R Notebook for the cystectomy study

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## Loading required package: pacman
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1 Index

Welcome to the notebook!

2 Prerequisites

2.1 Formulas

- Indexed blood volume[1]: $BV_i = \frac{70}{\sqrt{\frac{BMI}{22}}}$ [2]
- Estimated blood volume: $BV_e = BV_i \cdot Weight$ [3]
- Blood loss ratio: $BL_r = \frac{BV_e}{BL_a}$ [4]
- Standardization method for age and bmi[5]: $M_i = \frac{0.6745(x_i - \tilde{(x)})}{2 \cdot MAD}$ [6]

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[1]Lemmens, H. J. M., Bernstein, D. P., & Brodsky, J. B. (2006). Estimating blood volume in obese and morbidly obese patients. Obesity Surgery, 16(6), 773–776. https://doi.org/10.1381/096089206777346673

[2]BV_i = Indexed blood volume, BMI = Body mass index
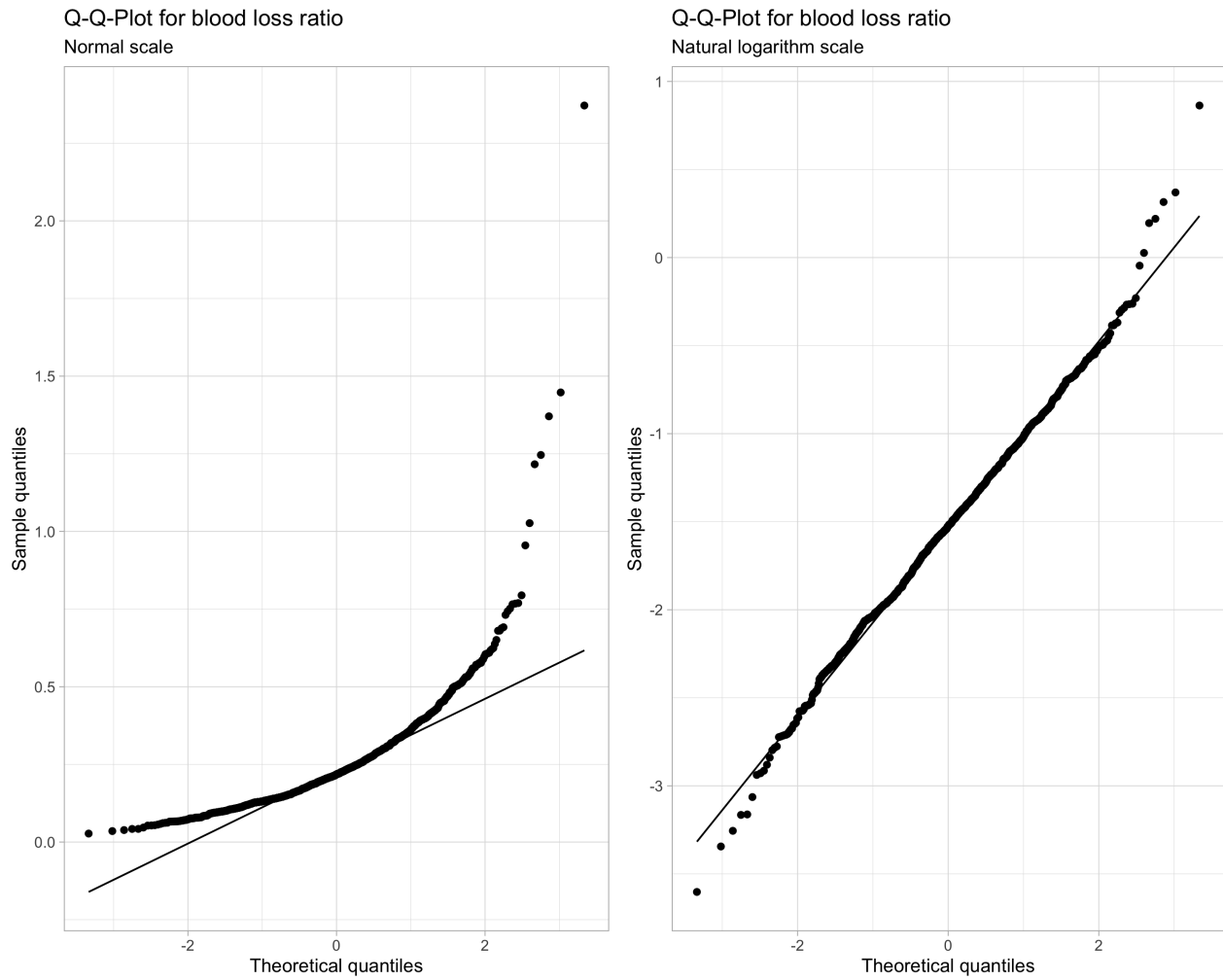
[3]BV_e = Estimated blood volume

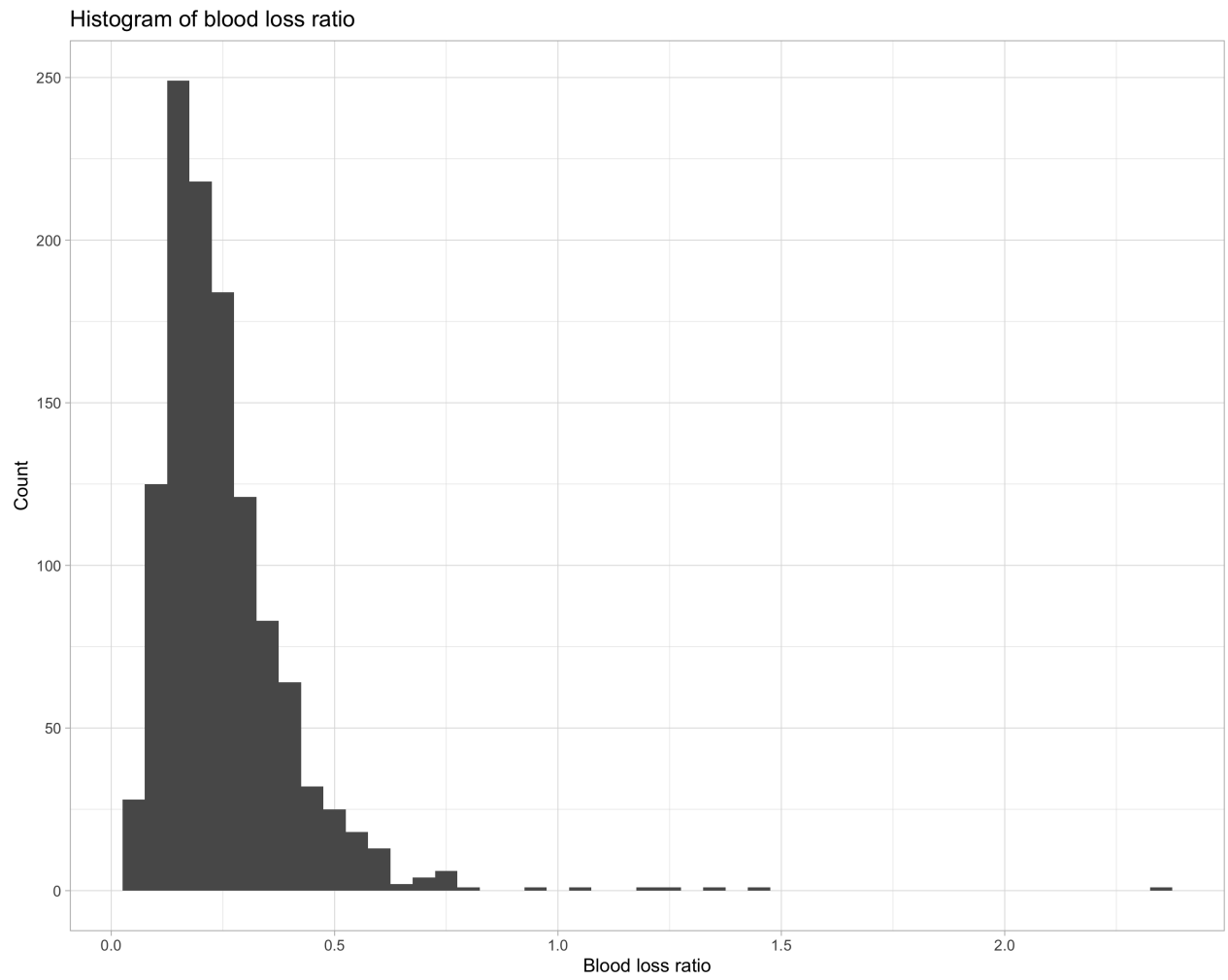[4]BL_r = Blood loss ratio, BL_a = Absolute blood loss

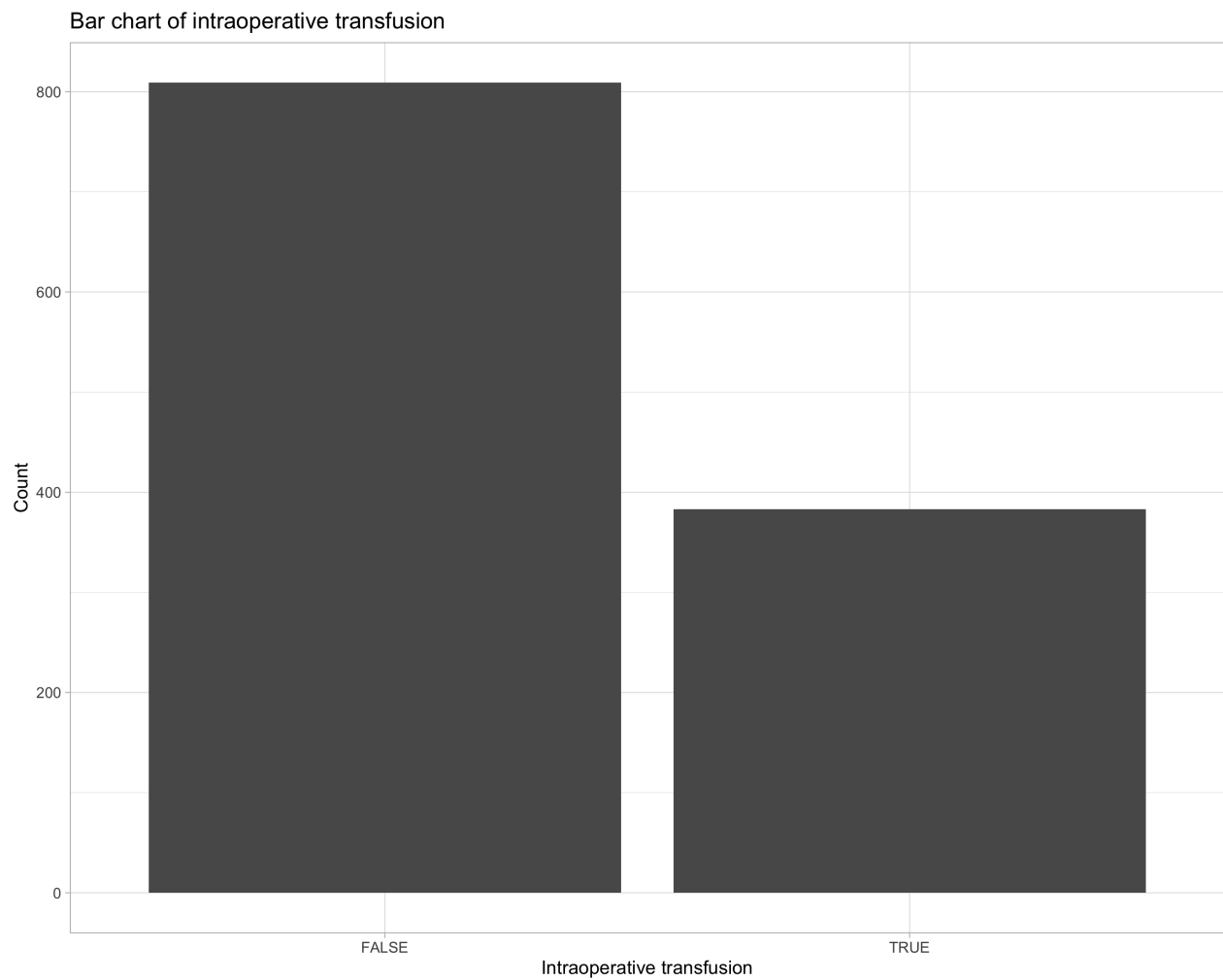[5]Iglewicz, B., & Hoaglin, D. C. (1993). How to detect and handle outliers. Milwaukee, Wis: ASQC Quality Press.

[6]M_i = Modified Z-score, $\tilde{(x)}$ = Median of x, MAD = Median absolute deviation

3 Results

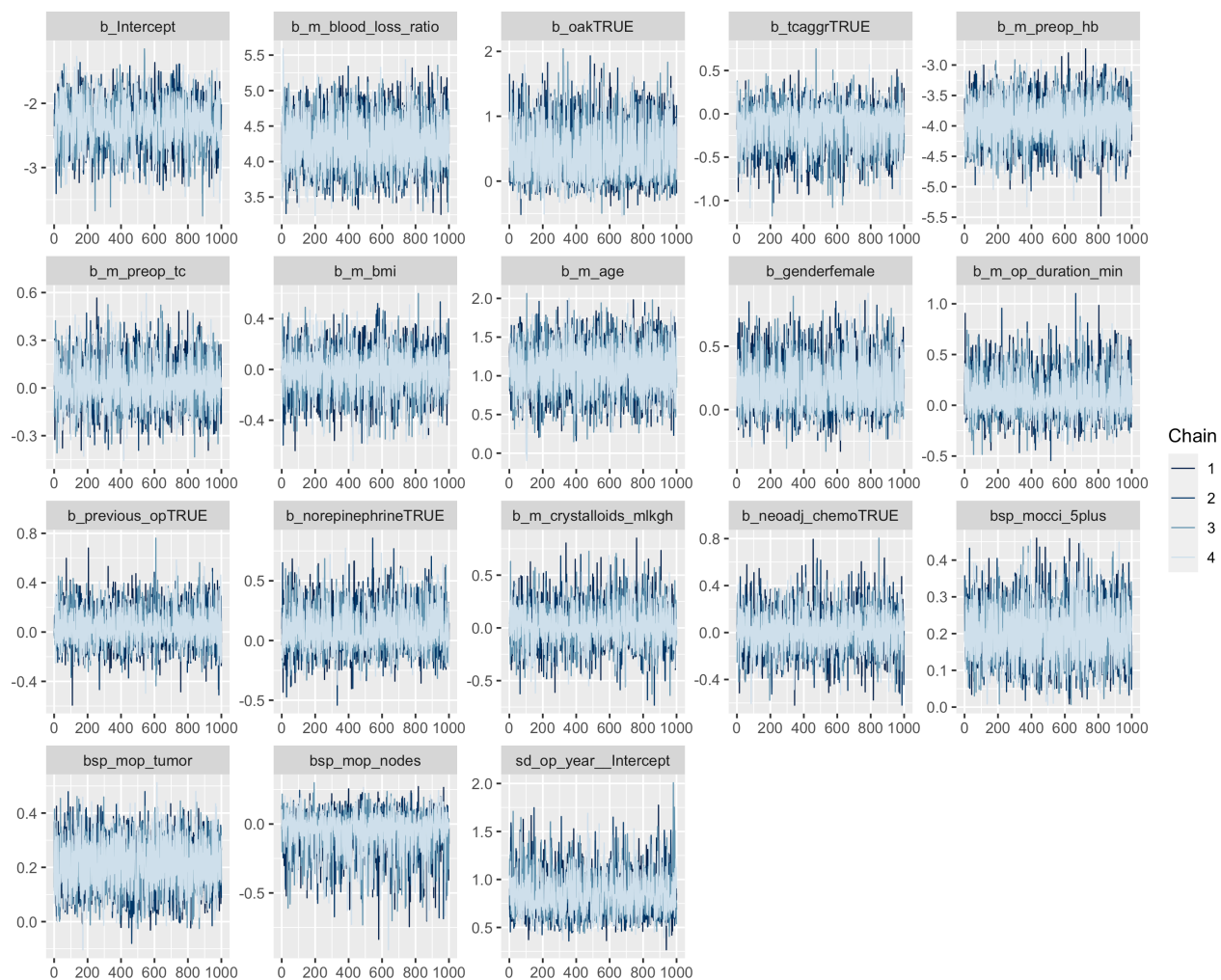## 3.1 Data plots

Q-Q-Plot for blood loss ratio
Normal scale

Q-Q-Plot for blood loss ratio
Natural logarithm scale

Histogram of blood loss ratio

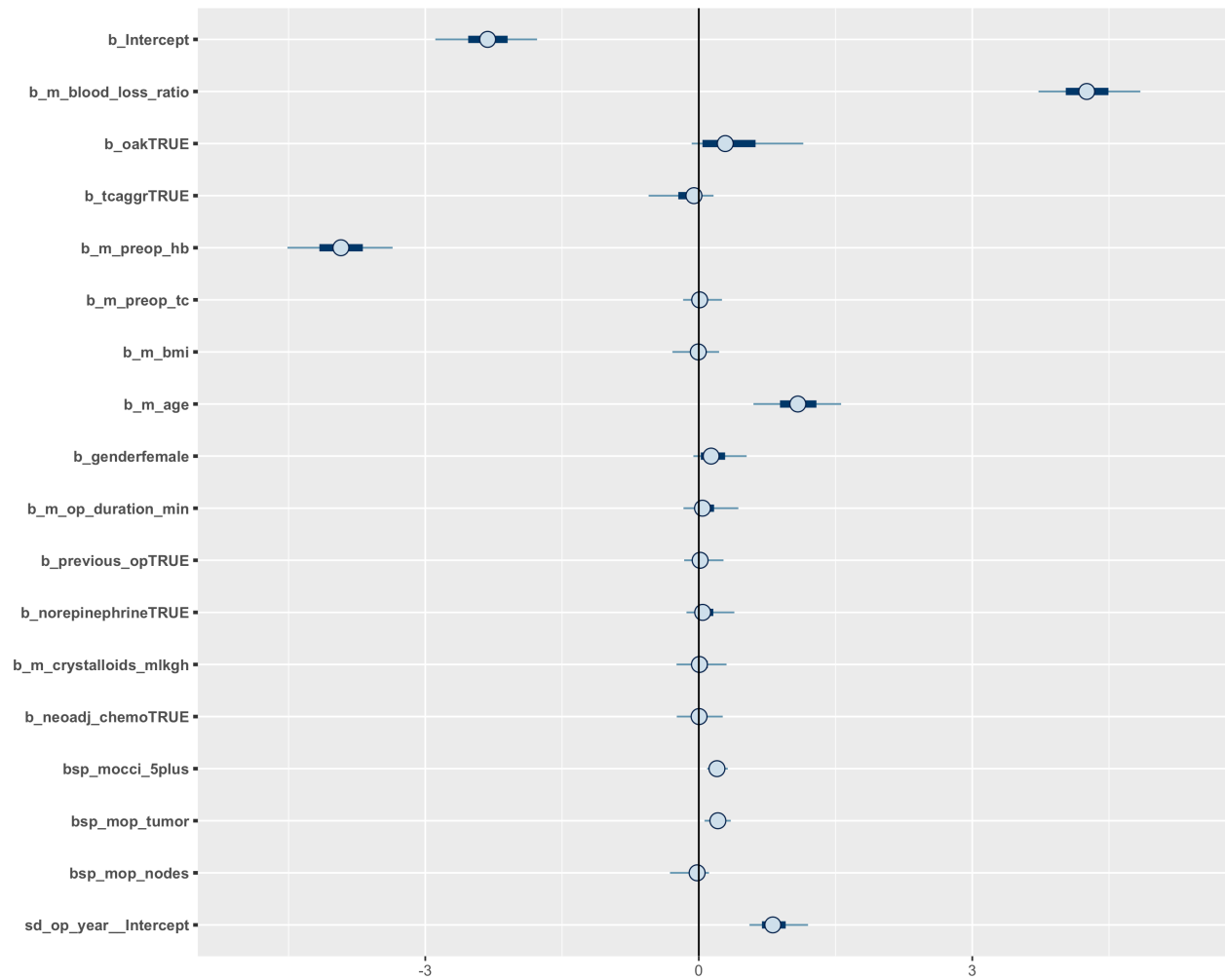Bar chart of intraoperative transfusion

3.2   Model outputs

3.2.1   Models with intraoperative transfusion as response
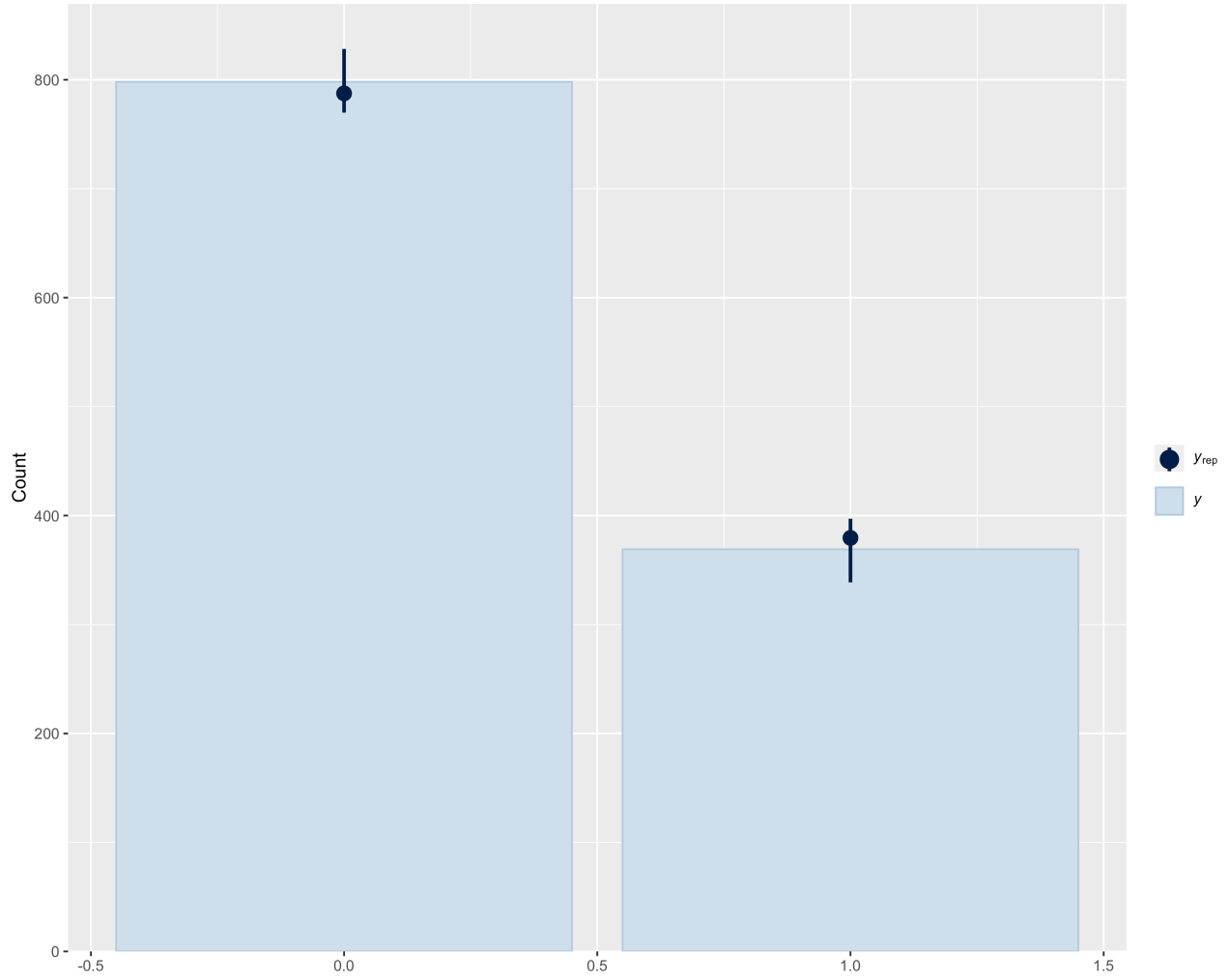
3.2.1.1   Full model

3.2.1.1.1   Diagnostics

```
#> No divergences to plot.
```

3.2.1.1.2 Posterior predictive check plot

```
#> Using 10 posterior samples for ppc type 'bars' by default.
```

3.2.1.1.3 Summary

Table 1: Table continues below

	Parameter	Median	CI	CI_low	CI_high
2	b_Intercept	-2.316	95	-2.976	-1.652
4	b_m_blood_loss_ratio	4.256	95	3.619	4.937
12	b_oakTRUE	0.2904	95	-0.2074	1.212
14	b_tcaggrTRUE	-0.05321	95	-0.6047	0.275
8	b_m_preop_hb	-3.926	95	-4.657	-3.283
9	b_m_preop_tc	0.009459	95	-0.2185	0.3044
5	b_m_bmi	-0.005621	95	-0.3602	0.2736
3	b_m_age	1.086	95	0.5356	1.689
1	b_genderfemale	0.1352	95	-0.1239	0.5736
7	b_m_op_duration_min	0.04048	95	-0.2655	0.4862
13	b_previous_opTRUE	0.01464	95	-0.2235	0.3102
11	b_norepinephrineTRUE	0.0425	95	-0.2008	0.4329
6	b_m_crystalloids_mlkgh	0.006921	95	-0.3254	0.3697
10	b_neoadj_chemoTRUE	0.003186	95	-0.3261	0.3225
15	bsp_mocci_5plus	0.1992	95	0.06772	0.3381
17	bsp_mop_tumor	0.2094	95	0.03192	0.3742

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	Parameter	Median	CI	CI_low	CI_high
16	bsp_mop_nodes	-0.01825	95	-0.3614	0.1658

	p_MAP	pd	ROPE_CI	ROPE_low	ROPE_high	ROPE_Percentage
2	0	1	100	-0.055	0.055	0
4	0	1	100	-0.055	0.055	0
12	0.9866	0.8448	100	-0.055	0.055	0.206
14	0.9974	0.6905	100	-0.055	0.055	0.3543
8	0	1	100	-0.055	0.055	0
9	0.9997	0.5665	100	-0.055	0.055	0.462
5	0.9965	0.539	100	-0.055	0.055	0.4218
3	0.006724	0.9988	100	-0.055	0.055	0.00125
1	0.9882	0.824	100	-0.055	0.055	0.2795
7	0.9992	0.6548	100	-0.055	0.055	0.3762
13	0.9994	0.5903	100	-0.055	0.055	0.4655
11	0.999	0.674	100	-0.055	0.055	0.3892
6	0.9996	0.546	100	-0.055	0.055	0.4098
10	0.9956	0.5248	100	-0.055	0.055	0.4335
15	0	1	100	-0.055	0.055	0.0155
17	0.08488	0.991	100	-0.055	0.055	0.04225
16	0.9998	0.6158	100	-0.055	0.055	0.5112

3.2.1.1.4 Region of practical equivalence Using a ROPE range of -0.055 to 0.055 $(0.1 \cdot \frac{\sqrt{3}}{\pi})$ and a CI of 1.

Region of Practical Equivalence (ROPE)
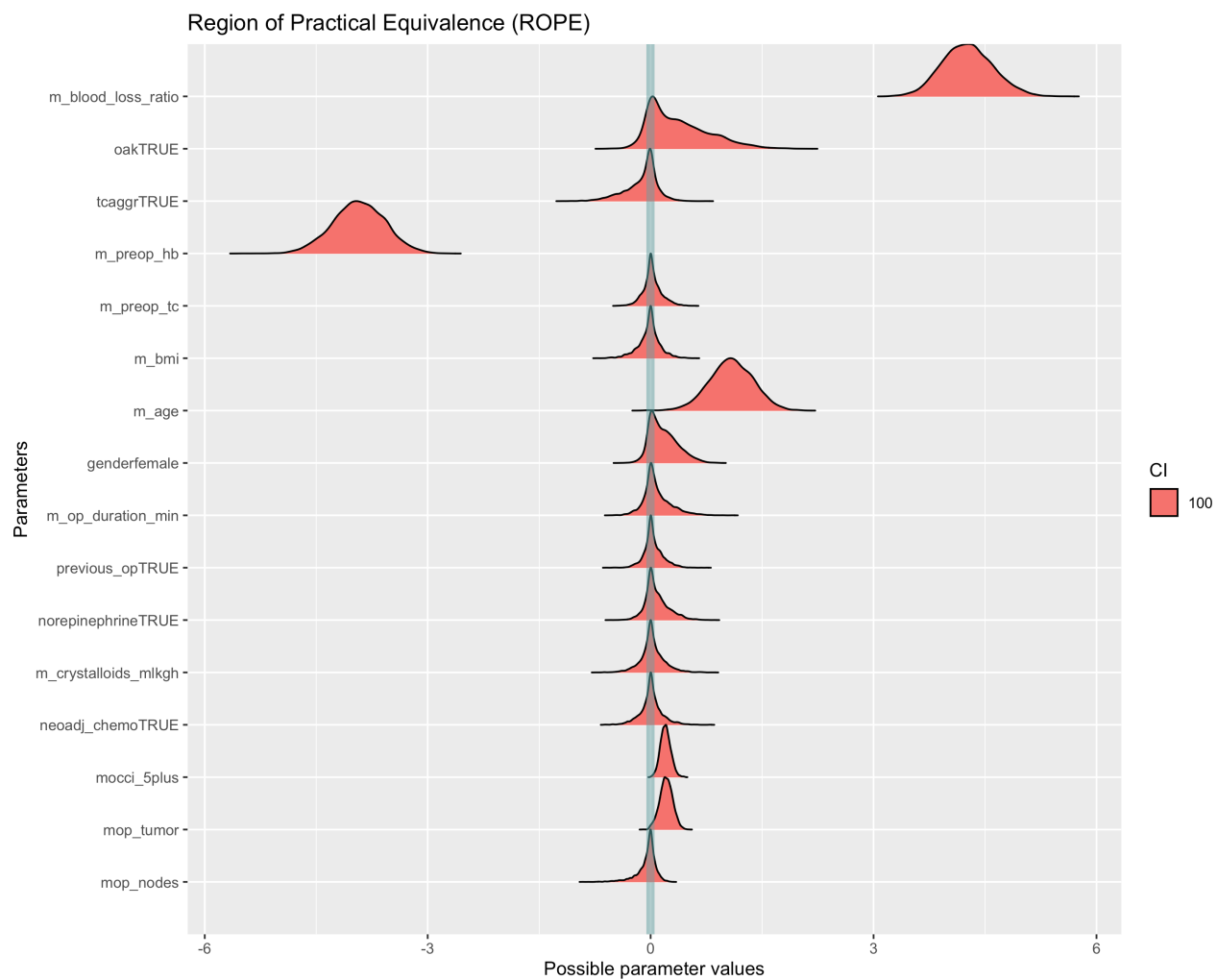
3.2.1.1.5 ROC-AUC

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#> AUC: 0.879159280314611
```
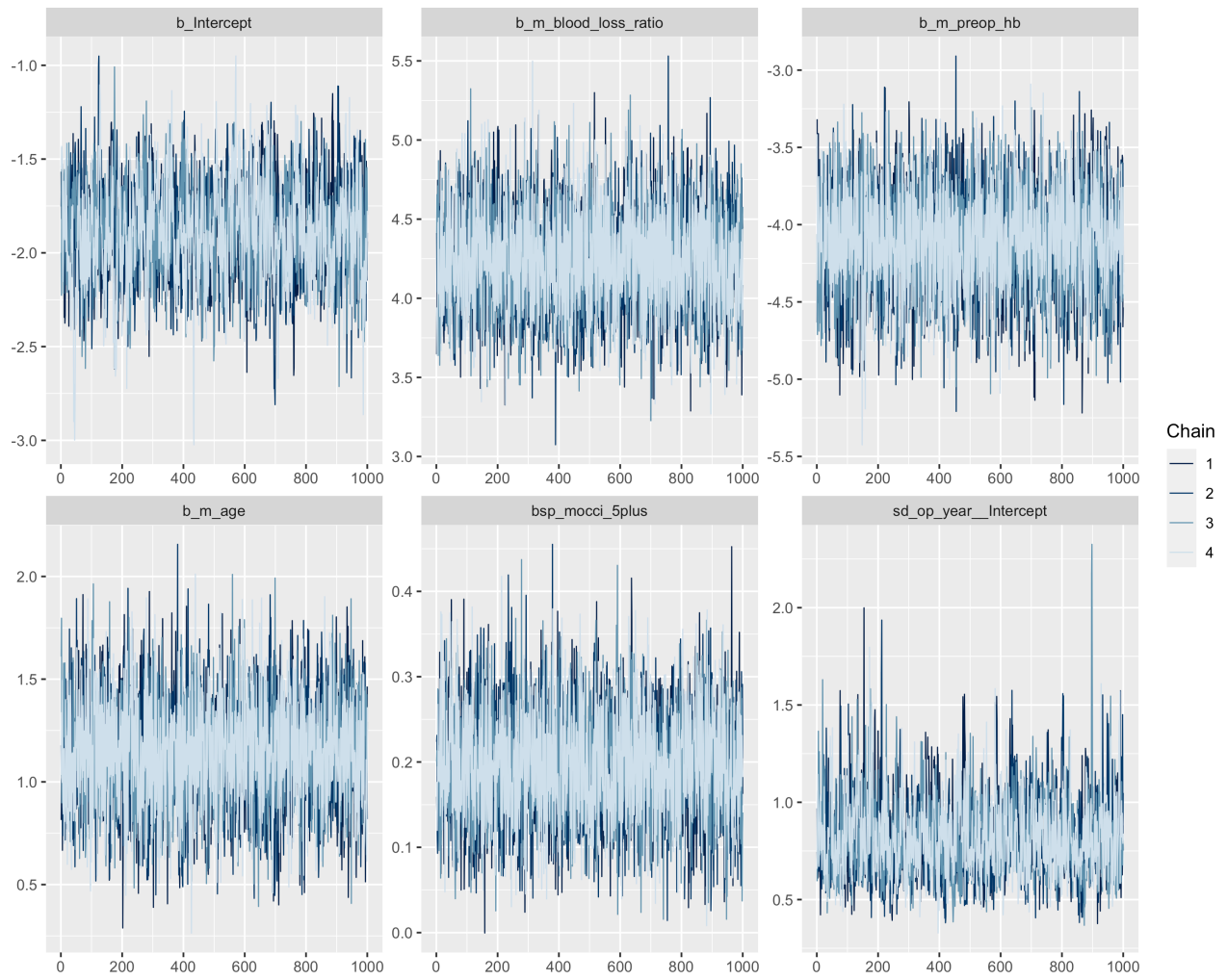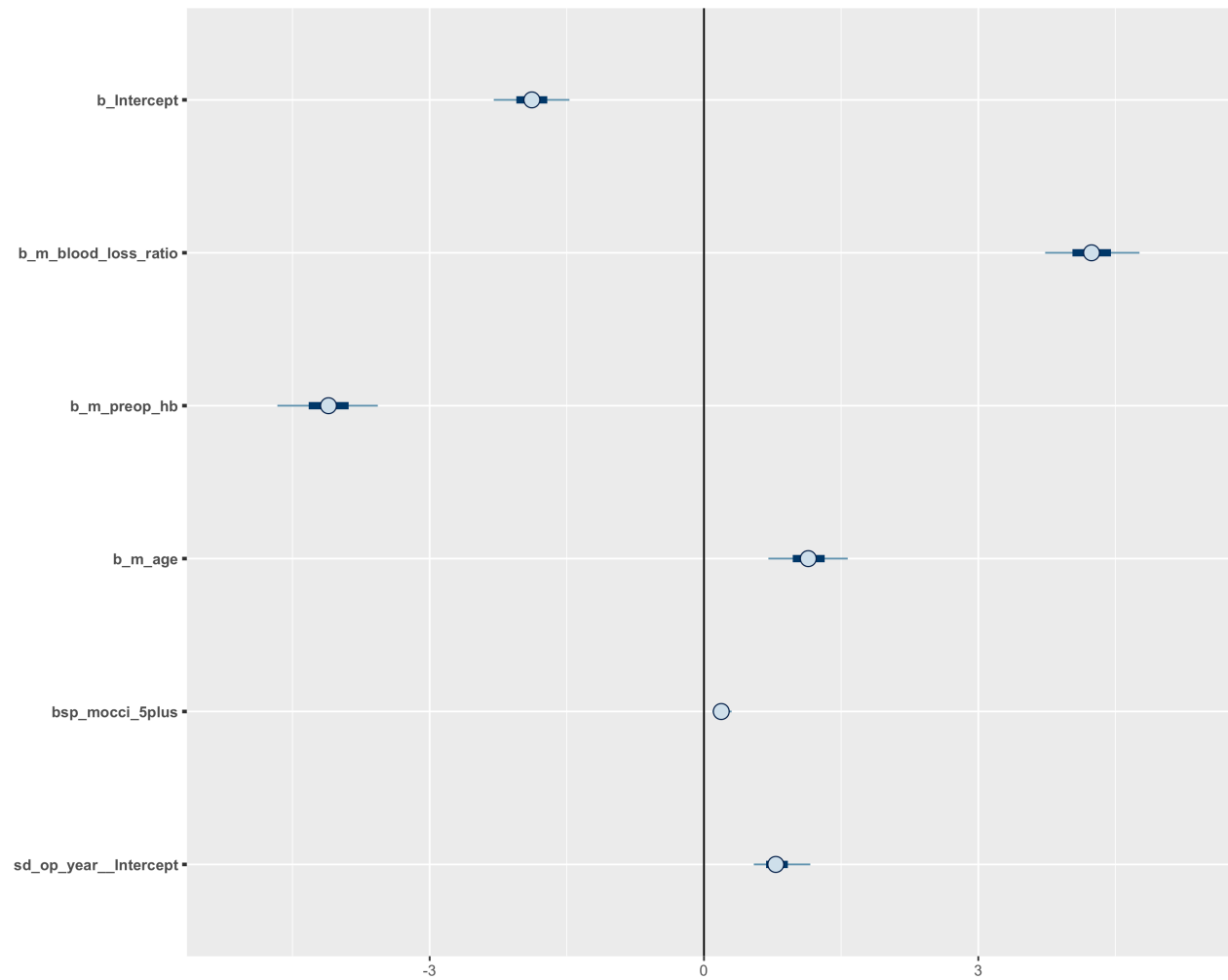
ROC-AUC
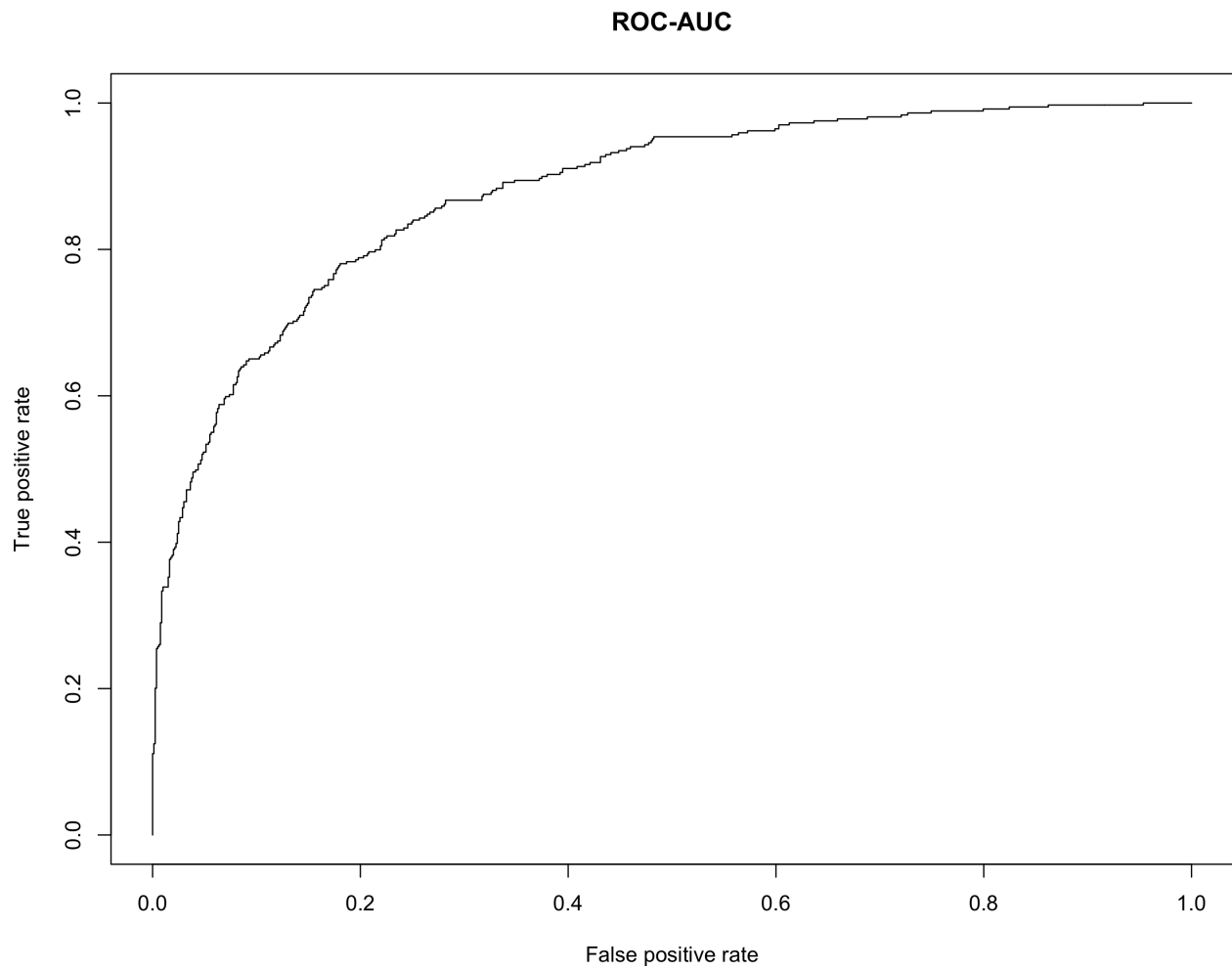
3.2.1.1.6 Conditional probability plot
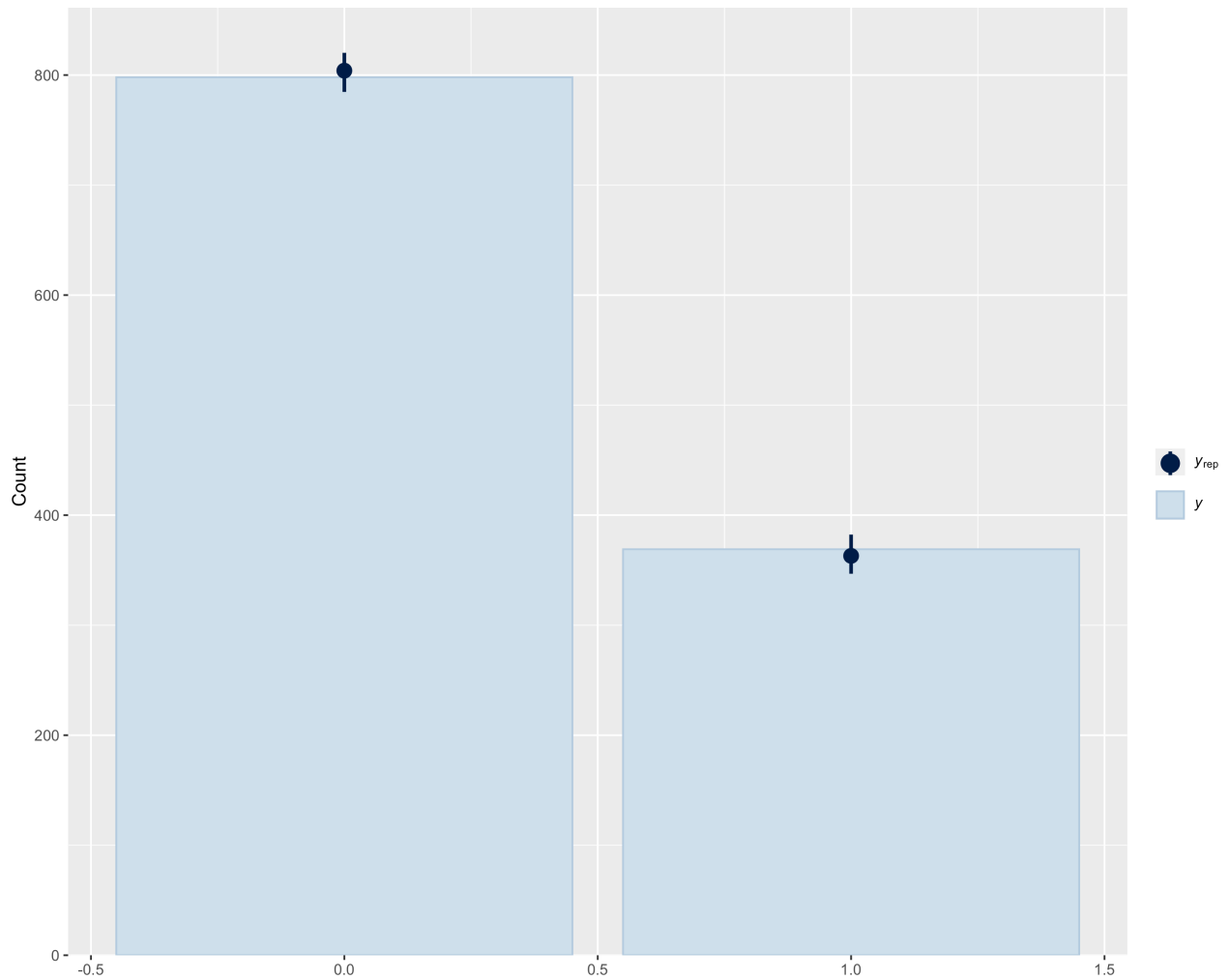
3.2.1.2 Reduced model

3.2.1.2.1 Diagnostics

```
#> No divergences to plot.
```

3.2.1.2.2 Posterior predictive check plot

```
#> Using 10 posterior samples for ppc type 'bars' by default.
```

3.2.1.2.3 Summary

Table 3: Table continues below

	Parameter	Median	CI	CI_low	CI_high	p_MAP
1	b_Intercept	-1.882	95	-2.38	-1.392	0
3	b_m_blood_loss_ratio	4.238	95	3.631	4.851	0
4	b_m_preop_hb	-4.106	95	-4.753	-3.466	0
2	b_m_age	1.141	95	0.6149	1.642	0
5	bsp_mocci_5plus	0.1888	95	0.06218	0.3124	0.005719

	pd	ROPE_CI	ROPE_low	ROPE_high	ROPE_Percentage
1	1	100	-0.055	0.055	0
3	1	100	-0.055	0.055	0
4	1	100	-0.055	0.055	0
2	1	100	-0.055	0.055	0
5	0.9998	100	-0.055	0.055	0.0125

3.2.1.2.4   Region of practical equivalence   Using a ROPE range of -0.055 to 0.055 $(0.1 \cdot \frac{\sqrt{3}}{\pi})$ and a CI of 1.
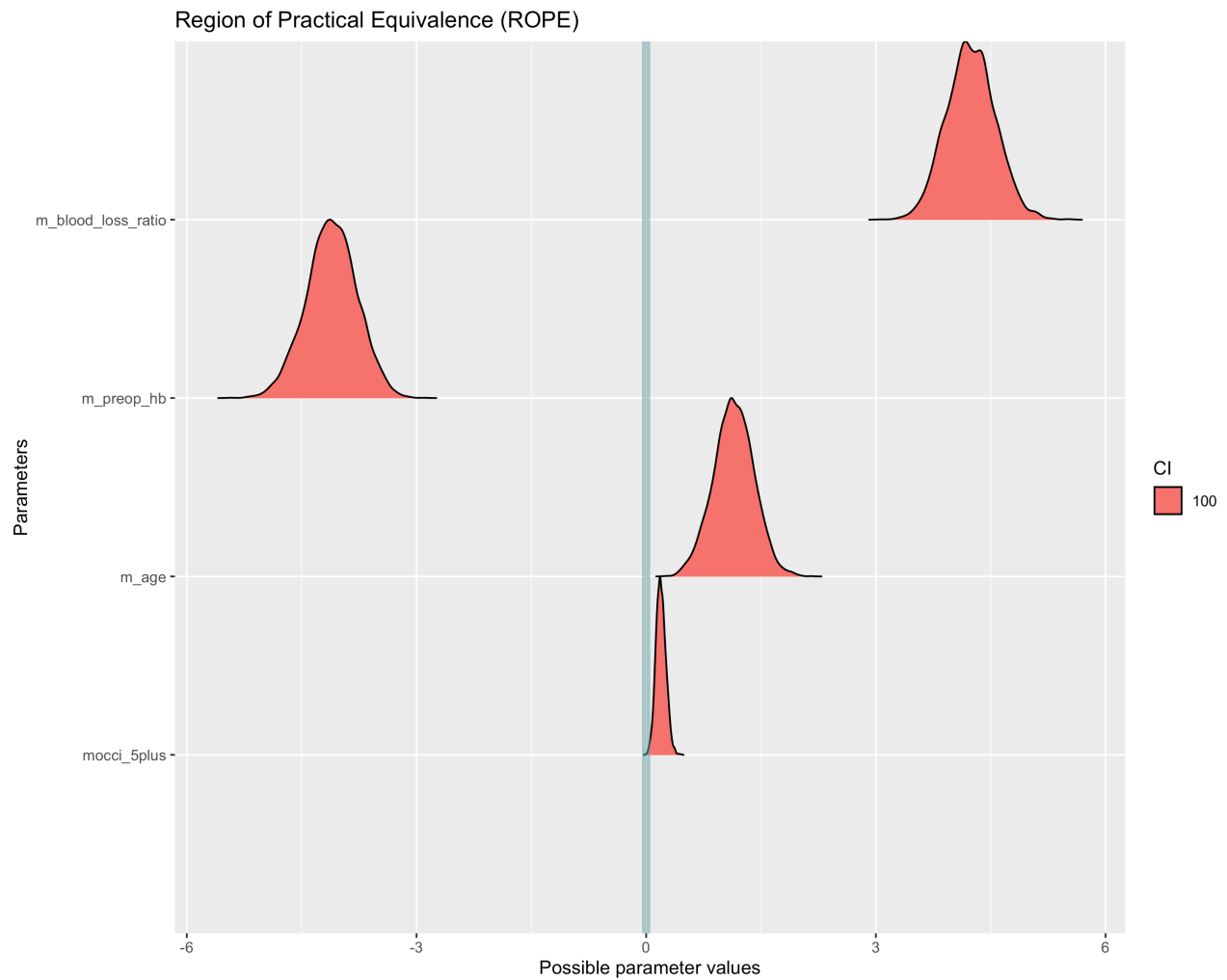
3.2.1.2.5   ROC-AUC

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#> AUC: 0.873386039624811
```

ROC-AUC

3.2.1.2.6 Conditional probability plot