

Dose Banding – weighing up benefits, therapeutic failure and risks

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Abstract

Aim Dose banding is a commonly used method of dose individualisation in which all patients with similar characteristics are allocated to the same dosing group. Dose banding results in some patients receiving less intensive treatment with the potential for a reduction in therapeutic benefit (iatrogenic therapeutic failure). This study aims to explore the effects of dose banding on therapeutic success and failure. **Methods** This was a simulation study conducted using MATLAB. Virtual patients were simulated under a simple pharmacokinetic model with a predefined target steady-state average concentration ($c_{ss,ave}$). Clearance was correlated with a covariate used for dosing. Dose individualisation was based on: one-dose-fits-all, covariate based dosing, empirical dose banding, dose banding optimised for benefit:risk only and dose banding optimised for both benefit:risk and minimising iatrogenic therapeutic failure. **Results** The lowest and highest probabilities of target attainment (PrTA) were 46% for one-dose-fits-all and 72% for fully individualised covariate-based dosing. Neither dosing approach would result in iatrogenic therapeutic failure as lower dose intensities do not occur. Empirical dose banding performed better than once-dose-fits-all with 59% PTA but not as good as either optimised method (64-69% PrTA) while carrying a risk of iatrogenic therapeutic failure in 25% of patients. Optimising for benefit:risk (only) improved PrTA but carried a risk of iatrogenic therapeutic failure of up to 10%. Optimising for benefit:risk and minimising iatrogenic therapeutic failure provided the best balance. **Conclusion** Future application of dose banding needs to consider both the probability of benefit:risk as well the risk of causing iatrogenic therapeutic failure.

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FIGURE 1

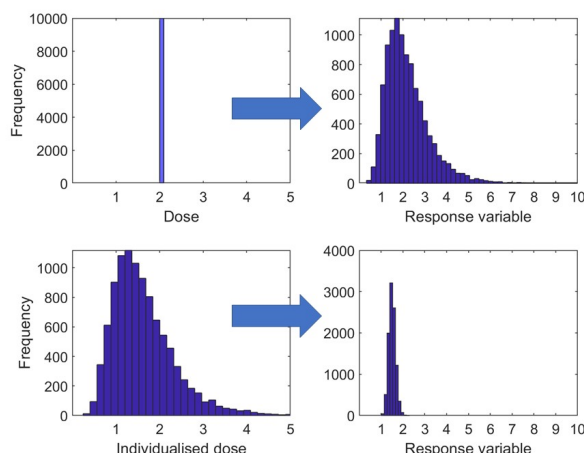


FIGURE 2

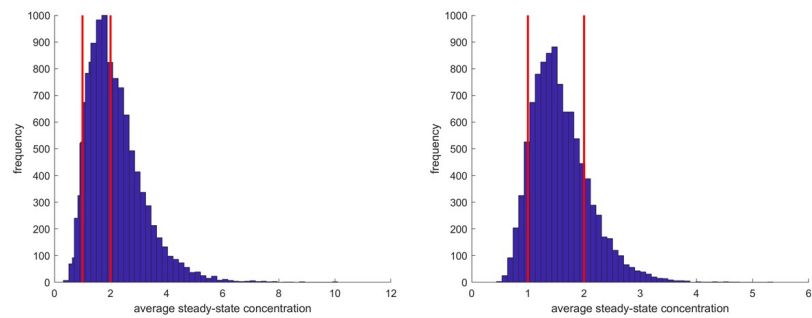


FIGURE 3

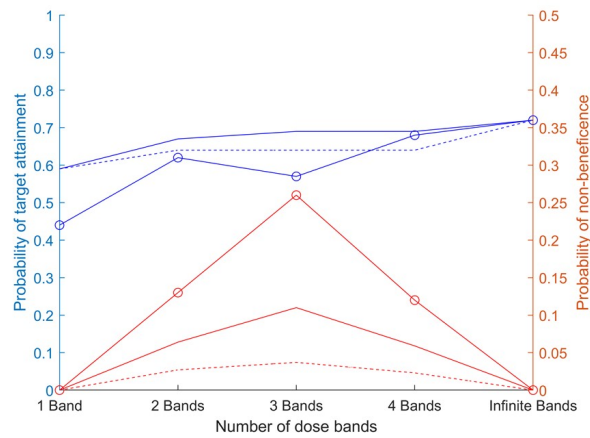


FIGURE A1

