

Supplemental Digital Content 8: Supplemental Text 4. Sample size calculation.

After finishing our study, we read the methods proposed by Riley et al.¹ and calculated the sample size as follows:

Five items were prepared to include in our model with an extubation failure rate assumed as 17%.²⁻⁴ In Godet's model predicting extubation failure in brain-injured patients, the C statistic was 0.85.⁵ Using the equations provided by Riley et al.,⁶ we could calculate the corresponding D statistic, $R^2_{D_app}$, $R^2_{O'Quigley_app}$, LR, $R^2_{CS_app}$, $R^2_{CS_adj}$ as 2.096, 0.512, 0.633, 43.01, 0.264, 0.240 respectively. As proposed by Riley et al., the sample size was calculated based on 4 criteria: to estimate the overall outcome proportion with sufficient precision (target the margin of error ≤ 0.05), to produce predicted values with a small mean error across all individuals (target a mean absolute error ≤ 0.05), to target a shrinkage factor of 0.9, and to produce a small optimism in apparent model fit.⁶ The estimated sample size was 217, 197, 162, and 136 for each criterion respectively.

Reference:

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3. Vidotto MC, Sogame LC, Calciolari CC, Nascimento OA, Jardim JR. The prediction of extubation success of postoperative neurosurgical patients using frequency-tidal volume ratios. *Neurocrit Care*. 2008;9(1):83-89.
4. Anderson CD, Bartscher JF, Scripko PD, Biffi A, Chase D, Guanci M, Greer DM. Neurologic examination and extubation outcome in the neurocritical care unit. *Neurocrit Care*. 2011;15(3):490-497.
5. Godet T, Chabanne R, Marin J, Kauffmann S, Futier E, Pereira B, Constantin JM. Extubation Failure in Brain-injured Patients: Risk Factors and Development of a

Prediction Score in a Preliminary Prospective Cohort Study. *Anesthesiology*. 2017;126(1):104-114.

6. Riley RD, Snell KI, Ensor J, Burke DL, Harrell FE Jr, Moons KG, Collins GS. Minimum sample size for developing a multivariable prediction model: PART II - binary and time-to-event outcomes [published correction appears in *Stat Med*. 2019 Dec 30;38(30):5672]. *Stat Med*. 2019;38(7):1276-1296.