

Table1 Basic clinical information for pregnant women and fetuses on the occurrence of fetal distress

Characteristic	Total cases (n=930)		Internal Validation cases(70 percentage) (n=654)	
	Fetal distress (n=150)	Control (n=780)	Fetal distress (n=103)	Control (n=551)
Age(years old)				
<35	110	643	76	456
35-39	26	116	16	79
>=40	14	21	11	16
Gestational week				
>=37	59	524	47	372
34-36w+6	47	161	28	115
28-33w+6	44	95	28	64
Delivery method				
Vaginal delivery	31	312	19	223
Cesarean section	119	468	84	328
Placenta previa				
Yes	4	43	4	30
No	146	737	99	521
Abnormal cord blood flow ( absent or upside down )				
Yes	26	16	18	9
No	124	764	85	542
Using LMWH				
Yes	24	213	13	145
No	126	567	90	406

Table2 Basic clinical information for pregnant women and fetuses on the occurrence of admission to NICU

Characteristic	Total Cases (n=930)		Internal Validation cases(70 percentage) (n=654)	
	Admission to NICU(n=452)	Control (n=478)	Admission to NICU(n=229)	Control (n=355)
Pregnancy times				
<3	287	355	187	264
>=3	165	123	112	91
Gestational week				
>=37	170	413	111	308

34-36w+6	163	45	109	34
28-33w+6	119	20	79	13
Delivery method				
Vaginal delivery	100	243	64	178
Cesarean section	352	235	235	177
HDP				
Yes	135	41	96	29
No	317	437	203	326
ICP				
Yes	42	19	28	16
No	410	459	271	339
Oligohydramnios				
Yes	84	52	56	39
No	368	426	243	316
RSA				
Yes	20	11	11	10
No	432	467	288	345
Using prednisone				
Yes	17	8	9	6
No	435	470	290	349
Newborn sex				
Boy	180	147	116	110
Girl	272	331	183	245

Abbreviations:HDP, hypertensive disorders of pregnancy; ICP, intrahepatic cholestasis of pregnancy; RSA, recurrent spontaneous abortion.

Table3 Prediction factors for fetal distress by logistic regression analysis in FGR

Intercept and variable	Prediction model one ( fetal distress )		
	Odds ratio	Odds ratio (95% CI)	P-value
Intercept	0.071	0.045-0.108	<0.001
Age(35-39 vs <35)	1.174	0.696-1.924	0.534
Age(>=40 vs <35)	4.058	1.872-8.622	<0.001
Gestational week (34w-36w+6 vs >=37w)	2.064	1.311-3.235	0.002
Gestational week(28w-33w+6 vs >=37w)	1.950	1.139-3.281	0.013
Delivery method(Cesarean section)	2.292	1.460-3.692	<0.001
Placenta previa	0.330	0.094-0.878	0.046
Abnormal cord blood flow	7.563	3.653-16.146	<0.001
Using LMWH	0.554	0.331-0.895	0.020

Table4 Prediction factors for NICU by logistic regression analysis in FGR

Intercept and variable	Prediction model two ( Admission to NICU )		
	Odds ratio	Odds ratio (95% CI)	P-value
Intercept	0.231	0.160-0.331	<0.001
Pregnancy times( $\geq 3$ vs $< 3$ )	1.147	0.805-1.631	0.446
Gestational week(34w-36w+6 vs $\geq 37$ w)	6.554	4.441-9.819	<0.001
Gestational week(28w-33w+6 vs $\geq 37$ w)	9.386	5.495-16.698	<0.001
Delivery method (Cesarean section vs Vaginal delivery)	2.329	1.676-3.247	<0.001
HDP	1.666	1.047-2.665	0.032
ICP	2.330	1.223-4.536	0.011
Oligohydramnios	1.508	0.970-2.353	0.069
RSA	1.830	0.751-4.578	0.187
Using prednisone	2.120	0.835-5.690	0.120
Newborn sex(Girl vs boy)	0.823	0.594-1.143	0.244

Abbreviations: HDP, hypertensive disorders of pregnancy; ICP, intrahepatic cholestasis of pregnancy; RSA, recurrent spontaneous abortion.

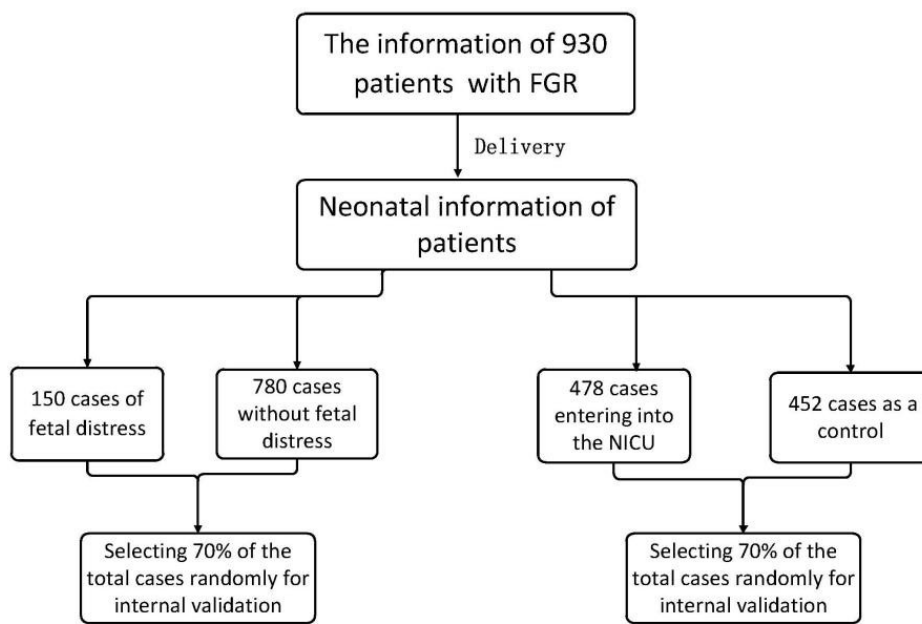


Figure 1A Study workflow of our research

Figure 1B

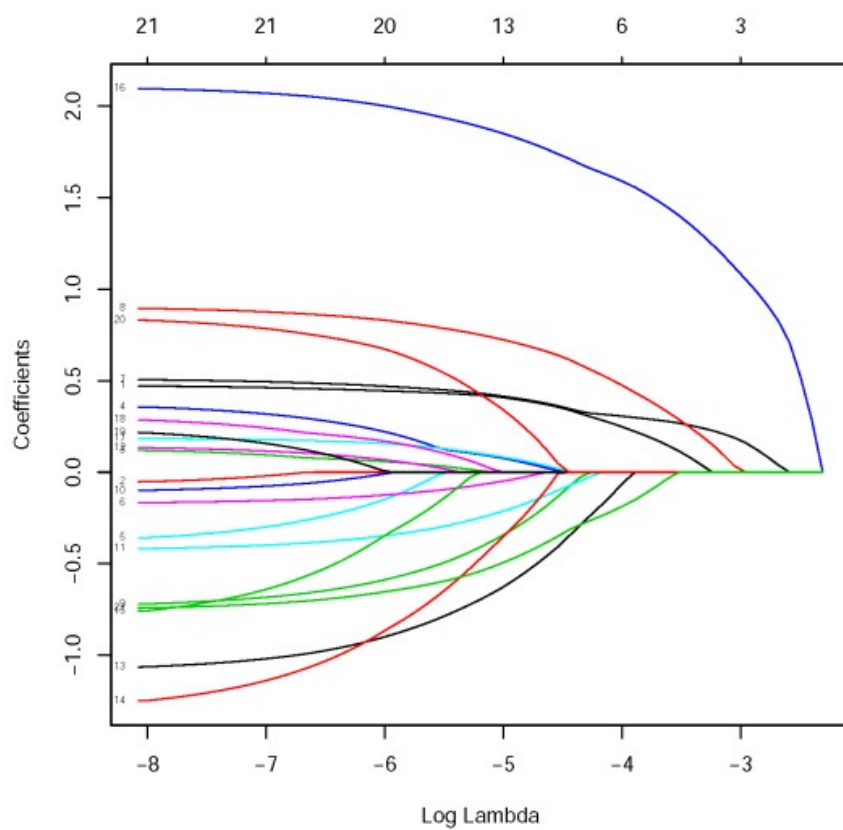


Figure 1C

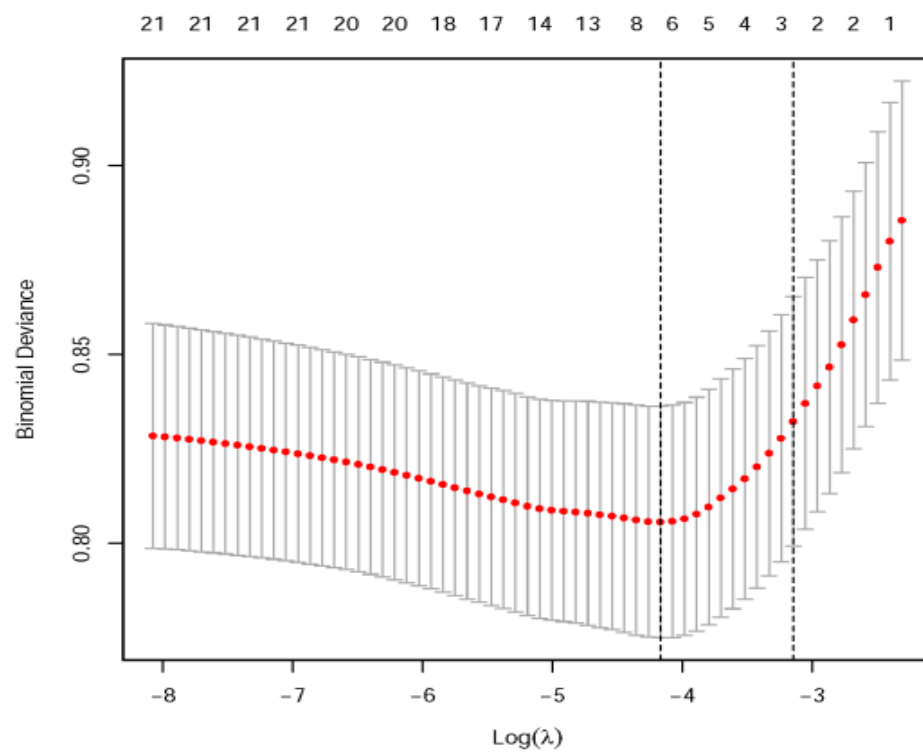


Figure 1D

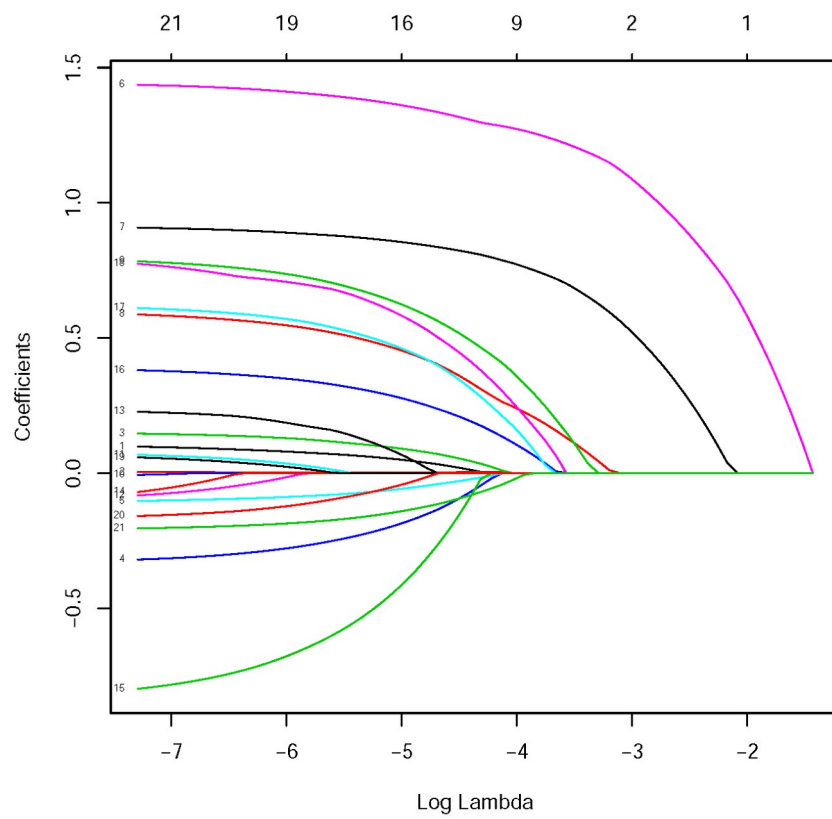


Figure 1E

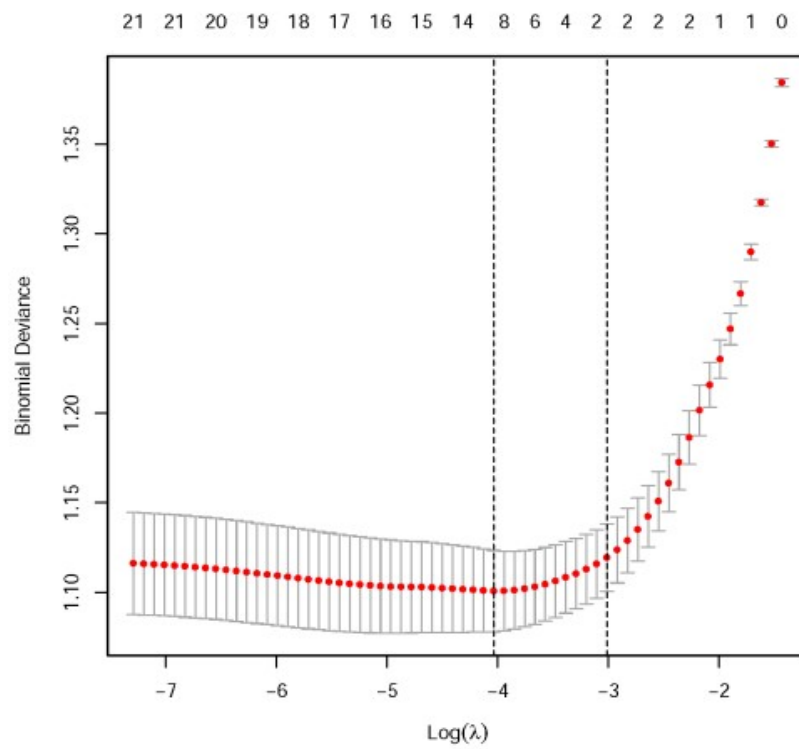


Figure 1 Study workflow and clinical characteristics selection using the LASSO regression analysis.

LASSO coefficient profiles of the twenty-one features were plotted according to the log(lambda) sequence about fetal distress (Figure 1B) and admission to NICU (Figure 1D). The binomial deviance curves were produced versus log(lambda) about fetal distress (Figure 1C) and admission to NICU (Figure 1E). Dotted vertical lines were plotted at the optimal values by using the minimum criteria and the 1-standard error criteria.

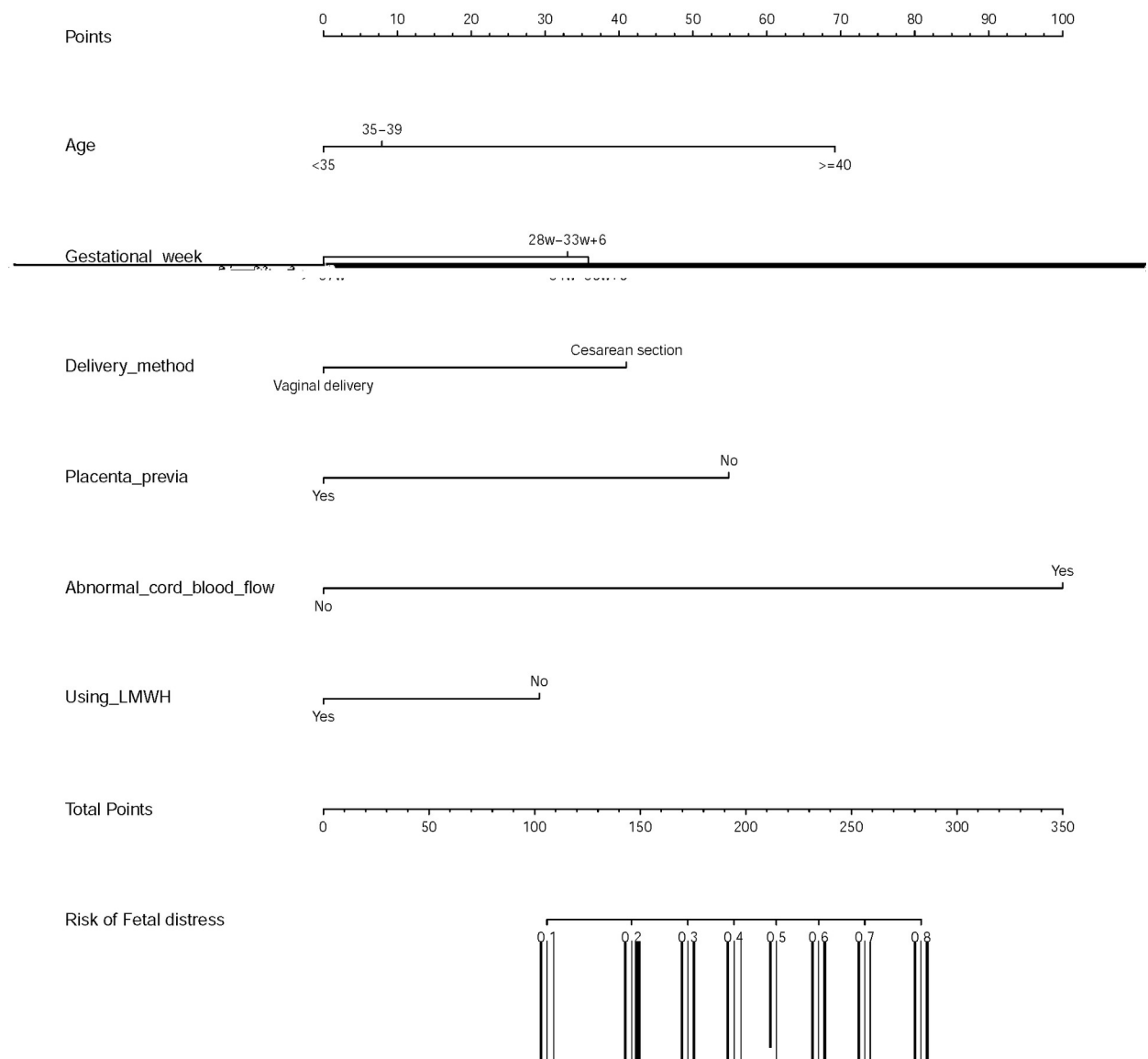


Figure 2A Risk of fetal distress nomogram

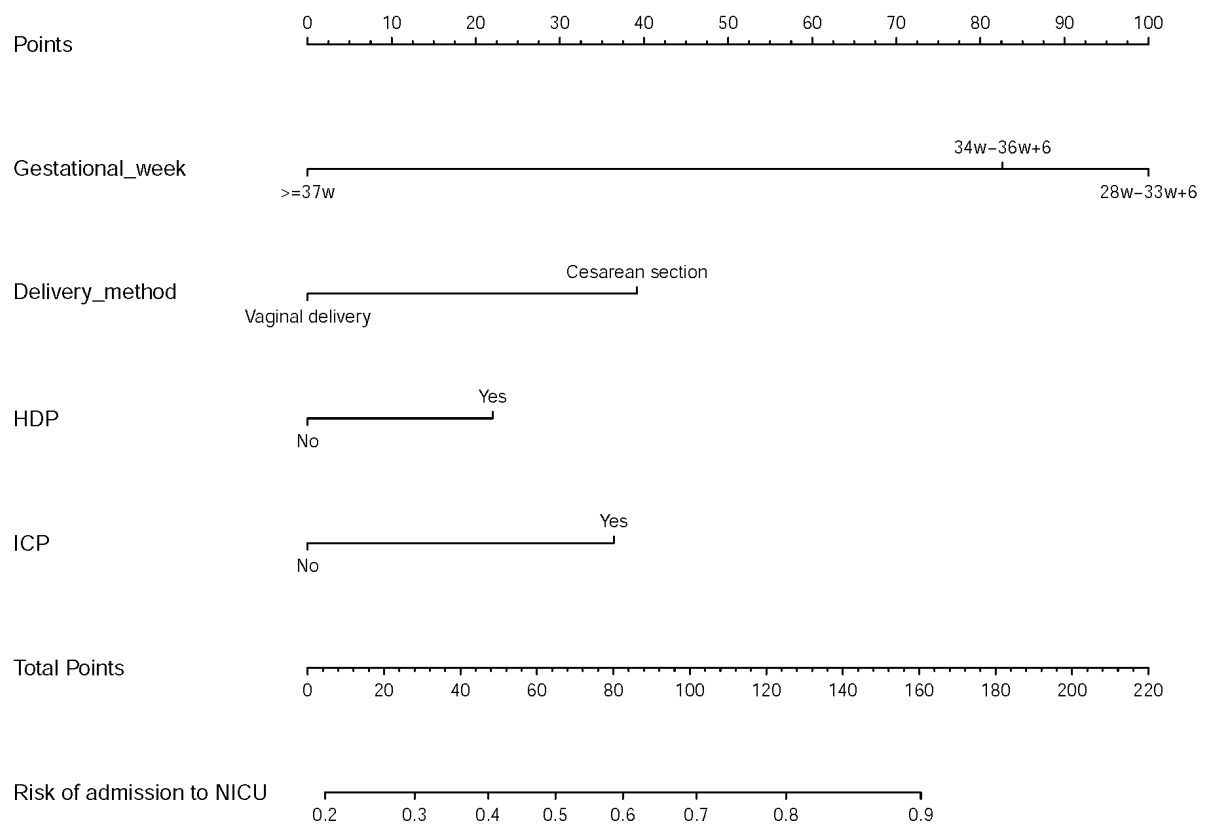


Figure 2B Risk of admission to NICU nomogram



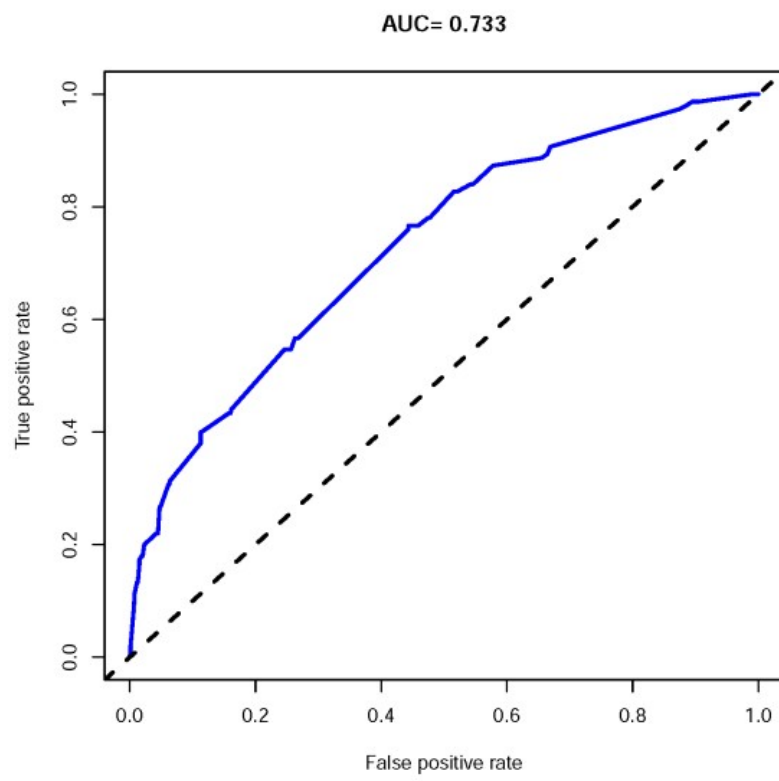


Figure3A

Figure 3B

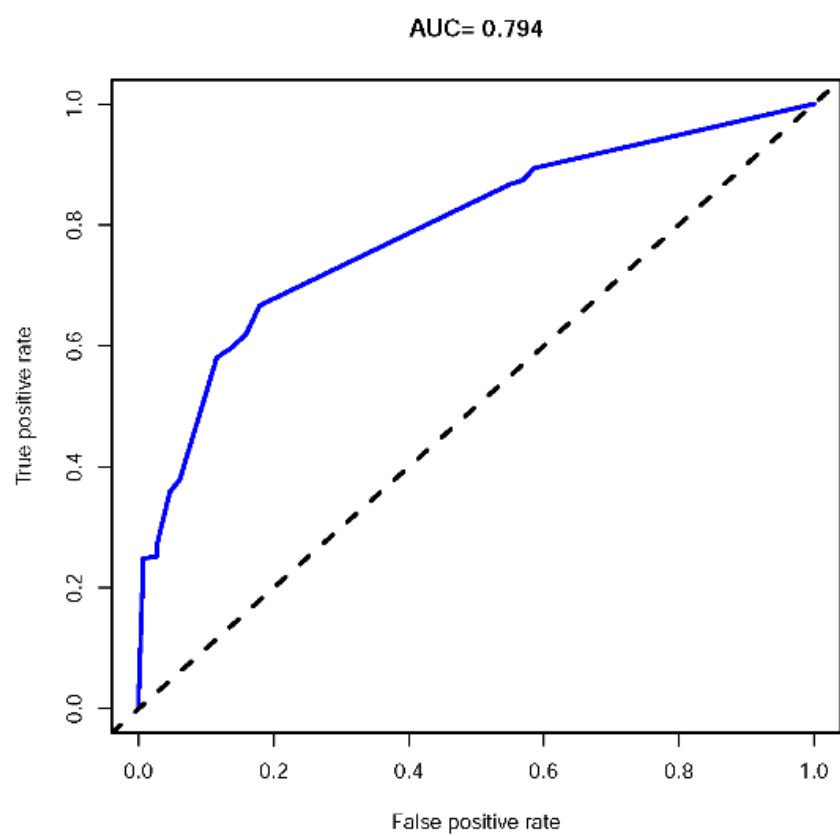


Figure 3C

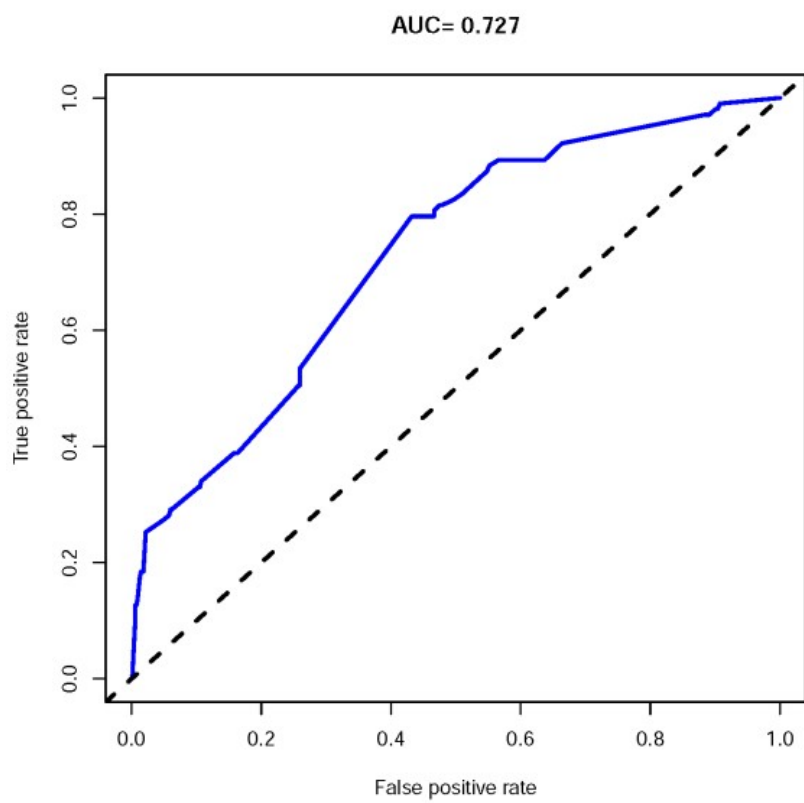


Figure 3D

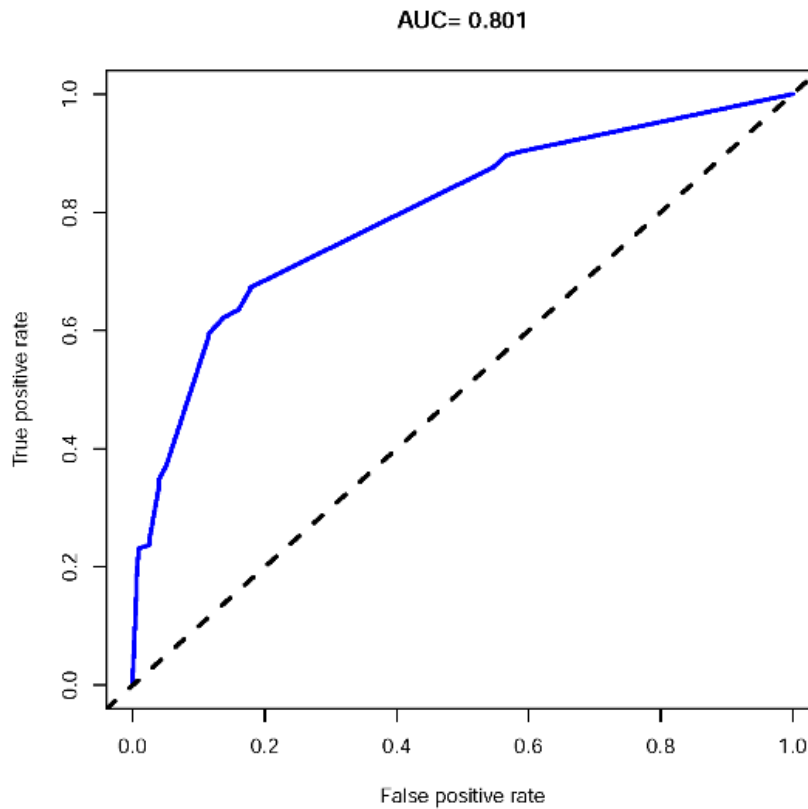


Figure 3 ROC curves for predicting the fetal distress risk and admission to NICU risk in the total and the internal Validation cases.

(3A) ROC curve in the total cases of prediction model one. (3B) ROC curve in the total cases of prediction model two. (3C) ROC curve in the internal validation cases of prediction model one. (3D) ROC curve in the internal validation cases of prediction model two.

Figure 4A

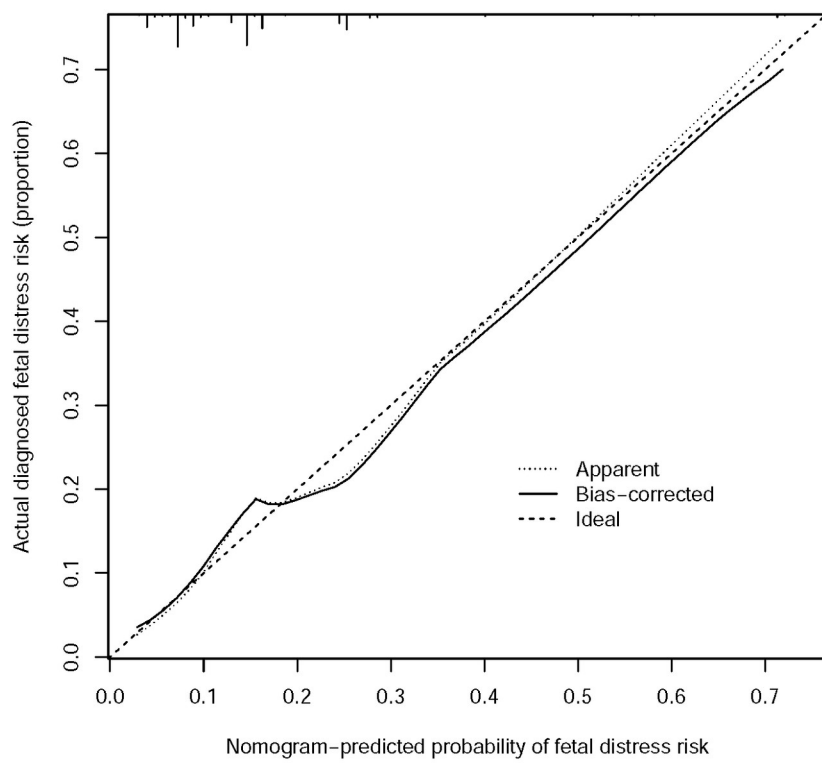


Figure 4B

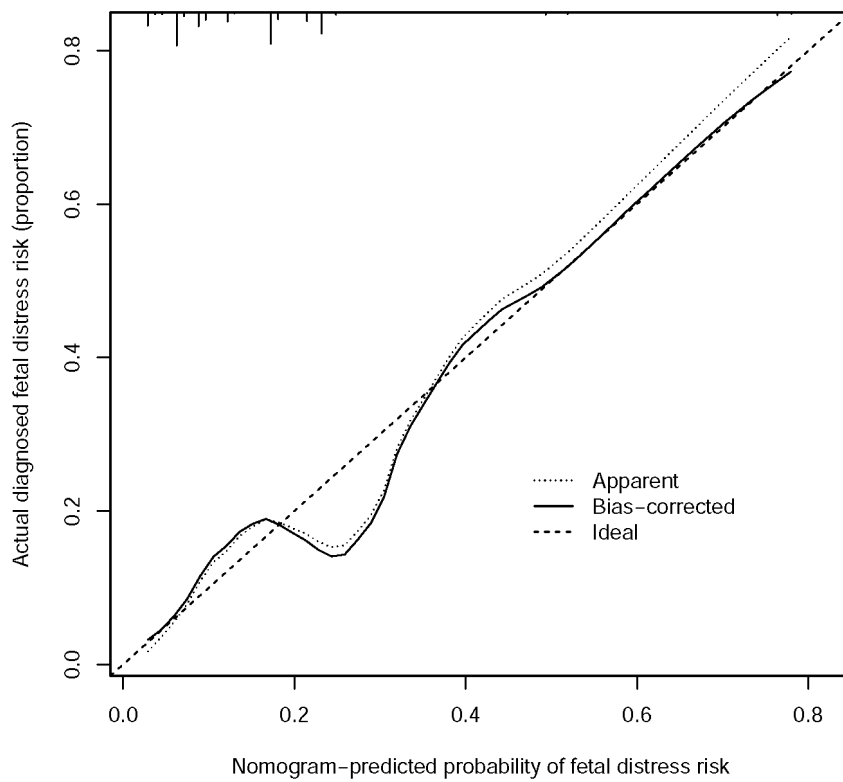


Figure 4C

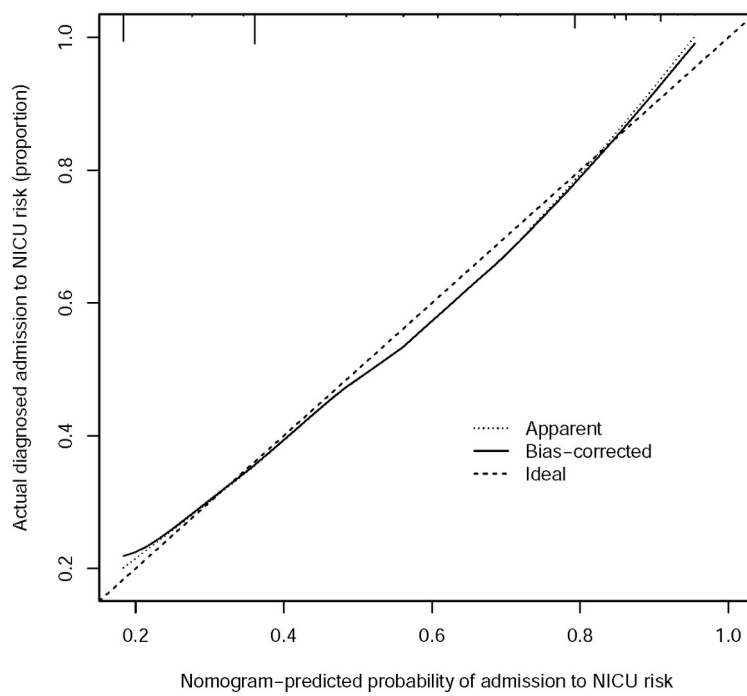


Figure 4D

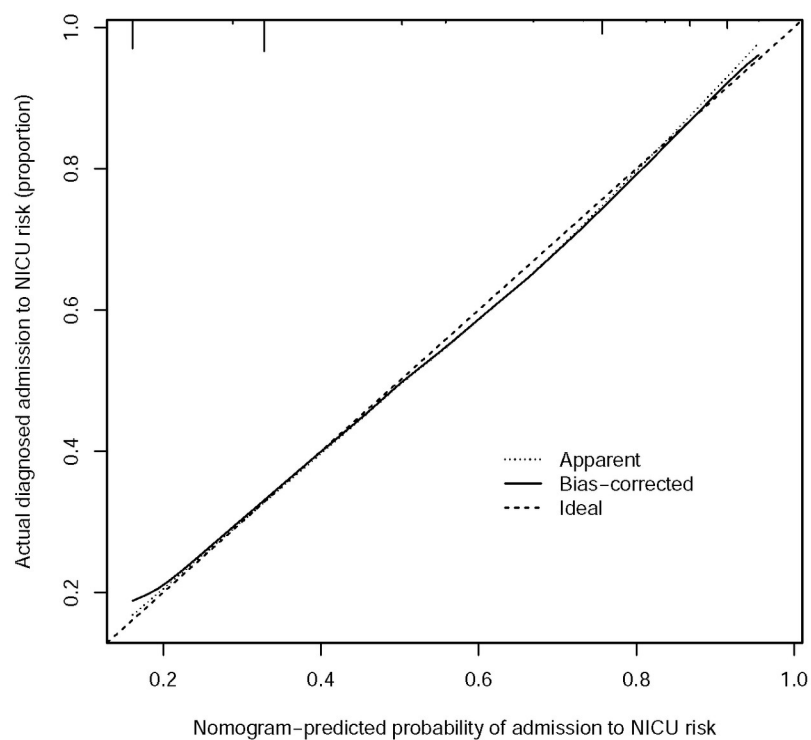


Figure 4 Calibration curves for predicting the fetal distress risk and admission to NICU risk in the total and the internal Validation cases.

The x-axis measures the predicted fetal distress risk or admission to NICU risk. The y-axis represents the actual diagnosed fetal distress risk or admission to NICU risk. The diagonal dotted line represents an ideal prediction model. The solid line measures the performance of the nomogram, and a better prediction effect is that it is closer to the diagonal dotted line.

Figure 5A

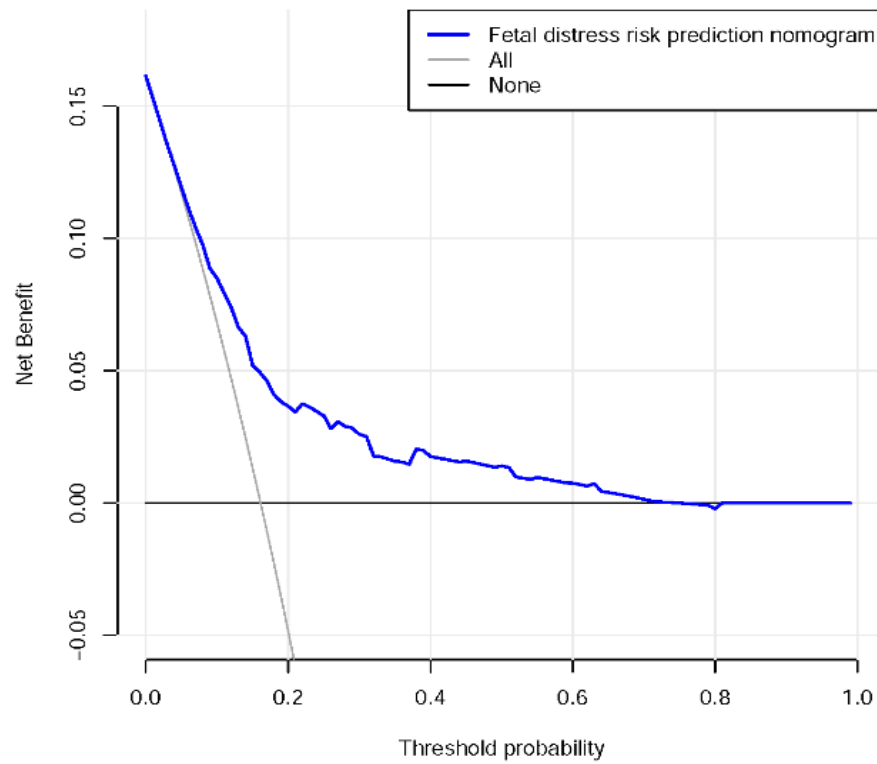


Figure 5B

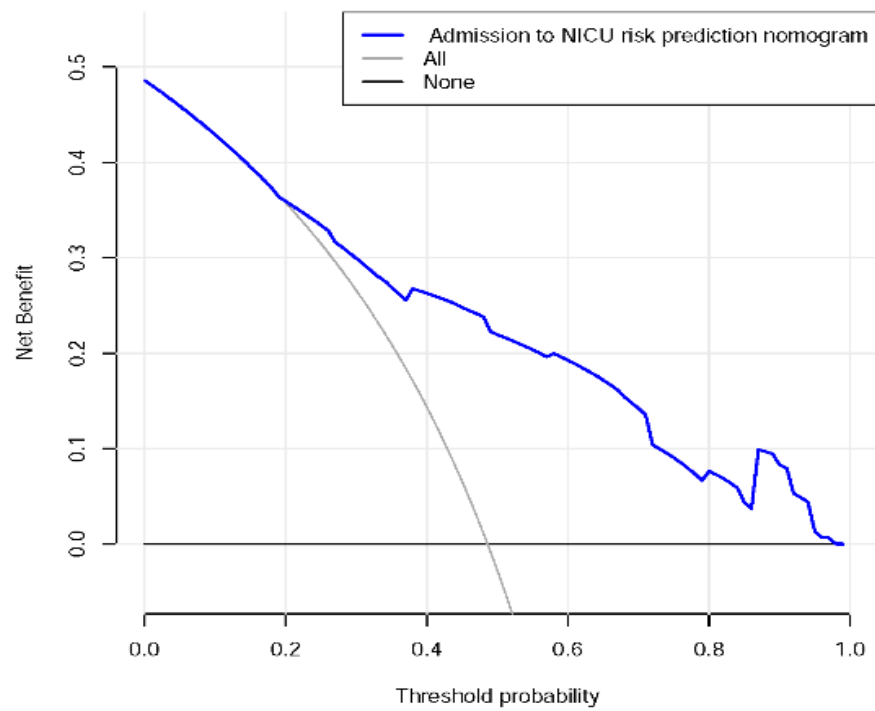


Figure 5 Decision curve analysis for the fetal distress risk nomogram(A) and admission to NICU

risk nomogram(B)

The y-axis represents the net benefit. The blue solid line measures the fetal distress risk nomogram(Figure 5A) and admission to NICU risk nomogram(Figure 5B). The thin solid line presumes all patients with FGR are the risk of fetal distress and admission to NICU. The thick solid line assumes that no patients with FGR are the risk of fetal distress and admission to NICU.