

## **Introduction to Bayesian reasoning.**

[Hornberger J.](#)

Roche Pharmaceuticals and Stanford University School of Medicine, USA.

### **Abstract**

Interest in Bayesian analyses has increased recently, in part as a response to policy makers wanting sound scientific bases for health technology assessments, and associated healthcare funding decisions. This paper provides a brief and simplified description of Bayesian reasoning. Bayes is illustrated in a clinical setting of an expert helping a woman understand the potential risk of passing on an inheritable disease (hemophilia) to her next child, based on disease occurrence in two living children. The illustration describes fundamental concepts and derivations, such as Bayes theorem, likelihood functions, prior probability, and posterior probability. A second illustration shows the use of Bayes for interpreting clinical trial results. The uncertainty in the clinical effect before and after the trial analyses has been completed is characterized by the Bayes prior and posterior probabilities, respectively. Techniques are also shown for estimating the potential loss (e.g., in lives lost) for making the wrong decision with and without knowledge of the trial results, an estimation that cannot be carried out using techniques of hypotheses testing associated with the frequentist school of statistics. Information from Bayes analysis then may be used to help policy makers decide, or justify, whether the analyses provides a sufficient basis for making a treatment recommendation, or whether there remains a need to request more information. Subsequent papers in this volume offer additional examples and clarification of the use of Bayes in clinical practice and in interpretation of clinical studies.

PMID: 11329848 [PubMed - indexed for MEDLINE]