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A BAYESIAN COMPARISON OF GROUP SEQUENTIAL DESIGNS

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A Bayesian approach to group sequential designs is illustrated for Anscombe's formulation of the problem of comparing two treatments in a medical trial. It is shown that an adjusted continuous time stopping boundary is a good approximation to the optimal group sequential stopping boundary. The Bayes risk and efficiency of the group sequential designs, using both the optimal and adjusted continuous time boundaries, are computed.

1. Introduction. In long-term clinical trials, where patients are entering sequentially, the strict application of fixed sample size designs is unjustified on ethical grounds. On the other hand, fully sequential designs may be impractical due to the need for continuous assessment of accumulating data. The planned use of group sequential designs has been advocated as a convenient approach to the monitoring of clinical trials. In the literature there are many ad-hoc group sequential designs, for example in Pocock (1977), O'Brien and Fleming (1979), and Lan and Demets (1983). For a good review, one can consult Simon (1991) and Whitehead (1997). Recently Lewis and Berry (1994) and Eales and Jennison (1995) gave some comparisons of different types of group sequential designs.

In this manuscript we will focus on the following issues:

(a) In a Bayesian framework, how a continuous-time version of the group sequential problem, where the data arrive as a Wiener process, can approximate the discrete-time group sequential procedure.

(b) How good the continuous-time "optimal" stopping boundary (with proper adjustment) is as an approximation to the "optimal" discrete-time group sequential stopping boundary.

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