

SEQUENTIAL ELIMINATION PROCEDURES IN CLINICAL TRIALS OF THREE BERNOULLI RESPONSE TREATMENTS

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Abstract

Data dependent allocation methods could be advantageously employed in some clinical trials, though in practice, such techniques are rarely used, in part due to their inherent complexity. We consider a practical, decision-theoretic approach for three dichotomous response treatments, using equal allocation until irrevocably dropped from contention. The objective is to maximize the total expected number of successes. We study three elimination procedures: from three treatments to one, both with and without an intermediate pairwise stage; and two serial, pairwise comparisons. The dynamic equations involved are computable for any patient horizon and asymptotic behavior is only marginally worse than if all participants receive superior treatment (in marked contrast to fixed sample size trials). For practical application, prior dependence is effectively removed and smaller horizons are discussed. The procedure with an intermediate stage is preferred, not so much for numerical reasons (by evaluation of rewards and regrets), but for qualitative ethical and practical considerations.

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