgement, has nothing to do with achieving diagnostic accuracy. We do not find it surprising therefore that the Bayesian method is not employed for diagnosis in practice.

The method which is employed for diagnosis in practice, as we have pointed out, is the frequentist method, which is the other (other than the Bayesian method) main method statistical inference. In this method, a disease suspected from a presentation is formulated as a diagnostic hypothesis without any prior evidence for or against it regardless of its prior probability, as we see in all published diagnostic exercises in real patients such as CPCs and clinical problem solving exercises. This, we believe, is the crucially important step in this method, as it enables even diseases with low prior probabilities to be suspected, tested and diagnosed accurately if they are present. A disease is inferred in this method from a highly informative test result (with likelihood ratio greater than 10) in any patient regardless of its prior probability with a diagnostic accuracy of 85 percent or greater.

The remarkable thing is that the frequentist method, unlike the Bayesian method, has not been prescribed, but has been adopted by physicians in practice for diagnosis due to its high diagnostic accuracy.

We shall now examine if the frequentist method qualifies for being prescribed for diagnosis in terms of the 3 steps mentioned above.

1. The goal to be achieved by prescribing the frequentist method is specified as diagnostic accuracy in practically every individual patient regardless of prior probability of a disease.
2. In looking at the process of diagnosis, we find the frequentist method to be the right method as every suspected disease is formulated as a diagnostic hypothesis in it regardless of its prior probability enabling every disease to be tested and diagnosed accurately.
3. On studying the result of employing the frequentist method, we find its diagnostic accuracy to be very high at 85 to 90 percent in practice in general and 98 percent in CPCs.

This prescription will be successful as the frequentist method is already employed for diagnosis routinely in practice.

In light of discussion in this paper, we suggest the prescription of the Bayesian method should be replaced by prescription of the frequentist method for diagnosis.

All the arguments made in this paper are discussed in detail with references in my paper "The method of statistical inference in diagnosis in practice" which is posted on Discussion Board, SIDM on Oct 15, 2019.