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Supplemental Table 1. Participating sites and associated IRB numbers

Site	IRB Number
Case Western Reserve University	09-00-59
University of Texas at Dallas	102010-163
Wayne State University	Protocol #: 0506002145
C.S. Mott Children's Hospital	HUM00041442
Emory University	IRB00045877
Grady Memorial Hospital	IRB000-45877(105-91)
Egleston Children's Hospital	000-45877(105-91)
Children's Hospital Medical Center	2012-4016
Good Samaritan Hospital	11078-11-049
Indiana University	1011003360
Brown University	WIH 00-0074
Stanford University	12282
El Camino Hospital	ECH-05-08
University of Alabama Hospital	X000330023
University of Texas at Houston	
Duke Hospital	Pro00016405
UNC-Chapel Hill	08-1176
Wake Med	00016405
ECU	19-000094
University of Iowa	200602748
Mercy Medical Center	MMC2009-54
Sanford Health	CR00001687
University of Utah Medical Center	IRB_00017524
Intermountain	1000349
University of NM	HRRC#: 06-075
Virtua Hospital	G17019
University of Pennsylvania	813326
Children's Hospital of Philadelphia	IRB-11-008082
Rochester	00000288
University of Buffalo	00004097
UCLA	11-000930
Olive View UCLA Medical Center	232301
Nationwide Children's Hospital	IRB13-00089
Children's Mercy Hospital	11120559
Yale University	304025158
Tufts University	7680

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Supplemental Table 2. Respiratory support and mean maximum fraction of inspired oxygen for each outcome by postnatal day

Day	Respiratory support	No BPD	Grade 1 BPD	Grade 2 BPD	Grade 3 BPD	Death prior to 36 weeks
		N=3257	N=2795	N=1526	N=551	N=1052
1	HFV, %	4%	12%	20%	19%	28%
	CV, %	38%	52%	58%	64%	56%
	Nasal ventilation or CPAP, %	50%	33%	21%	16%	15%
	Nasal cannula or hood, %	4%	2%	1%	1%	1%
	No support, %	4%	0%	0%	0%	1%
	Mean FIO$_2$, %	0.28 ± 0.13	0.33 ± 0.17	0.35 ± 0.18	0.38 ± 0.21	0.44 ± 0.26
3	HFV, %	5%	17%	32%	33%	44%
	CV, %	25%	40%	42%	49%	40%
	Nasal ventilation or CPAP, %	59%	39%	25%	17%	15%
	Nasal cannula or hood, %	7%	3%	1%	1%	1%
	No support, %	5%	0%	0%	0%	0%
	Mean FIO$_2$, %	0.30 ± 0.14	0.37 ± 0.18	0.41 ± 0.20	0.43 ± 0.21	0.55 ± 0.29
7	HFV, %	3%	15%	31%	35%	40%
	CV, %	13%	33%	40%	45%	39%
	Nasal ventilation or CPAP, %	53%	43%	26%	17%	17%
	Nasal cannula or hood, %	18%	8%	3%	3%	2%
	No support, %	14%	1%	1%	0%	1%
	Mean FIO$_2$, %	0.26 ± 0.10	0.33 ± 0.15	0.39 ± 0.19	0.44 ± 0.23	0.50 ± 0.27
14	HFV, %	2%	13%	31%	37%	39%
	CV, %	9%	31%	39%	47%	37%
	Nasal ventilation or CPAP, %	46%	43%	26%	13%	21%
	Nasal cannula or hood, %	27%	11%	3%	3%	3%
	No support, %	16%	1%	0%	0%	1%
	Mean FIO$_2$, %	0.28 ± 0.12	0.38 ± 0.18	0.46 ± 0.21	0.53 ± 0.25	0.54 ± 0.27
28	HFV, %	1%	6%	23%	28%	41%
	CV, %	5%	26%	40%	56%	37%
	Nasal ventilation or CPAP, %	33%	47%	32%	12%	17%
	Nasal cannula or hood, %	36%	19%	5%	4%	3%
	No support, %	26%	1%	0%	0%	2%
	Mean FIO$_2$, %	0.26 ± 0.11	0.36 ± 0.16	0.44 ± 0.19	0.52 ± 0.23	0.58 ± 0.29

Definition of abbreviations: BPD = bronchopulmonary dysplasia; CV = conventional mechanical ventilation; CPAP = continuous positive airway pressure; FIO$_2$ = fraction of inspired oxygen; HFV = high-frequency mechanical ventilation

Supplemental Table 3. Multinomial regression model for Grade of BPD or death: postnatal day 1

	Grade of BPD or Death	Odds ratios (95% CI)	p-value
Birth weight (per 100g increase)			
	Grade 1	0.80 (0.77-0.83)	<0.0001
	Grade 2	0.65 (0.62-0.69)	<0.0001
	Grade 3	0.64 (0.59-0.69)	<0.0001
	Death	0.60 (0.56-0.64)	<0.0001
Respiratory support at 24 hours (reference: room air):			
HFV	Grade 1	20.9 (10.2-42.8)	<0.0001
	Grade 2	34.0 (12.1-95.7)	<0.0001
	Grade 3	28.2 (3.81-208.1)	0.001
	Death	7.34 (2.80-19.2)	<0.0001
CV	Grade 1	9.31 (4.68-18.5)	<0.0001
	Grade 2	10.1 (3.66-27.7)	<0.0001
	Grade 3	11.2 (1.54-81.0)	0.02
	Death	2.03 (0.80-5.18)	0.14
NIPPV	Grade 1	5.22 (2.57-10.6)	<0.0001
	Grade 2	3.96 (1.39-11.3)	0.01
	Grade 3	2.63 (0.34-20.4)	0.36
	Death	0.96 (0.36-2.61)	0.94
CPAP	Grade 1	7.20 (3.63-14.3)	<0.0001
	Grade 2	5.00 (1.81-13.8)	0.002
	Grade 3	5.30 (0.73-38.7)	0.10
	Death	1.22 (0.47-3.13)	0.69
NC	Grade 1	9.88 (4.54-21.5)	<0.0001
	Grade 2	3.49 (0.97-12.5)	0.06
	Grade 3	7.55 (0.82-69.6)	0.07
	Death	1.91 (0.52-7.11)	0.33
Hood	Grade 1	1.69 (0.60-4.74)	0.32
	Grade 2	0.38 (0.04-3.52)	0.39
	Grade 3	2.27 (0.20-26.4)	0.51
	Death	0.34 (0.06-1.96)	0.23
Gestational age (per 1 week increase)			
	Grade 1	0.81 (0.77-0.85)	<0.0001
	Grade 2	0.83 (0.78-0.88)	<0.0001
	Grade 3	0.74 (0.68-0.80)	<0.0001
	Death	0.64 (0.59-0.69)	<0.0001
FIO2 at 24 hours (per increase by 20%)			
	Grade 1	1.23 (1.14-1.33)	<0.0001
	Grade 2	1.25 (1.14-1.36)	<0.0001
	Grade 3	1.51 (1.36-1.68)	<0.0001
	Death	1.72 (1.57-1.88)	<0.0001
Male (reference: female)			
	Grade 1	1.41 (1.26-1.58)	<0.0001
	Grade 2	2.10 (1.83-2.42)	<0.0001
	Grade 3	2.01 (1.65-2.45)	<0.0001
	Death	2.11 (1.78-2.50)	<0.0001
Antenatal steroids (reference: no antenatal steroids)			
	Grade 1	1.04 (0.86-1.27)	0.68
	Grade 2	1.01 (0.79-1.27)	0.96
	Grade 3	1.63 (1.12-2.39)	0.01
	Death	0.78 (0.60-1.01)	0.06

HFV=high-frequency ventilation; CV=conventional mechanical ventilation; NIPPV=non-invasive positive pressure ventilation; CPAP=continuous positive airway pressure; FIO2=fraction of inspired oxygen; BPD=bronchopulmonary dysplasia

Supplemental Table 4. Multinomial regression model for Grade of BPD or death: postnatal day 3

	Grade of BPD or Death	Odds ratios (95% CI)	p-value
Respiratory support at Day 3 (reference: room air):			
HFV	Grade 1	17.5 (9.10-33.6)	<0.0001
	Grade 2	*	
	Grade 3	*	
	Death	6.81 (2.06-22.4)	0.002
CV	Grade 1	9.45 (5.05-17.7)	<0.0001
	Grade 2	46.0 (6.39-331.8)	0.0001
	Grade 3	*	
	Death	2.39 (0.74-7.74)	0.15
NIPPV	Grade 1	5.91 (3.13-11.2)	<0.0001
	Grade 2	19.4 (2.67-141.2)	0.003
	Grade 3	*	
	Death	0.94 (0.28-3.18)	0.92
CPAP	Grade 1	6.21 (3.34-11.6)	<0.0001
	Grade 2	21.4 (2.97-153.9)	0.002
	Grade 3	*	
	Death	1.41 (0.43-4.58)	0.57
NC	Grade 1	6.85 (3.50-13.4)	<0.0001
	Grade 2	8.74 (1.10-69.5)	0.04
	Grade 3	*	
	Death	1.35 (0.33-5.62)	0.68
Hood	Grade 1	1.68 (0.64-4.46)	0.30
	Grade 2	4.11 (0.36-46.7)	0.25
	Grade 3	*	
	Death	2.09 (0.46-9.42)	0.34
Birth weight (per 100g increase)			
	Grade 1	0.82 (0.79-0.86)	<0.0001
	Grade 2	0.69 (0.66-0.73)	<0.0001
	Grade 3	0.68 (0.63-0.74)	<0.0001
	Death	0.65 (0.61-0.70)	<0.0001
FIO2 at Day 3 (per increase by 20%)			
	Grade 1	1.28 (1.18-1.39)	<0.0001
	Grade 2	1.27 (1.16-1.39)	<0.0001
	Grade 3	1.41 (1.26-1.57)	<0.0001
	Death	2.07 (1.88-2.28)	<0.0001
Gestational age (per 1 week increase)			
	Grade 1	0.81 (0.77-0.85)	<0.0001
	Grade 2	0.82 (0.78-0.88)	<0.0001
	Grade 3	0.75 (0.69-0.81)	<0.0001
	Death	0.62 (0.58-0.67)	<0.0001
Male (reference: female)			
	Grade 1	1.39 (1.24-1.55)	<0.0001
	Grade 2	2.06 (1.79-2.37)	<0.0001
	Grade 3	1.96 (1.61-2.39)	<0.0001
	Death	1.87 (1.56-2.23)	<0.0001
* Estimate is unstable due to sparse data. HFV=high-frequency ventilation; CV=conventional mechanical ventilation; NIPPV=non-invasive positive pressure ventilation; CPAP=continuous positive airway pressure; FIO2=Fraction of inspired oxygen; BPD=bronchopulmonary dysplasia.			

Supplemental Table 5. Multinomial regression model for Grade of BPD or death: postnatal day 7

Variables, in order of entry	Grade of BPD or Death	Odds ratios (95% CI)	p-value
Respiratory support at Day 7 (reference: room air):			
HFV	Grade 1	20.2 (13.2-30.7)	<0.0001
	Grade 2	77.7 (36.7-164.5)	<0.0001
	Grade 3	*	
	Death	12.1 (5.58-26.3)	<0.0001
CV	Grade 1	12.7 (8.79-18.3)	<0.0001
	Grade 2	31.9 (15.5-65.7)	<0.0001
	Grade 3	75.0 (10.4-539.2)	<0.0001
	Death	5.49 (2.62-11.5)	<0.0001
NIPPV	Grade 1	7.57 (5.21-11.0)	<0.0001
	Grade 2	11.3 (5.43-23.7)	<0.0001
	Grade 3	17.7 (2.39-130.3)	0.005
	Death	2.17 (0.99-4.76)	0.055
CPAP	Grade 1	6.19 (4.37-8.78)	<0.0001
	Grade 2	8.75 (4.28-17.9)	<0.0001
	Grade 3	15.2 (2.10-109.4)	0.007
	Death	1.60 (0.76-3.39)	0.22
NC	Grade 1	4.90 (3.36-7.14)	<0.0001
	Grade 2	4.27 (1.96-9.32)	0.0003
	Grade 3	11.3 (1.47-86.4)	0.02
	Death	0.94 (0.36-2.48)	0.90
Hood	Grade 1	2.38 (1.34-4.23)	0.003
	Grade 2	1.23 (0.32-4.77)	0.76
	Grade 3	5.57 (0.50-62.3)	0.16
	Death	1.83 (0.63-5.33)	0.26
Birth weight (per 100g increase)			
	Grade 1	0.83 (0.80-0.86)	<0.0001
	Grade 2	0.72 (0.68-0.76)	<0.0001
	Grade 3	0.71 (0.66-0.77)	<0.0001
	Death	0.67 (0.62-0.73)	<0.0001
FIO2 at Day 7 (per increase by 20%)			
	Grade 1	1.58 (1.40-1.79)	<0.0001
	Grade 2	1.78 (1.57-2.02)	<0.0001
	Grade 3	2.19 (1.90-2.52)	<0.0001
	Death	2.53 (2.21-2.91)	<0.0001
Male (reference: female)			
	Grade 1	1.39 (1.24-1.56)	<0.0001
	Grade 2	2.03 (1.76-2.34)	<0.0001
	Grade 3	1.95 (1.59-2.38)	<0.0001
	Death	1.84 (1.51-2.24)	<0.0001
Gestational age (per 1 week increase)			
	Grade 1	0.91 (0.87-0.96)	0.0008
	Grade 2	0.98 (0.92-1.04)	0.49
	Grade 3	0.92 (0.84-0.999)	0.049
	Death	0.78 (0.72-0.86)	<0.0001
HFV=high-frequency ventilation; CV=conventional mechanical ventilation; NIPPV=non-invasive positive pressure ventilation; CPAP=continuous positive airway pressure; FIO2=Fraction of inspired oxygen; BPD=bronchopulmonary dysplasia.			

Supplemental Table 6. Multinomial regression model for Grade of BPD or death: postnatal day 14

Variables, in order of entry	Grade of BPD or Death	Odds ratios (95% CI)	p-value
Respiratory support at Day 14 (reference: room air):	Grade 1	23.7 (14.9-37.6)	<0.0001
HFV	Grade 2	191.2 (74.4-491.0)	<0.0001
	Grade 3	119.1 (28.0-505.6)	<0.0001
	Death	21.5 (7.30-63.5)	<0.0001
	Grade 1	18.2 (12.5-26.5)	<0.0001
CV	Grade 2	86.6 (35.0-213.9)	<0.0001
	Grade 3	65.7 (16.0-270.2)	<0.0001
	Death	10.3 (3.65-28.9)	<0.0001
	Grade 1	9.78 (6.73-14.2)	<0.0001
NIPPV	Grade 2	21.5 (8.64-53.6)	<0.0001
	Grade 3	8.95 (2.09-38.3)	0.003
	Death	4.35 (1.51-12.5)	0.007
	Grade 1	7.20 (5.07-10.2)	<0.0001
CPAP	Grade 2	17.8 (7.29-43.6)	<0.0001
	Grade 3	6.31 (1.52-26.2)	0.01
	Death	2.55 (0.91-7.18)	0.08
	Grade 1	4.15 (2.88-5.97)	<0.0001
NC	Grade 2	4.60 (1.81-11.7)	0.001
	Grade 3	3.27 (0.74-14.4)	0.12
	Death	0.73 (0.21-2.52)	0.62
	Grade 1	2.20 (1.27-3.81)	0.005
Hood	Grade 2	1.17 (0.22-6.11)	0.86
	Grade 3	*	
	Death	1.93 (0.47-7.94)	0.36
FIO2 at Day 14 (per increase by 20%)			
	Grade 1	1.75 (1.58-1.95)	<0.0001
	Grade 2	1.93 (1.72-2.17)	<0.0001
	Grade 3	2.36 (2.07-2.69)	<0.0001
	Death	2.41 (2.09-2.78)	<0.0001
Birth weight (per 100g increase)			
	Grade 1	0.84 (0.81-0.87)	<0.0001
	Grade 2	0.73 (0.69-0.77)	<0.0001
	Grade 3	0.73 (0.67-0.79)	<0.0001
	Death	0.68 (0.62-0.75)	<0.0001
Male (reference: female)			
	Grade 1	1.37 (1.22-1.53)	<0.0001
	Grade 2	2.00 (1.72-2.31)	<0.0001
	Grade 3	1.88 (1.53-2.32)	<0.0001
	Death	1.66 (1.32-2.09)	<0.0001
Surgical NEC by Day 14 (reference: no surgical NEC)			
	Grade 1	0.81 (0.43-1.52)	0.51
	Grade 2	0.68 (0.33-1.41)	0.30
	Grade 3	3.14 (1.60-6.15)	0.0008
	Death	1.46 (0.62-3.41)	0.39
Gestational age (per 1 week increase)			
	Grade 1	1.04 (0.98-1.10)	0.23
	Grade 2	1.20 (1.12-1.28)	<0.0001
	Grade 3	1.16 (1.06-1.28)	0.001
	Death	0.95 (0.85-1.05)	0.32
* Estimate is unstable due to sparse data.			

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HFV=high-frequency ventilation; CV=conventional mechanical ventilation; NIPPV=non-invasive positive pressure ventilation; CPAP=continuous positive airway pressure; FIO2=Fraction of inspired oxygen; BPD=bronchopulmonary dysplasia; NEC=necrotizing enterocolitis.

Supplemental Table 7. Multinomial regression model for Grade of BPD or death: postnatal day 28

	Grade of BPD or Death	Odds ratios (95% CI)	p-value
Respiratory support at Day 28 (reference: room air):			
HFV	Grade 1	76.0 (40.6-142.0)	<0.0001
	Grade 2	*	
	Grade 3	*	
	Death	44.1 (11.6-167.7)	<0.0001
CV	Grade 1	55.2 (36.5-83.5)	<0.0001
	Grade 2	*	
	Grade 3	215.8 (52.1-893.8)	<0.0001
	Death	12.2 (3.55-41.9)	<0.0001
NIPPV	Grade 1	25.2 (17.0-37.4)	<0.0001
	Grade 2	158.1 (38.8-644.2)	<0.0001
	Grade 3	17.2 (4.01-73.8)	0.0001
	Death	3.14 (0.87-11.4)	0.08
CPAP	Grade 1	20.1 (13.9-29.0)	<0.0001
	Grade 2	109.7 (27.2-442.8)	<0.0001
	Grade 3	11.6 (2.76-48.4)	0.0008
	Death	2.29 (0.66-7.97)	0.19
NC	Grade 1	8.85 (6.13-12.8)	<0.0001
	Grade 2	18.0 (4.41-73.9)	<0.0001
	Grade 3	3.70 (0.86-16.0)	0.08
	Death	0.36 (0.08-1.57)	0.17
Hood	Grade 1	5.69 (3.32-9.76)	<0.0001
	Grade 2	8.11 (1.33-49.3)	0.02
	Grade 3	4.70 (0.65-34.0)	0.12
	Death	1.00 (0.10-9.85)	0.999
FIO2 at Day 28 (per increase by 20%)			
	Grade 1	1.99 (1.77-2.23)	<0.0001
	Grade 2	2.44 (2.14-2.77)	<0.0001
	Grade 3	3.11 (2.70-3.59)	<0.0001
	Death	3.92 (3.29-4.66)	<0.0001
Birth weight (per 100g increase)			
	Grade 1	0.87 (0.83-0.90)	<0.0001
	Grade 2	0.76 (0.72-0.80)	<0.0001
	Grade 3	0.76 (0.70-0.82)	<0.0001
	Death	0.72 (0.63-0.82)	<0.0001
Surgical NEC by Day 28 (reference: no surgical NEC)			
	Grade 1	0.80 (0.48-1.34)	0.39
	Grade 2	0.85 (0.48-1.52)	0.59
	Grade 3	2.48 (1.38-4.46)	0.003
	Death	4.70 (2.41-9.19)	<0.0001
Male (reference: female)			
	Grade 1	1.26 (1.12-1.42)	0.0002
	Grade 2	1.75 (1.50-2.04)	<0.0001
	Grade 3	1.60 (1.29-2.00)	<0.0001
	Death	1.41 (1.02-1.94)	0.04
Gestational age (per 1 week increase)			
	Grade 1	1.07 (1.01-1.13)	0.02
	Grade 2	1.27 (1.18-1.36)	<0.0001
	Grade 3	1.24 (1.13-1.37)	<0.0001
	Death	1.02 (0.88-1.18)	0.81

* Estimate is unstable due to sparse data.
HFV=high-frequency ventilation; CV=conventional mechanical ventilation; NIPPV=non-invasive positive pressure ventilation; CPAP=continuous positive airway pressure; FIO2=Fraction of inspired oxygen; BPD=bronchopulmonary dysplasia; NEC=necrotizing enterocolitis.

Supplemental material

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Supplemental Figure 1. Respiratory support by day and year of birth
Over time, there were trends toward increased use of high-frequency ventilation and nasal ventilation or
CPAP.
Definition of abbreviations: CPAP = continuous positive airway pressure