

Supplementary materials

Supplementary table S1: Inclusion number for each center per year

Center	Number of patients included per year					total No. for each center
	2015	2016	2017	2018	2019	
Beijing Chao-Yang Hospital	30	49	53	48	34	214
Beijing Chao-Yang Hospital, West Branch	6	11	10	9	8	44
Beijing Huai-Rou Hospital	8	13	11	17	13	62
Total No for each year	44	73	74	74	55	320

Supplementary table S2. Patient baseline characteristics according to HFNC failure and success

Characteristic	HFNC success	HFNC failure	<i>P</i>
	group (n=144)	group (n=16)	
Age (years)	66.5±6.28	70.9±8.76	0.102
Male no. (%)	93(64.6)	8(50.0)	0.282
Body mass index (kg/m ²)	23.1±4.61	22.8±3.37	0.868
COPD history(years)	16.5±13.5	19.6±12.5	0.429
Smoking history (years)	22.6±12.8	19.4±8.08	0.463
Current smokers no. (%)	93(64.6)	9(56.2)	0.587
CAT scores	20.2±5.55	21.7±5.38	0.593
APACHEII scores	15.8±6.50	16.0±6.37	0.918
Comorbidity, no. (%)			
Hypertension	31(21.5)	4(25.0)	0.753
Diabetes mellitus	14(9.7)	3(18.8)	0.382
Coronary heart disease	16(11.1)	4(25.0)	0.119
Cerebrovascular Disease	7(4.9)	2(12.5)	0.223
Obsolete Pulmonary Tuberculosis	6(4.2)	1(6.2)	0.529
Baseline spirometry			
Pre-bronchodilator FEV1 (L)	1.49±0.57	1.57±0.61	0.635
Post-bronchodilator FEV1 (L)	1.70±0.59	1.75±0.56	0.790
Post-bronchodilator FEV1, % predicted	59.7±17.9	68.2±18.7	0.076
Post-bronchodilator FEV1/FVC ratio, %	52.1±10.4	55.7±10.4	0.212
Vital signs			
Body temperature (°C)	36.3±2.62	36.6±0.35	0.559
Heart rate (beats/min)	90.4±13.6	94.1±14.4	0.323
Mean arterial pressure (mmHg)	93.2±13.1	86.5±10.2	0.276

Respiratory rate (beats/min)	20.1±1.52	22.4±2.47	0.032
Respiratory rate (beats/min) 24h	21.3±2.31	22.7±2.65	0.059
Respiratory rate (beats/min) 48h	22.4±5.89	22.0±2.83	0.829
Arterial blood gas (room air)			
pH	7.38±0.05	7.40±0.04	0.281
PaO ₂ (mmHg)	55.9±5.97	55.8±9.38	0.964
PaCO ₂ (mmHg)	54.6±6.88	58.0±8.94	0.086
SaO ₂ (%)	89.1±4.67	90.5±4.82	0.295
Arterial blood gas (24h)			
pH	7.40±0.04	7.38±0.04	0.334
PaO ₂ (mmHg)	72.1±8.69	71.2±11.7	0.786
PaCO ₂ (mmHg)	52.4±7.96	59.0±11.8	0.006
SaO ₂ (%)	93.3±2.72	92.9±1.88	0.592
Arterial blood gas (48h)			
pH	7.40±0.04	7.39±0.02	0.756
PaO ₂ (mmHg)	70.6±14.0	68.1±10.3	0.649
PaCO ₂ (mmHg)	51.5±5.61	55.8±5.61	0.012
SaO ₂ (%)	93.3±2.18	92.3±2.50	0.237
Laboratory parameters			
White blood cell (×10 ⁹ /L)	7.67±4.57	8.35±4.59	0.582
Neutrophil (%)	66.6±19.1	68.7±21.7	0.677
Albumin (g/L)	37.1±5.17	35.8±3.54	0.363
Creatinine (umol/L)	64.9±25.2	56.6±19.5	0.217
NT-proBNP (pg/ml)	83(32-357)	63(5-387)	0.150*

Abbreviations: APACHE, Acute Physiology and Chronic Health Evaluation; BE, base excess; COPD, Chronic Obstructive Pulmonary Disease; CAT score, COPD Assessment Test (CAT) scores; FEV₁, forced expiratory volume in one Second; FVC, forced vital capacity; FiO₂, fraction of inspired oxygen; HFNC, high-flow nasal cannula oxygen therapy; NT-proBNP, N-Terminal pro-brain natriuretic peptide; PaO₂, partial pressure of oxygen; PaCO₂, partial

pressure of carbon dioxide.

*: Continuous variables were compared using the Mann-Whitney U test.

Supplementary table S3: HFNC parameter setting

Characteristic	Baseline	12h	24h	48h	72h	120h
FiO ₂	0.21	0.26±0.05	0.25±0.05	0.26±0.04	0.25±0.05	0.25±0.05
Flow (L/min)	-	27.1±9.43	36.2±10.0	38.4±11.4	38.1±11.7	38.1±12.1
Temperature (°C)	-	32.1±1.54	32.9±1.5	32.6±1.79	32.9±1.51	32.8±1.47
SpO ₂ (%)	-	92.5±2.54	93.0±3.69	93.2±2.21	93.0±3.39	93.8±2.73

Abbreviations: FiO₂, fraction of inspired oxygen; HFNC, high-flow nasal cannula oxygen therapy;