Continuous outcomes We hypothesized a difference in means of $\delta = 2$ between the two groups. We also assumed a standard deviation $\sigma_{\text{assum}} = 10$ in the control group, which led to a hypothesized effect size of $2/10 = 0.2$. With such values and considering 80% power with two-sided type I error 5%, the required sample size was 393 patients in each group. Then we considered that the true standard deviation $\sigma$ differed from the assumed standard deviation $\sigma_{\text{assum}}$. Then considering the relative error distribution in Fig. 1.a (i.e., with mean $\mu_{\epsilon} = 0$ and standard deviation $\sigma_{\epsilon} = 0.4$), we performed the following steps:

1. We randomly generated a value of the relative error $\epsilon \sim \Gamma(k, \theta) - 1$ with $k\theta = \mu_{\epsilon} + 1$ and $k\theta^2 = \sigma_{\epsilon}^2$
2. The true standard deviation was deduced as $\sigma = \sigma_{\text{assum}} \cdot (1 + \epsilon)$
3. The true difference in means remained identical to the hypothesized value $\delta = 2$
4. Considering a sample size of 786 patients, we derived the power of such a trial to detect a difference of $\delta$ with standard deviation $\sigma$

Steps 1 to 4 were repeated 10,000 times.

Binary outcomes We hypothesized a difference in success rates of $\delta = 10\%$ between the two groups and assumed a rate $p_{\text{assum}}^C = 20\%$ in the control group. With such values, and considering 80% power with two-sided type I error 5%, the required sample size was 290 patients in each group. Then, considering the relative error in Fig. 1.b (i.e., with mean $\mu_{\epsilon} = 0.05$ and standard deviation $\sigma_{\epsilon} = 0.3$),

1. We randomly generated a value of the relative error $\epsilon \sim N(\mu_{\epsilon}, \sigma_{\epsilon})$
2. The true rate in the control group was deduced from $\arcsin(\sqrt{p_C}) = (1 + \epsilon)\arcsin(\sqrt{p_{\text{assum}}^C})$ because we applied an angular transformation before calculating relative differences.
3. The true difference in rates remained identical to the hypothesized value $\delta = 10\%$
4. Considering a sample size of 580 patients, we derived the power of such a trial to detect a difference of $\delta$ with a success rate for the control group of $p_C$

Steps 1 to 4 were repeated 10,000 times.

Time-to-event outcomes We hypothesized a hazard ratio $HR = \frac{\log 0.8}{\log 0.7} = 0.63$ with the assumption of the probability of events $p_{\text{assum}}^C = 30\%$ in the control group. With such values, and considering 80% power with two-sided type I error of 5%, the required sample size was 296 patients in each group. Then, considering the relative error in Fig. 1.c (i.e., with mean $\mu_{\epsilon} = 0.1$ and standard deviation $\sigma_{\epsilon} = 0.2$),

1. We randomly generated a value of the relative error $\epsilon \sim N(\mu_{\epsilon}, \sigma_{\epsilon})$
2. The true probability of events in the control group was deduced from $\arcsin(\sqrt{p_C}) = (1 + \epsilon)\arcsin(\sqrt{p_{\text{assum}}^C})$ because we applied an angular transformation before calculating relative differences.
3. The true hazard ratio remained identical to the hypothesized value $HR$.

4. Considering a sample size of 592 patients, we derived the power of such a trial to detect a hazard ratio of $HR$ with the probability of event in the control group of $p_C$.

Steps 1 to 4 were repeated 10,000 times.