

# Predictive Checking Approach to Bayesian Interim Monitoring

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## Abstract

In clinical trials, an interim monitoring is conducted so as to consider the early termination/continuation or design modification of a trial, from the ethical, administrative, and financial viewpoints. Statistical approaches to the interim monitoring can be, in general, classified into the frequentist and Bayesian paradigms. In this article we focus on the interim monitoring in the latter. In the Bayesian interim monitoring, one must construct the model that provides the posterior information by combining the data information with the prior, like the general Bayesian approaches, and judge the *pros and cons* of early termination/continuation of a trial, based on a index derived from the model. Then it is required to check whether the model and derived index are reliable or not. In this paper, a predictive checking approach is proposed, and its performance are evaluated in several examples. The results showed that the predictive checking approach allowed us to evaluate the consistency in information between the prior, data, and posterior and check the reliability of the model and indices.

**Key words:** interim analysis, prior, posterior, hybrid (mixed) frequentist/Bayesian, model checking, model criticism

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