**Supplementary Table 1**. Risk Factor Variables and the Abbreviations Used in the Analysis

|  |  |  |  |
| --- | --- | --- | --- |
|  | Factors related to the prenatal environment and pregnancy (23 factor variables) | Factors associated with delivery and the period immediately after birth (21 factor variables) | Factors recorded after birth (3 factor variables) |
| Continuous variables | Maternal age (M\_AGE, year); premature rupture of membranes (PROM(h), hour); gestational age (GA, week) | Birth weight (WT, g); birth height (HT, cm); birth head circumference (HC, cm); body temperature at birth (TEMP, ℃); hydrogen ion concentration in the blood within 1 hour after birth (pH); base excess within 1 hour after birth (BE) |  |
| Ordinal variables | Gravida (GRAV); paternal education level (F\_EDU); maternal education level (M\_EDU); multiple gestation (MULTI); order of multiple births (MULTI(th)); antenatal steroid use (ANS, never administered/incomplete administration/complete administration) | Apgar score at 1 minute (1\_AS); Apgar score at 5 minutes (5\_AS) | Number of administered surfactants (SFT(n)) |
| Nominal variables | Parity (PARITY); oligohydramnios (OLIGO); polyhydramnios (POLY); maternal country of origin (M\_COUN); Paternal country of origin (F-COUN); marital status (MRG, cohabitation/separation); pregnancy process (PREP, natural pregnancy/in vitro fertilization); gestational diabetes mellitus (G\_DM); overt diabetes mellitus (O\_DM); pregnancy-induced hypertension (PIH); chronic hypertension (HTN); histological chorioamnionitis (CA); premature rupture of membranes (PROM); delivery mode (C-SEC, virginal delivery/cesarean section) | Birth place (BPL, in the hospital/outside the hospital); need for initial resuscitation (CPR\_R); need for oxygen supplementation at birth (O2\_R); need for cardiac massage at birth (CM\_R); epinephrine administration at birth (EPI\_R); need for endotracheal intubation at birth (INT\_R); need for continuous positive airway pressure at birth (PPV\_R); respiratory distress syndrome (RDS); need for surfactant (SFT); invasive mechanical ventilation (I\_VENT); noninvasive mechanical ventilation (NI\_VENT); supplemental oxygen (O2); congenital infection (C\_INF) | Sepsis (SEPS); fungal infection before PDA treatment (FUNG) |

**Supplementary Table 2**. Full Rankings of Important Variables in the Artificial Intelligence Analysis

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **RF** | **SHAP value** | **L-GBM** | **SHAP value** | **MLP** | **SHAP value** | **SVM** | **SHAP value** | **K-NN** | **SHAP value** |
| **sPDA****vs****nPDA** | I\_VENTGASEPSWTSFT(n)HTINT\_RSFTRDSBE5\_ASHCNI\_VENTpHTEMPMULTIPROMANSOLIGOPROM(h)PPV\_RPARITY1\_ASMULTI(th)GRAVO2M\_AGECAM\_EDUPREPO2\_RPIHBPLF\_EDUCPR\_RC-SECG\_DMCM\_REPI\_RM\_COUNFUNGPOLYF\_COUNHTNO\_DMC\_INFMRG | 0.0610.0500.0380.0340.0240.0230.0140.0120.0090.0090.0080.0070.0070.0060.0060.0060.0060.0050.0040.0040.0030.0030.0030.0030.0030.0020.0020.0020.0020.0020.0020.0010.0010.0010.0010.0010.0010.0000.0000.0000.0000.0000.0000.0000.0000.0000.000 | I\_VENTGASEPSWTSFT(n)HTNI\_VENTBEMULTITEMPPROMpHHCO25\_ASANSOLIGO1\_ASM\_AGEPARITYGRAVINT\_RPROM(h)MULTI(th)RDSBPLCAM\_EDUO2\_RPREPF\_EDUPIHG\_DMPPV\_RM\_COUNCM\_RC-SECCPR\_RPOLYSFTFUNGF\_COUNO\_DMHTNEPI\_RC\_INFMRG | 0.0950.0730.0520.0280.0260.0220.0150.0130.0090.0090.0090.0070.0070.0070.0060.0060.0060.0050.0050.0050.0040.0040.0040.0030.0030.0030.0030.0030.0020.0010.0010.0010.0010.0010.0010.0010.0010.0000.0000.0000.0000.0000.0000.0000.0000.0000.000 | GAI\_VENTWTSEPSSFT(n)PROMPARITYHTHCGRAVBE1\_ASSFT5\_ASpHNI\_VENTO\_DMMULTITEMPMULTI(th)O2INT\_RANSM\_AGEM\_EDUBPLOLIGOPPV\_RF\_EDUCAG\_DMO2\_RPIHPROM(h)C-SECRDSCPR\_RF\_COUNPREPEPI\_RM\_COUNCM\_RPOLYMRGFUNGC\_INFHTN | 0.1130.0910.0490.0410.0360.0310.0310.0280.0270.0220.0200.0200.0190.0160.0160.0150.0110.0110.0110.0110.0100.0100.0090.0090.0080.0050.0050.0050.0050.0040.0040.0040.0030.0030.0030.0020.0020.0020.0010.0010.0010.0010.0010.0010.0000.0000.000 | GAI\_VENTWTSFT(n)SEPSHTPROMBEpH5\_ASSFTPARITYHC1\_ASGRAVINT\_RM\_AGEF\_EDUANSMULTI(th)TEMPMULTINI\_VENTOLIGOO2\_RO2CAPROM(h)PREPM\_EDURDSPIHBPLG\_DMC-SECCPR\_REPI\_RPPV\_RFUNGF\_COUNHTNCM\_RPOLYO\_DMMRGM\_COUNC\_INF | 0.1010.0670.0560.0400.0350.0350.0220.0180.0170.0160.0150.0150.0130.0110.0110.0080.0080.0080.0070.0070.0070.0060.0060.0050.0040.0040.0040.0040.0030.0030.0030.0030.0030.0020.0020.0020.0010.0010.0010.0000.0000.0000.0000.0000.0000.0000.000 | GAWTI\_VENTSFT(n)HTANSHCM\_AGEMULTISFT5\_ASRDSpH1\_ASBEM\_EDUGRAVINT\_RF\_EDUO2PROMTEMPMULTI(th)PARITYSEPSC-SECCANI\_VENTPREPPIHPROM(h)O2\_RPPV\_ROLIGOCPR\_RM\_COUNO\_DMG\_DMBPLCM\_REPI\_RHTNF\_COUNFUNGC\_INFMRGPOLY | 0.0420.0350.0300.0290.0280.0220.0210.0180.0170.0170.0160.0160.0160.0140.0130.0130.0130.0120.0120.0110.0110.0110.0100.0100.0100.0090.0090.0090.0060.0060.0050.0050.0050.0050.0030.0020.0010.0010.0010.0000.0000.0000.0000.0000.0000.0000.000 |
| **sPDA\_tx****vs****sPDA\_nontx** | SEPSO2O2\_RNI\_VENTTEMPPARITYF\_EDUANSGRAVINT\_ROLIGOM\_EDUC-SECM\_AGE1\_ASWTSFT(n)MULTIGA5\_ASPPV\_RHTBECAMULTI(th)HCPIHPREPF\_COUNpHPROM(h)SFTBPLCPR\_RRDSPROMM\_COUNG\_DMI\_VENTFUNGCM\_RHTNEPI\_RPOLYC\_INFMRGO\_DM | 0.0450.0420.0260.0200.0180.0180.0140.0140.0110.0110.0100.0080.0060.0060.0060.0060.0060.0050.0050.0030.0030.0030.0030.0030.0020.0020.0020.0020.0020.0020.0010.0010.0010.0010.0010.0010.0010.0010.0000.0000.0000.0000.0000.0000.0000.0000.000 | SEPSO2O2\_RTEMPANSNI\_VENTGAM\_AGEPARITYHTOLIGOWTGRAVINT\_RPPV\_R5\_ASM\_EDU1\_ASSFT(n)pHBEF\_COUNHCC-SECPROMMULTIF\_EDUPROM(h)CABPLPIHPREPMULTI(th)RDSG\_DMSFTM\_COUNCM\_RCPR\_RFUNGPOLYO\_DMHTNEPI\_RI\_VENTC\_INFMRG | 0.0750.0350.0280.0200.0160.0150.0150.0150.0140.0140.0130.0120.0120.0120.0100.0090.0090.0080.0080.0070.0070.0070.0060.0060.0050.0050.0050.0040.0040.0040.0030.0020.0020.0020.0010.0000.0000.0000.0000.0000.0000.0000.0000.0000.0000.0000.000 | SEPSPROMO2TEMPO2\_RGRAVMULTIHCMULTI(th)5\_ASWTHTBESFT(n)pHM\_AGEGA1\_ASPROM(h)ANSF\_EDUM\_EDUPPV\_RPIHPARITYC-SECNI\_VENTCAINT\_RCM\_RPREPBPLOLIGOEPI\_RF\_COUNCPR\_RRDSG\_DMI\_VENTSFTM\_COUNPOLYHTNC\_INFFUNGO\_DMMRG | 0.1460.0490.0480.0450.0440.0400.0350.0330.0320.0320.0320.0320.0290.0290.0280.0240.0230.0210.0210.0200.0190.0190.0190.0170.0170.0150.0140.0140.0130.0110.0100.0080.0070.0070.0070.0050.0040.0040.0030.0020.0020.0010.0010.0010.0010.0010.001 | SEPSO2O2\_RNI\_VENTTEMPGRAVF\_EDUPARITYSFT(n)WTHCM\_AGEMULTI1\_AS5\_ASHTBEANSPPV\_RMULTI(th)M\_EDUPROMGAOLIGOpHCAINT\_RPROM(h)BPLC-SECCPR\_RPIHPREPF\_COUNI\_VENTCM\_RSFTEPI\_RHTNG\_DMM\_COUNPOLYMRGC\_INFO\_DMRDSFUNG | 0.1300.0680.0640.0440.0430.0430.0380.0320.0310.0260.0240.0240.0200.0200.0180.0170.0170.0170.0160.0160.0160.0160.0150.0120.0110.0100.0100.0090.0060.0060.0050.0050.0040.0030.0020.0020.0020.0010.0010.0010.0010.0010.0010.0000.0000.0000.000 | O2SFT(n)ANSTEMPMULTIGRAVSEPSMULTI(th)WT5\_ASBE1\_ASM\_AGEM\_EDUF\_EDUHTGAPROMPARITYHCNI\_VENTO2\_RC-SECCApHPREPPIHPROM(h)INT\_RPPV\_RBPLCM\_ROLIGOEPI\_RSFTRDSI\_VENTG\_DMCPR\_RM\_COUNF\_COUNHTNPOLYMRGC\_INFFUNGO\_DM | 0.0430.0330.0320.0310.0290.0270.0250.0240.0230.0230.0220.0220.0220.0210.0200.0200.0190.0180.0170.0160.0150.0150.0150.0140.0130.0110.0090.0060.0060.0040.0040.0040.0040.0030.0020.0020.0010.0010.0010.0000.0000.0000.0000.0000.0000.0000.000 |

Abbreviations: PDA, patent ductus arteriosus; sPDA, symptomatic PDA; sPDA\_tx, sPDA with any treatment; RF, random forest; L-GBM, light gradient boosting machine; MLP, multilayer perceptron; SVM, support vector machine; K-NN, k-nearest neighbors. The abbreviations of all factors are shown in SupplementaryTable 1.

a Feature importance values describe how relevant a factor is to the model's predictions. These are listed in descending order in terms of the average absolute SHAP values ​​for the artificial intelligence algorithms.