

SUPPLEMENTARY MATERIAL

Supplementary Table 1. Pairwise comparison of categorical clinical outcomes

Outcomes	Group 2 vs. 1	Group 3 vs. 1	Group 3 vs. 2
NIV	1.4 (0.9 - 2.1)	1.3 (0.8 - 2.0)	0.9 (0.6 - 1.5)
MV	2.1 (1.0 - 4.3)	3.4 (1.6 - 7.2)	1.6 (0.8 - 3.0)
NIV failure	1.9 (0.8 - 4.1)	3.1 (1.4 - 7.2)	1.7 (0.8 - 3.5)
Reintubate 48	4.0 (0.5 - 36.3)	1.8 (0.1 - 28.9)	0.5 (0.1 - 4.0)
In-hospital mortality	4.1 (1.2 - 14.9)	4.4 (1.1 - 17.2)	1.1 (0.4 - 2.8)

Represented as: Odds ratio (95% confidence interval)

Groups: Group 1: BNP \leq 100 pg/mL, Group 2: BNP 101-500 pg/mL, Group 3: BNP \geq 501 pg/mL

Abbreviations: BNP: B-type natriuretic peptide, CI: confidence interval, MV: mechanical ventilation, NIV: non-invasive ventilation, OR: odds ratio, Reintubate 48: reintubation rates at 48 hours

Supplementary Table 2. Baseline patient characteristics of groups without renal dysfunction

Characteristics	Total cohort (n=406)	Group 1 (n=189)	Group 2 (n=153)	Group 3 (n=64)	p-value
Age (years)	63.6 ± 11.6	60.2 ± 0.8	65.4 ± 0.9	69.1 ± 1.4	<0.001
Male gender	203 (50.0)	98 (51.9)	83 (54.3)	22 (34.4)	0.02
Comorbidities					
Hypertension	295 (72.7)	129 (68.3)	120 (78.4)	46 (71.9)	0.11
DM-II	120 (29.6)	54 (28.6)	54 (35.3)	12 (18.8)	0.04
Malignancy	55 (13.6)	20 (10.6)	25 (16.3)	10 (15.6)	0.26
Hyperlipidemia	149 (36.7)	59 (31.2)	67 (43.8)	23 (35.9)	0.06
CAD	127 (31.3)	44 (23.3)	56 (36.6)	27 (42.2)	0.004
OSA	88 (21.7)	46 (24.3)	32 (20.9)	10 (15.6)	0.32
Home oxygen	175 (43.1)	77 (40.7)	70 (45.8)	28 (43.8)	0.64
Current smoking	235 (57.9)	116 (61.4)	86 (56.2)	33 (51.6)	0.34
Pack years	40 (25-60)	44.7 ± 2.5	42.0 ± 2.8	49.8 ± 4.3	0.31
Pre-hospital medications					
LABA	246 (60.6)	132 (69.8)	82 (53.6)	32 (50.0)	0.002
LAAC	201 (49.5)	107 (56.6)	69 (45.1)	25 (39.1)	0.02
ICS	245 (60.4)	131 (69.3)	81 (52.9)	33 (51.6)	0.002
ACE-i/ARB	149 (36.8)	62 (32.8)	64 (41.8)	23 (36.5)	0.23
Beta-blockers	127 (31.4)	35 (18.5)	67 (43.8)	25 (39.7)	<0.001
Loop diuretics	129 (31.9)	34 (18.0)	63 (41.2)	32 (50.8)	<0.001
Thiazide diuretics	56 (13.8)	28 (14.8)	23 (15.0)	5 (7.9)	0.29
Statins	141 (34.8)	57 (30.2)	63 (41.2)	21 (33.3)	0.10
Physical examination					
Heart rate (beats/min)	97.9 ± 20.0	99.4 ± 1.4	98.7 ± 1.6	91.3 ± 2.5	0.06
SBP (mm Hg)	134.4 ± 25.2	136.4 ± 1.8	132.6 ± 2.0	132.3 ± 3.2	0.40
SpO ₂ (%)	94.3 ± 8.2	94.5 ± 0.6	94.7 ± 0.7	92.5 ± 1.0	0.56
BMI (kg/m ²)	28.9 ± 10.0	29.0 ± 0.7	29.4 ± 0.8	27.7 ± 1.3	0.63
Pulmonary Function Tests					
FEV ₁ (%)	44.1 ± 21.3	41.4 ± 2.1	47.4 ± 2.5	44.8 ± 3.9	0.02
DLCO (%)	40.9 ± 21.5	44.6 ± 2.5	38.7 ± 2.7	35.8 ± 4.1	0.07

Laboratory parameters					
Hemoglobin (g/dL)	12.8 ± 2.4	13.1 ± 0.2	12.6 ± 0.2	12.0 ± 0.3	0.02
BNP (pg/mL)	112 (49-304.5)	46 (29-71)	206 (140-303.5)	736.5 (633-989)	<0.001
pH	7.36 ± 0.16	7.35 ± 0.01	7.37 ± 0.02	7.38 ± 0.03	0.25
pCO ₂ (mm Hg)	60.3 ± 24.4	63.0 ± 2.3	56.2 ± 2.4	63.4 ± 3.8	0.08
Bicarbonate (mmol/L)	30.0 ± 6.8	30.2 ± 0.5	29.9 ± 0.6	30.0 ± 0.9	0.88
Creatinine (mg/dL)	0.8 ± 0.3	0.8 ± 0.0	0.9 ± 0.0	0.9 ± 0.0	0.005
Echocardiographic parameters					
LVEF (%)	59.0 ± 7.2	60.8 ± 0.5	58.7 ± 0.6	54.2 ± 0.9	<0.001
LVMI (g/m ²)	98.7 ± 38.7	94.7 ± 2.9	99.5 ± 3.3	108.4 ± 5.0	0.17
LA dimension (cm)	3.9 ± 0.8	3.9 ± 0.1	4.0 ± 0.1	4.3 ± 0.1	<0.001
DD grade	1.1 ± 0.5	0.9 ± 0.0	1.1 ± 0.1	1.4 ± 0.1	<0.001
RVSP (mm Hg)	44.0 (35.0-53.0)	39.3 ± 2.3	46.7 ± 2.0	53.3 ± 2.9	0.003
RV dysfunction	128 (32.4)	52 (28.1)	49 (33.1)	27 (43.6)	0.08
RA pressure (mm Hg)	5.0 (5.0-15.0)	5.0 (5.0-10.0)	10.0 (5.0-20.0)	7.5 (5.0-15.0)	0.002
Aortic valve pathology*	15 (4.0)	0 (0.0)	9 (6.4)	6 (9.8)	<0.001

Represented as: Mean ± standard error or median (interquartile range) or number (%)

Groups: Group 1: BNP ≤100 pg/mL, Group 2: BNP 101-500 pg/mL, Group 3: BNP ≥501 pg/mL

Abbreviations: ACE-i: Angiotensin-converting enzyme inhibitors; ARB: angiotensinogen receptor blockers; BMI: body mass index; BNP: B-type natriuretic peptide; BSA: body surface area; CAD: coronary artery disease; DD: diastolic dysfunction; DLCO: diffusion capacity of the lung for carbon monoxide; DM-II: diabetes mellitus type II; eGFR: estimated glomerular filtration rate; FEV₁: Forced expiratory volume at 1 second; ICS: inhaled corticosteroids; LA: left atrium; LAAC: long-acting anti-cholinergic agents; LABA: long-acting beta-agonist agents; LVEF: left ventricular ejection fraction; LVMI: left ventricular mass index; OSA: obstructive sleep apnea; pCO₂: partial pressure of carbon dioxide; RA: right atrium; RV: right ventricle; RVSP: right ventricular systolic pressure; SBP: systolic blood pressure; SpO₂: peripheral oxygen saturation

Footnotes: *Moderate or greater stenosis or regurgitation

Supplementary Table 3. Multivariate logistic regression analysis of outcomes between BNP sub-groups in patients without renal dysfunction

Outcome	Est (SE)*	p-value
NIV duration (days)[†]		
Group 2	1.1 (0.7)	0.15
Group 3	-1.9 (1.8)	0.30
MV duration (days)[†]		
Group 2	0.2 (0.2)	0.35
Group 3	1.5 (1.0)	0.13
ICU LOS (days)[†]		
Group 2	0.6 (0.7)	0.35
Group 3	-1.0 (2.1)	0.66
Total LOS (days)[†]		
Group 2	1.9 (0.7)	0.01
Group 3	-1.3 (2.0)	0.51

Represented as: Odds Ratio (95% confidence interval) or Estimate (Standard Error)

Groups: Group 1: BNP ≤100 pg/mL, Group 2: BNP 101-500 pg/mL, Group 3: BNP ≥501 pg/mL

Abbreviations: BB: beta-blockers; BMI: body mass index; CAD: coronary artery disease; DM-II: diabetes mellitus, type II; Est: estimate; FEV₁: Forced expiratory volume at 1 second; Hb: hemoglobin; HTN: hypertension; ICU: intensive care unit; LAAC: long-acting anticholinergics; LABA: long-acting beta-agonists; LOS: length of stay; LVEF: left ventricular ejection fraction; MV: mechanical ventilation; NIV: non-invasive ventilation; OSA: obstructive sleep apnea; pCO₂: partial pressure of carbon dioxide; RVSP: right ventricular systolic pressure; SE: standard error

Footnotes:

*Compared to reference group (Group 1)

[†]Adjusted for age, gender, HTN, DM-II, CAD, OSA, FEV₁, LABA, LAAC, BB, loop diuretics, BMI, Hb, creatinine, pH, pCO₂, LVEF, RVSP