Introduction to Bayesian Statistics for Physicians

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Background: The Deutsches Ärzteblatt runs a series of short pieces on statistics in medicine. This is delivered to every accredited physician in Germany.

Purpose: To discuss didactic choices.

Methods: First I state the editor's requirements. Among those were a word count below 2300, and relevance to everyday work of physicians.
Then I outline the three versions I wrote. These were a normal-normal model with mixture prior for body height, a beta-binomial model with a mixture prior for treatment success, and a normal-normal model for the logarithm of an odds ratio with a mixture of binomials prior for the control arm.
Finally, I discuss the advantages and disadvantages of the versions. Models and Parameters are simpler or more complex. Prior information is more or less derived from everyday experience. Marketing authorization is different, but a seemingly simple decision problem. The similarity with a diagnostic decision may be helpful or a distraction. Formulae may bring the description of a calculation to the point or may decimate the readership. Some, likely composite figure of the density functions involved was always part of the plan.

Results: The published version is available in the international edition in English, too. It contains no formulae, a large composite figure and an if-then diagram. The latter is a remake of one used in marketing authorization of a drug for children. The narrow space limit was circumvented by text boxes with a glossary, Q&A, and examples of applications in many different parts of medicine. Physicians may earn credits for their mandatory continuous learning by answering multiple choice questions. I will share the feedback I received from readers so far.

Conclusion: Statistics consultation in Germany involving the Bayesian use of prior information now has to consider a mixture prior and an if-then diagram.

Reference:

GERß JWO, VONTHEIN R. Introduction to Bayesian statistics: Part 36 of a series on the evaluation of scientific publications. *Dtsch Arztebl Int* 2025; 122(10): 271-6. DOI: 10.3238/arztebl.m2025.0035