Online Supplement:

Online Supplement I: Missing data for components of NIVO score and comparison scores.

	Derivation			Validation		
Variable	% Missing	Original	Post EM	% Missing	Original	Post EM
pH	0.0	7.24 (0.09)	N/A	0.0	7.24 (0.08)	N/A
Time to acidaemia (min)	0.0	146 (56-852)	N/A	0.0	137 (41-767)	N/A
Temperature (ºC)	0.0	35.7 (6.0)	N/A	2.3	36.7 (1.0)	36.7 (1.0)
Systolic BP (mmHg)	1.4	123.9 (31.5)	123.0 (32.4)	2.2	133.4 (34.3)	133.3 (34.0)
Diastolic BP (mmHg)	1.6	70.1 (18.8)	69.7 (19.2)	2.2	75.6 (20.8)	75.4 (20.7)
Heart rate	1.4	112.8 (21.9)	112.4 (22.1)	1.9	110.0 (21.4)	109.9 (21.4)
Respiratory rate	0.0	28.5 (8.2)	N/A	2.2	28.4 (7.4)	28.4 (7.4)
GCS	2.2	13.6 (2.8)	13.5 (2.7)	2.3	13.8 (2.5)	13.8 (2.4)
Sodium (mmol/L)	3.3	136.6 (5.3)	136.6 (5.2)	1.5	136.9 (5.5)	136.9 (5.5)
Potassium (mmol/L))	6.7	4.65 (0.7)	4.63 (0.7)	6.5	4.61 (0.64)	4.61 (0.64)
Urea (mmol/L)	3.3	9.2 (5.7)	9.0 (5.7)	3.1	8.5 (5.3)	8.5 (5.3)
Creatinine (umol/L)	3.3	105.6 (53.3)	105.7 (53.4)	1.8	87.1 (49.4)	87.2 (49.1)
Albumin (g/L)	19.0	37.9 (5.4)	37.9 (5.4)	15.0	37.8 (5.2)	37.7 (5.2)
Haematocrit (L/L)	3.9	0.420 (0.06)	0.420 (0.06)	1.6	0.433 (0.06)	0.433 (0.06)
White cell count (x10⁹/L)	3.9	13.7 (6.6)	13.6 (6.6)	1.4	13.0 (6.7)	13.1 (6.8)
Eosinophil Count (x10⁹/L)	4.1	0.09 (0.18)	0.10 (0.18)	2.9	0.12 (0.24)	0.12 (0.24)

Online Supplement II: Univariate association with in-hospital mortality (continuous variables) in derivation cohort. Dynamic variables recorded in 24 hours prior to ventilation. Candidate indices for multivariable, regression analysis.

Variable for further evaluation	P Value
Age	<0.001
Atrial Fibrillation present	0.012
Left Ventricular Systolic Dysfunction	0.025
Depression	0.097
eMRCD	<0.001
Long term Oxygen Therapy (LTOT)	0.014
Chest radiograph consolidation	<0.001
Pleural Effusion on admission chest radiograph	<0.001
Confusion present	<0.001
GCS	<0.001
Systolic Blood pressure	0.026
Heart Rate	0.057
Respiratory Rate	0.041
Haemoglobin	<0.001
White Cell Count (WCC)	0.016
Eosinophil Count	<0.001
Urea	<0.001
C- reactive protein (CRP)	0.005
pH	0.003
Base Excess	0.001
Time to acidaemia	<0.001
Albumin **(Not eligible for further exploration due to missing data rate.)**	<0.001

Online Supplement III: Multivariable, forced entry, logistical regression results in validation cohort using 8 categorical variables from derivation cohort. Inpatient mortality as dependent variable.

	B	Significance	(Odds Ratio 95% CI)
Chest radiograph consolidation	0.343	0.106	1.41 (0.93-2.14)
Glasgow Coma Scale (GCS) ≤14	0.650	0.003	1.92 (1.25-2.93)
Atrial fibrillation present	0.838	<0.0001	2.31 (1.45-3.70)
pH <7.25	0.989	<0.0001	2.69 (1.73-4.18)
Time to acidaemia >12 hours	1.300	<0.0001	3.67 (2.35-5.73)
eMRCD 5a	1.378	<0.0001	3.97 (3.34-6.74)
eMRCD 5b	1.892	<0.0001	6.63 (3.73-11.79)
Long term Oxygen Therapy (LTOT)	0.239	0.296	1.27 (0.81-1.99)
Eosinophil count <0.05 x10^9/L	0.107	0.617	1.11 (0.73-1.69)

Intercept -2.976, R^2 0.288, Hosmer and Lemeshow 0.561. Cook's distances and Studentised residuals all within acceptable limits.

Using these eight variables and simple scoring system from derivation (1 point for all except 2 points for 5b) gives AUROC to predict in-hospital mortality of 0.77 (0.73-0.81). I.E an unmodified validation.

Online Supplement IV: the extended medical research council dyspnoea (eMRCD) score and guidance notes.

Extended MRC Dyspnoea (eMRCD) Score "In the past 3 months, when you were feeling at your best, which of the following statements best describes your level of breathlessness?" (please circle)	
Only Breathless on strenuous exertion	1
Breathless hurrying on the level or walking up a slight hill	2
Walks slower than contemporaries, or stops when walking on the level for 15 min	3
Stops for breath after walking 100m, or for a few minutes, on the level	4
Too breathless to leave the house unassisted but independent in washing and/ or dressing	5a
Too breathless to leave the house unassisted and requires help with both washing and dressing	5b

Guidance notes:
Remember that you are asking the patient about their level of breathlessness on a good day over the preceding 3 months, not breathlessness during an exacerbation / on admission.

A patient only achieves a higher grade if they are as breathless as defined in that higher grade.
- for example, if worse than defined in eMRCD 3, but not as bad as eMRCD 4, they remain eMRCD 3.

A key distinction is between eMRCD 4 and eMRCD 5a/5b:
- only score 5a or 5b if the patient cannot leave the house without assistance.
- if a patient can only walk 30 to 40 metres, but can leave the house unassisted, they are eMRCD 4.
- if a patient can walk 5 or 10 metres, perhaps from their front door to a car, but need a wheelchair otherwise, they require assistance: eMRCD 5a or 5b. Simple walking aids do not constitute assistance.

If a patient requires assistance in personal washing and dressing they are eMRCD 5b. If they only require assistance in washing or dressing they are eMRCD 5a. Remember to ask about putting on socks and shoes.
If patients are limited for a reason other than breathlessness, score based on their functional limitation.

Online Supplement V: Predicted vs. observed mortality calibration plots using both ten equal groups (top panel) and the NIVO score (bottom panel).