

Appendix 1 Definitions of comorbidities.

SGA: Birth weight was below the 10th percentile for corresponding sex and gestational age.

PDA: Patent ductus arteriosus was diagnosed on an echo at any point during admission.

IVH: Grade 3 or 4 intraventricular hemorrhage.

NEC: Including all stages of necrotizing enterocolitis.

ROP: Including all stages of retinopathy of prematurity.

CMV infection: PCR for CMV-DNA was positive in blood or urine sample.

Sepsis: Including culture-positive bacteremia sepsis and clinical sepsis.

EUGR: Growth values were below the 10th percentile for expectation based on estimated postmenstrual age at hospital discharge.

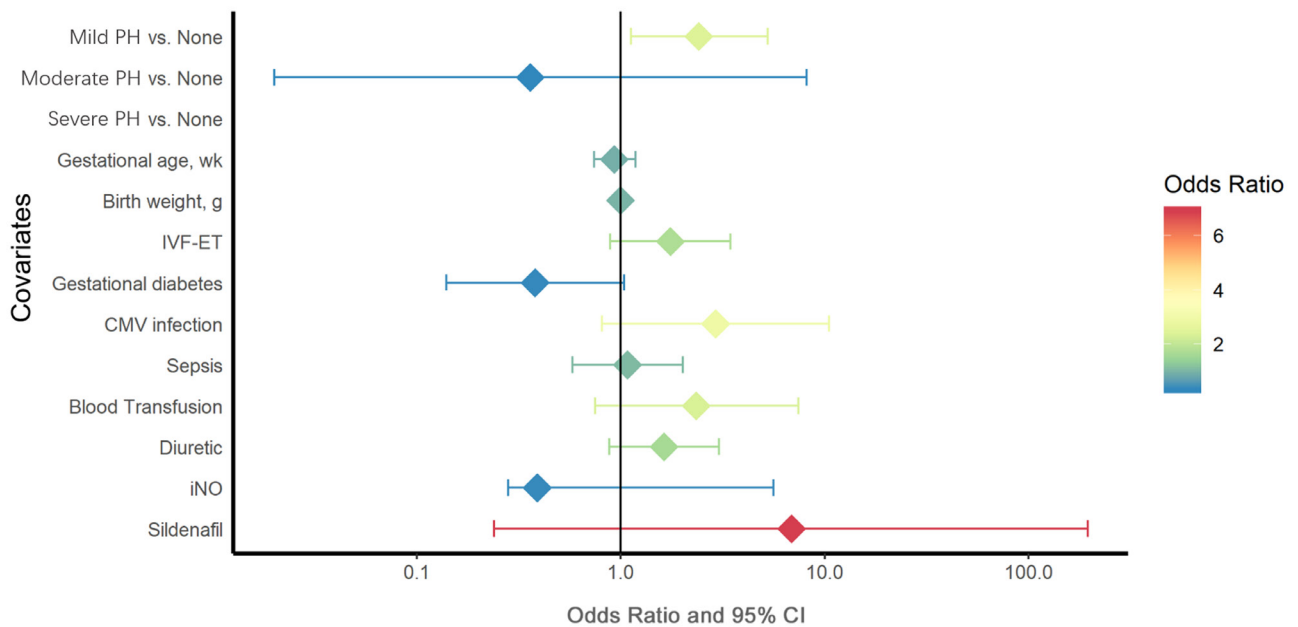


Figure S1 Parameter estimates from multivariable logistic regression. Adjusted odds ratios from logistic regression modeling readmission during the first one year of life based on PH severity, gestational age, birth weight, IVF-ET, gestational diabetes, CMV infections, sepsis, blood transfusion, diuretic, iNO and sildenafil administration. Mild PH was significantly associated with readmission (OR =2.42, 95% CI: 1.12–5.26, P=0.025). PH, pulmonary hypertension; IVF-ET, *in vitro* fertilization and embryo transfer; CMV, cytomegalovirus; iNO, inhaled nitric oxide.

Table S1 Grading criteria for pulmonary hypertension associated with bronchopulmonary dysplasia based on echocardiogram findings

| Grade | Echocardiogram findings |
|----------|---|
| None | sPAP \leq 35 mmHg, no RVH, normal RV size and function |
| Mild | sPAP >35 mmHg and \leq 50 mmHg, mild right ventricular hypertrophy or dilatation, right ventricular function may be normal |
| Moderate | sPAP >50 mmHg and \leq 70 mmHg, moderate right ventricular hypertrophy or dilatation |
| Severe | sPAP >70 mmHg, shunt with predominant right-to-left gradient, Severe right ventricular hypertrophy, right ventricular dysfunction, right ventricular dilatation |

sPAP, systolic pulmonary artery pressure.

Table S2 Echocardiographic characteristics in patients with pulmonary hypertension

| Variable | Mild PH | Moderate PH | Severe PH |
|--------------------|------------|-------------|------------|
| sPAP, mmHg | 44 [41–47] | 62 [50–65] | 69 [51–85] |
| RV hypertrophy | | | |
| Mild | 4 (9.6%) | 0 | 0 |
| Moderate | 0 | 0 | 0 |
| Severe | 0 | 0 | 0 |
| RV dilation | | | |
| Mild | 10 (23.8%) | 0 | 0 |
| Moderate | 0 | 4 (57.1%) | 0 |
| Severe | 0 | 0 | 2 (28.6%) |
| RV dysfunction | 0 | 0 | 2 (28.6%) |
| Right-to-left shut | 0 | 0 | 4 (57.1%) |

Data shown as n (%) or median [interquartile range]. sPAP, systolic pulmonary artery pressure; RV, right ventricle.

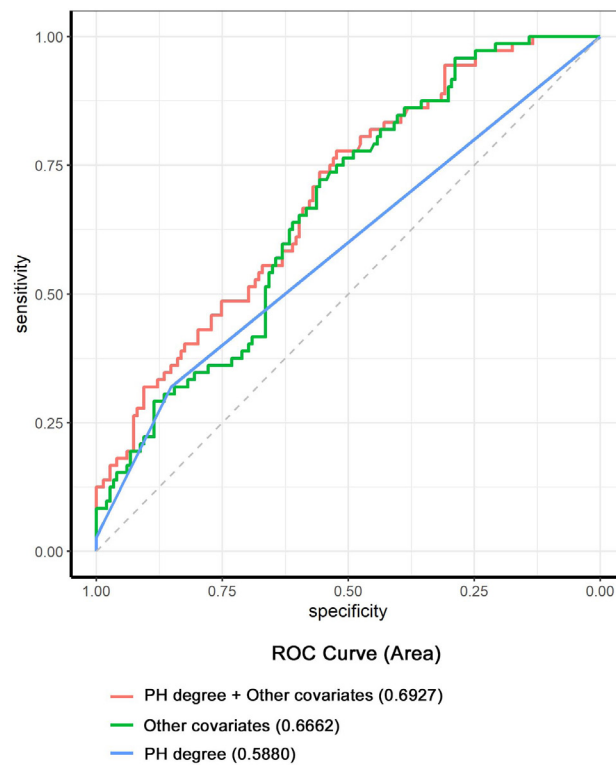


Figure S2 Receiver operating characteristic curves suggest that PH severity together other covariates can inform readmission in the first year of life. Logistic regression models: PH severity model, model including selected covariates listed in the Figure S1 and model using the other selected covariates except PH severity. AUC of the PH severity model was 0.58, and addition of other covariates could improve it to 0.69. PH, pulmonary hypertension.

Table S3 Subject characteristics by readmission status

| Variable | All subjects | No readmission | Readmission | P value |
|--|-------------------|-------------------|-------------------|---------|
| Number of subjects with outcome | 221 | 149 | 72 | |
| Gestational age, wk | 28 [27–29] | 28 [27–29] | 27 [26–29] | 0.07 |
| Birth weight, g | 1,080 [930–1,250] | 1,080 [950–1,275] | 1,050 [880–1,188] | 0.13 |
| SGA | 18 (8.1%) | 11 (7.4%) | 7 (9.7%) | 0.55 |
| Gender (male) | 136 (61.4%) | 90 (60.4%) | 46 (63.9%) | 0.62 |
| Maternal complications | | | | |
| Multiple gestation | 80 (36.2%) | 53 (35.6%) | 27 (37.5%) | 0.78 |
| IVF-ET | 61 (27.6%) | 35 (23.5%) | 26 (36.1%) | 0.05 |
| Preeclampsia | 31 (14.0%) | 20 (13.4%) | 11 (15.3%) | 0.71 |
| Gestational diabetes | 33 (14.9%) | 27 (18.1%) | 6 (8.3%) | 0.06 |
| PROM | 68 (30.8%) | 42 (28.2%) | 26 (36.1%) | 0.23 |
| Intrauterine distress | 24 (10.9%) | 17 (11.4%) | 7 (9.7%) | 0.71 |
| Antenatal corticosteroids | 105 (47.5%) | 71 (47.7%) | 34 (47.2%) | 0.95 |
| Cesarean section | 90 (40.9%) | 60 (40.5%) | 30 (41.7%) | 0.87 |
| Postnatal hospitalization | | | | |
| Surfactant | 175 (79.2%) | 121 (81.2%) | 54 (75.0%) | 0.29 |
| Mechanical ventilation support at 7 days | 144 (65.2%) | 101 (67.8%) | 43 (59.7%) | 0.24 |
| Days on MV | 8 [3–19] | 7 [3–13] | 13 [7–32] | <0.001 |
| PDA | 186 (88.6%) | 125 (88.7%) | 61 (88.4%) | 0.96 |
| IVH (Grade 3 or 4) | 22 (10.0%) | 14 (9.4%) | 8 (11.1%) | 0.69 |
| NEC | 34 (15.4%) | 25 (16.8%) | 9 (12.5%) | 0.41 |
| ROP | 143 (64.7%) | 93 (62.4%) | 50 (69.4%) | 0.31 |
| BPD (NHLBI multi-level) | | | | 0.008 |
| Mild | 86 (38.9%) | 66 (44.3%) | 20 (27.8%) | |
| Moderate | 55 (24.9%) | 37 (24.8%) | 18 (25.0%) | |
| Severe | 80 (36.2%) | 46 (30.9%) | 34 (47.2%) | |
| PH severity | | | | 0.002 |
| None | 176 (79.6%) | 127 (85.2%) | 49 (68.1%) | |
| Mild | 39 (17.7%) | 20 (13.4%) | 19 (26.4%) | |
| Moderate | 4 (1.8%) | 2 (1.3%) | 2 (2.8%) | |
| Severe | 2 (0.9%) | 0 (0%) | 2 (2.8%) | |
| CMV infection | 14 (6.3%) | 5 (3.5%) | 9 (12.5%) | 0.009 |
| Sepsis | 112 (50.7%) | 71 (47.7%) | 41 (56.9%) | 0.20 |
| EUGR | 163 (73.8%) | 108 (72.8%) | 55 (76.4%) | 0.54 |
| Blood transfusion | 190 (86.0%) | 123 (82.6%) | 67 (93.1%) | 0.04 |
| Postnatal steroids | 120 (54.3%) | 77 (51.7%) | 43 (59.7%) | 0.26 |
| Diuretic | 111 (50.2%) | 69 (46.3%) | 42 (58.3%) | 0.10 |
| iNO | 5 (2.7%) | 3 (2.0%) | 2 (2.8%) | 0.72 |
| Sildenafil | 5 (2.7%) | 1 (0.7%) | 4 (5.6%) | 0.02 |

Data shown as n (%) or median [interquartile range]. P values represent results of Kruskal-Wallis analysis of rank sum for tests. SGA, small for gestational age; IVF-ET, *in vitro* fertilization and embryo transfer; PROM, prolonged rupture of membranes; MV, mechanical ventilation; PDA, patent ductus arteriosus; IVH, intraventricular hemorrhage; NEC, necrotizing enterocolitis; ROP, retinopathy of prematurity; BPD, bronchopulmonary dysplasia; PH, pulmonary hypertension; CMV, cytomegalovirus; EUGR, extrauterine growth restriction; iNO, inhaled nitric oxide.

Table S4 Parameter estimates from multivariable cox regression

| Parameter | Hazard ratio | 95% confidence interval | P value |
|-------------------|--------------|-------------------------|---------|
| PH severity | | | |
| Mild vs. none | 2.09 | 0.43–10.18 | 0.36 |
| Moderate vs. none | 26.58 | 4.40–160.78 | <0.001 |
| Severe vs. none | 36.49 | 5.65–235.84 | <0.001 |
| Gender (male) | 5.34 | 1.06–26.90 | 0.04 |
| IVF-ET | 1.43 | 0.45–4.59 | 0.55 |
| Preeclampsia | 4.38 | 1.04–18.43 | 0.04 |
| SGA | 0.34 | 0.04–3.32 | 0.36 |
| NEC | 2.17 | 0.61–7.75 | 0.23 |
| EUGR | 0.44 | 0.12–1.63 | 0.22 |
| Surfactant | 5.77 | 0.49–67.76 | 0.16 |
| Diuretic | 0.85 | 0.24–3.08 | 0.81 |
| iNO | 5.78 | 1.08–31.08 | 0.04 |
| Sildenafil | 0.68 | 0.13–3.61 | 0.65 |

PH, pulmonary hypertension; IVF-ET, *in vitro* fertilization and embryo transfer; SGA, small for gestational age; NEC, necrotizing enterocolitis; EUGR, extrauterine growth restriction; iNO, inhaled nitric oxide.

Table S5 Parameter estimates from multivariable logistic regression

| Parameter | Odds ratio | 95% confidence interval | P value |
|----------------------|------------|-------------------------|---------|
| PH severity | | | |
| Mild vs. none | 2.42 | 1.12–5.26 | 0.03 |
| Moderate vs. none | 0.36 | 0.02–8.14 | 0.52 |
| Severe vs. none | Omitted | | |
| Gestational age, wk | 0.93 | 0.74–1.18 | 0.57 |
| Birth weight, g | 1.00 | 0.99–1.00 | 0.49 |
| IVF-ET | 1.75 | 0.89–3.45 | 0.11 |
| Gestational diabetes | 0.38 | 0.14–1.04 | 0.06 |
| CMV infection | 2.92 | 0.81–10.50 | 0.10 |
| Sepsis | 1.08 | 0.58–2.02 | 0.82 |
| Blood transfusion | 2.35 | 0.75–7.42 | 0.14 |
| Diuretic | 1.63 | 0.88–3.03 | 0.12 |
| iNO | 0.39 | 0.28–5.61 | 0.49 |
| Sildenafil | 6.88 | 0.24–194.36 | 0.26 |

PH, pulmonary hypertension; IVF-ET, *in vitro* fertilization and embryo transfer; CMV, cytomegalovirus; iNO, inhaled nitric oxide.