

In this document, we provide additional details, which are sufficient for replicating our simulation study. The parameters in our simulations are the following.

ICC , the Intra-class correlation coefficient in the therapist population

k_{pop} , the number of therapists in the therapist population

m , the number of patients seen by each therapist at each iteration

k , the number of therapists in the clinic population

q , the percentile used to select therapists to remove at each iteration

N , number of iterations

Note that the only parameter we varied was $ICC = 0.05, 0.1, 0.2$. We assume a population size of $k_{\text{pop}} = 1000$ therapists. Our clinic size was $k = 50$. Each therapist saw $m = 30$ patients before each replacement decision was made. Therapists with response rates in the $q = 0.05$ percentile were replaced at each decision. We repeated the process of replacing therapists a total of $N = 50$ times.

The underlying model we assume is a binary mixed effects model, which is defined as follows.

$$\begin{aligned} Y_{ij} &= \text{Binary}(p_j) \\ p_j &= \text{expit}(\alpha_j) \\ \alpha_j &= \mathcal{N}\left(0, \sigma_\alpha^2 \equiv \frac{\pi^2/3 \cdot ICC}{1 - ICC}\right), \end{aligned}$$

where Y_{ij} is the binary outcome of the i th patient when seen by the j th therapist, p_j is the success rate (or true response rate) of the j th therapist, and mean and variance parameters of the distribution of α_j correspond to a therapist population with an average response rate of 50% and variability of therapist effects of ICC .

The simulation procedure has five steps (as shown in the flow chart in Figure 2):

1. **Simulate the therapist population:** For therapist $j = 1, \dots, k_{\text{pop}}$, their true response rate p_j is obtained from our model (by taking k_{pop} iid draws from a normal distribution $\mathcal{N}(0, \sigma_\alpha^2)$, then expit-transforming them).
2. **Select the initial clinic population:** We randomly selected k therapists from the population to join the clinic (reducing the therapists population by k).
3. **Simulate patient outcomes:** For therapist j in the clinic population, patient outcomes were obtained by taking m iid draws from a $\text{Binary}(p_j)$ distribution.
4. **Remove therapists with outcomes in the lowest $q\%$:** Response rates for each therapist were computed as the average of their m patient responses. Therapists with response rates in the q th percentile are removed from the clinic population and do not return to the therapist population. (Hence a therapist that has been removed from the clinic cannot return to the clinic.)
5. **Replace therapists with a random sample from the therapist population:** In order to bring the clinic population size back to k , we replace the removed therapists with random draws from the therapist population (reducing the therapist population again).

Steps 3-5 are repeated N times to obtain results for one clinic over time. Finally, we repeated this simulation procedure 10,000 to obtain results over 10,000 simulated clinics.