Score name	Specific for Covid-19	Main outcome	Predictors	Sample size for validation	AUROC [95% CI]	Low risk cut-off value (discriminative performance)	High risk cut-off value (discriminative performance)
4C Mortality Score	Yes	Death (in-hospital)	Age, sex, number of comorbidities, respiratory rate, oxygen saturation, consciousness, urea, CRP	22361	0.770 [0.760 - 0.770]	3 (Se=0.997; NPV=0.998)	15 (PPV=0.615)
ABC-GOALSc	Yes	ICU admission	Gender, SBP, dyspnea, respiratory rate, Charlson index, obesity	240	0.770 [0.710-0.830]	NA	NA
ABCS	Yes	Death (30 days)	Age, hs-CRP, WBC, D-dimer, Sex, COPD, AST, hs-Tni, lymphocyte, procalcitonin	188	0.838 [0.777-0.899]	2%	9%
A-DROP	No	Death (in-hospital)	Age, urea, oxygen saturation, oxygen arterial pressure, confusion, SBP	15572	0.736 [0.728-0.744]	NA	NA
ANDC	Yes	Death	Age, neutrophils, lymphocytes, D-dimers, CRP	125	0.975 [0.947-1.000]	59	101
Bennouar et al.	Yes	Death (28 days)	Age, sodium, urea, CRP, NLR, LDH, albumin	247	0.900 [0.870-0.940]	NA	4 (Se=0.91; Sp=0.70)
CHA(2)DS(2)-VASc	No	Death	Age, gender, hypertension, diabetes, stroke, CAD, heart failure	864	0.690 [0.650-0.730]	NA	NA
COPS	Yes	Death (28 days)	Age, mental disturbance, dyspnea, chronic renal failure, dementia, lymphocyte count	1865	0.896 [0.872-0.911]	2	5
CORONATION-TR	Yes	Death (30 days)	Age, neutrophils, lymphocytes, D-dimer, LDH, CRP, haemoglobin, platelets, creatinine, creatinine, albumin, pneumonia on CT, heart failure, diabetes, coronary artery disease, peripheral artery disease, collagen tissue disorders, malignancy, lymphoma, heart failure, COPD, cerebrovascular disease, hypertension, diabetes mellitus, valvular heart disease, chronic liver disease	37377	0.896 [0.890-0.902]	NA	NA
COVID-19 SEIMC	Yes	Death (in-hospital, 30 days)	Age, oxygen saturation, neutrophil, lymphocytes, eGFR, dyspnea, sex	2126	0.831 [0.806-0.856]	2 (Se=1;Sp=0.081; PPV=0.159;NPV=1)	9 (Se=0.862;Sp=0.685; PPV=0.322;0.966)
COVID-AID	Yes	Death (7 days)	Age, mean arterial pressure, severe hypoxia (oxygen therapy, mechanical ventilation, NIV, oxygen saturation), SCr	265	0.851 [0.781-0.921]	NA	NA
COVID-GRAM	Yes	Composite: Death, ICU admission, mechanical ventilation	Age, number of comorbidities (COPD, hypertension, diabetes, CAD, CKD, cancer, cerebrovascular disease, hepatitis B, immunodeficiency), cancer history, neutrophils, lymphocytes, LDH, bilirubin, chest radiography abnormalities, hemoptysis, dyspnea, unconsciousness	710	0.880 [0.840-0.930]	NA	NA
COVID-NoLab	Yes	Death (in-hospital)	Age, respiratory rate, oxygen saturation	537	0.803 [Unknown]	1	6
COVID-SimpleLab	Yes	Death (in-hospital)	CRP, respiratory rate, oxygen saturation, age, asthma, WBC, creatinine	295	0.833 [Unknown]	7	12
CURB-65	No	Death (in-hospital)	Confusion, urea, respiratory rate, SBP, DBP, age	15560	0.720 [0.713-0.728]	NA	NA
Hachim et al.	Yes	ICU admission	D dimers, urea, troponin	289	NA	1 (Se=0.854;Sp=0.460)	3 (Se=0.302;Sp=0.931)
Hu et al.	Yes	Death	Age, hsCRP, lymphocytes, D-dimers	64	0.881	NA	0 (Se=0.839;Sp=0.794)
KPI Score	Yes	Composite: Death (in-hospital), ICU, MV, NIV, O2, CTC, IvIg, ECMO, CRRT, dyspnea, X-ray consolidation	Age, CRP, PCT, lymphocytes (%), monocytes (%), albumin	309	0.888 [0.854-0.922]	-7 (Se=0.9; NLR=0.225)	15 (Sp=0.9; PLR=5.334)
LOW-HARM Score	Yes	Death (in-hospital)	Hypertension, oxygen saturation, WBC, lymphocytes, SCr, CPK, troponin, myoglobin	400	0.960 [0.940-0.980]	NA	25 (Se=0.915;Sp=0.89; PPV=0.9;NPV=0.91)
Mei et al. (full)	Yes	Death (60 days)	Age, respiratory failure, WBC, lymphocytes, platelets, D-dimer and LDH	276	0.970 [0.960-0.980]	NA	"30% risk" (Se=0.742;Sp=0.972; PPV=0.717;NPV=0.975)

Score name	Specific for Covid-19	Main outcome	Predictors	Sample size for validation	AUROC [95% CI]	Low risk cut-off value (discriminative performance)	High risk cut-off value (discriminative performance)
Mei et al. (simple)	Yes	Death (60 days)	Age, respiratory failure, CAD, renal failure and heart failure	276	0.880 [0.800-0.960]	NA	NA
NEWS2	No	Composite: Death, ICU admission	Respiratory rate, oxygen saturation, systolic blood pressure, heart rate, temperature, oxygen therapy, counsciousness	66	0.822 [0.690-0.953]	NA	6 (Se=0.800;Sp=0.843; PPV=0.60;NPV=0.935)
PLANS	Yes	Death (in-hospital)	Age, sex, neutrophils, lymphocytes, platelets	1031	0.870 [0.850-0.890]	NA	NA
PREDI-CO	Yes	Composite: Mechanical ventilation, NIV, oxygen saturation <93% with FiO2=1	Age, obesity, temperature, respiratory rate, lymphocytes, CRP, LDH	526	0.850 [0,810-0,880]	NA	3 (Se=0.80;Sp=0.76; PPV=0.69;NPV=0.85)
PRESEP	No	Death (60 days)	Temperature, oxygen saturation, respiratory rate, heart rate, systolic blood pressure, glasgow coma scale	557	0.607 [0.555-0.652]	NA	1 (Se=0.6226;Sp=0.5655; PPV=0.175;NPV=0.91)
qSOFA	No	Death (in-hospital)	Respiratory rate, Glasgow coma scale, systolic blood pressure	19361	0.622 [0.615-0.630]	NA	NA
RISE UP	No	Death (30 days)	Age, heart rate, MBP, respiratory rate, oxygen saturation, temperature, Glasgow coma scale, albumin, urea, LDH, bilirubin	642	0.770 [0.680-0.760]	0.05 (Se=1;Sp=0.089; PPV=0.278;NPV=1)	0.5 (Se=0.217;Sp=0.915; PPV=0.473;NPV=0.770)
SIMI	Yes	Composite: NIV, mechanical ventilation, death	Age, coronary heart disease, CRP, AST, D-dimer, neutrophils, lymphocytes	175	0.800 [Unknown]	NA	7 (Se=0.93;Sp=0.34; PPV=0.59;NPV=0.82)
SIRS	No	Death (in-hospital)	Temperature, heart rate, respiratory rate, WBC	175	0.700 [0.610-0.800]	NA	2 (Se=76%;Sp=52%; PPV=32%;NPV=90%)
STSS	No	Death (30 days)	Respiratory rate, heart rate, SBP, oxygen saturation, Glasgow coma scale, age	100	0.962 [0.903-0.990]	NA	1 (Se=0.833;Sp=0.936; PPV=0.455;NPV=0.989)
Wang et al. (Clinical)	Yes	Death	Age, hypertension, CAD	44	0.830 [0.680-0.930]	NA	-1.798 (Se=0.643;Sp=0.933; PPV=0.818;NPV=0.849)
Wang et al. (Laboratory)	Yes	Death	Age, lymphocytes, hsCRP, D-dimer, AST, eGFR	44	0.880 [0.750-0.960]	NA	-3.829 (Se=1.00;Sp=0.70; PPV=0.609;NPV=1.00)

Se: sensitivity; Sp: specificity; PPV: positive predictive value; NPV: negative predictive value; PLR: positive likelihood ratio; NLR: negative likelihood ratio.

Table S1. General information on scores included in the study.

Score name	Unavailable variables?	Variable with the highest rate of missing data	Can the score be computed without alterations?	Alterations used to compute the score?	Sample size with complete data
4C Mortality Score	No	Glasgow coma scale	Yes	NA	3277
ABC-GOALSc	Yes (dyspnea)	NA	No	Dyspnea: defined as RR > 24/min and/or oxygen saturation < 92%	3784
ABCS	No	Troponin	Yes	NA	2411
A-DROP	Yes (oxygen arterial pressure)	NA	No	Oxygen arterial pressure: ignored, respiratory failure is defined using arterial oxygen saturation	3974
ANDC	No	D-dimers	Yes	NA	7137
Bennouar et al.	No	Albumin	Yes	NA	3395
CHA(2)DS(2)-VASc	No	None	Yes	NA	14343
COPS	Yes (dyspnea)	NA	No	Dyspnea: defined as RR > 24/min and/or oxygen saturation < 92%	4882
CORONATION-TR	Yes (pneumonia on CT)	NA	No	Pneumonia on CT: considered true for patients with ICD-10 codes for respiratory Covid-19, otherwise false	2572
COVID-19 SEIMC	Yes (dyspnea)	NA	No	Dyspnea: defined as RR > 24/min and/or oxygen saturation < 92%	7079
COVID-AID	Yes (oxygen therapy, mechanical or non-invasive ventilation)	NA	No	Oxygen therapy, mechanical or non-invasive ventilation: ignored, severe hypoxia is defined as oxygen saturation < 90%	6565
COVID-GRAM	Yes (chest radiography abnormalities, hemoptysis, direct bilirubin)	NA	No	Dyspnea: defined as RR > 24/min and/or oxygen saturation < 92% Chest radiography abnormalities: considered true for patients with ICD-10 codes for respiratory Covid-19, otherwise false Hemoptysis: ignored, rare event Direct bilirubin: estimated as 0.6 x total bilirubin	2667
COVID-NoLab	No	Respiratory rate	Yes	NA	8109
COVID-SimpleLab	No	Respiratory rate	Yes	NA	6640
CURB-65	No	Glasgow coma scale	Yes	NA	5300
Hachim et al.	No	D-dimers	Yes	NA	4920
Hu et al.	No	D-dimers	Yes	NA	7137
KPI Score	No	Albumin	Yes	NA	4703
LOW-HARM Score	Yes (myoglobin)	NA	No	Myoglobin: ignored, cardiac injury is defined as either CPK or troponin elevation	1957
Mei et al. (full)	Yes (respiratory failure)	NA	No	Respiratory failure: defined as RR ≥ 30/min and/or oxygen saturation < 90%	3071
Mei et al. (simple)	No	None	Yes	NA	8123
NEWS2	Yes (oxygen therapy)	NA	No	Oxygen therapy: considered true for patients with ICD-10 codes for respiratory Covid-19, otherwise false	3704
PLANS	No	Lymphocytes	Yes	NA	12307
PREDI-CO	No	LDH	Yes	NA	2898
PRESEP	No	Glasgow coma scale	Yes	NA	3704
qSOFA	No	Glasgow coma scale	Yes	NA	3718
RISE UP	No	Albumin	Yes	NA	1015

Score name	Unavailable variables?	Variable with the highest rate of missing data	Can the score be computed without alterations?	Alterations used to compute the score?	Sample size with complete data
SIMI	No	D-dimer	Yes	NA	6230
SIRS	No	Respiratory rate	Yes	NA	7688
STSS	No	Glasgow coma scale	Yes	NA	3707
Wang et al. (Clinical)	No	None	Yes	NA	14343
Wang et al. (Laboratory)	No	D-dimers	Yes	NA	4266

Table S2. Systematic evaluation for scores included in the study.

Variable	Cut-offs for aberrant or extreme values	Way to treat out-of-range values
Vital signs on admission		
Heart rate, beats per minute	NA	Out of range values were ignored (e.g. for a diastolic blood pressure of 7, the patient was considered as having a missing value for this variable; no control for user input exists in most electronic medical records used in GPUH's hospitals)
Respiratory rate, cycles per minute	8-80	
Altered consciousness (i.e. Glasgow Coma Scale < 15)	NA	
Diastolic blood pressure, mmHg	10-	
Mean blood pressure, mmHg	10-	
Systolic blood pressure, mmHg	40-250	
Arterial oxygen saturation, %	50-100	
Temperature, °C	30-42	
Body mass index (BMI), kg/m²	NA	
Biological values on admission		
Haemoglobin, g/dl	NA	Out-of-range values were modified to the closest in-range value (e.g. for a lactate dehydrogenase value of >1200 UI/l given by the laboratory, the patient was considered as having a value of 1200 UI/l)
Leukocytes, G/l	0-60	
Neutrophils, G/l	0-60	
Lymphocytes, G/l	0-40	
Eosinophils, G/l	NA	
Monocytes, G/l	0-10	
Basophils, G/l	NA	
Platelets count, G/l	0-2000	
Sodium, mmol/l	110-170	
Potassium, mmol/l	NA	
Bicarbonates, mmol/l	NA	
Proteins, g/l	25-	
Calcium, mmol/l	0-4	
Urea, mmol/l	0-100	
Serum creatinine, µmol/l	4.4-4000	
Alanine aminotransferase, IU/l	3-500	
Asparate aminotransferase, IU/l	3-1000	
Total bilirubin, µmol/l	0-500	
Lactate dehydrogenase, IU/l	0-1200	
Creatinine phosphokinase, IU/l	0-10000	
Troponine, ng/l	2.3-5000	
Activated partial thromboplastin time	0-7	
Prothrombin time, %	10-100	
Fibrinogen, g/l	NA	
D-dimers, µg/l	270-10000	
C-reactive protein, mg/l	0.2-4800	
Procalcitonin, µg/l	0-25	

Table S3. Lower and upper limits for aberrant or extreme values.

Variable	Variable class (transformation used)	Missing data, n (%)
Demographic data		
Sex	Binary	
Age	Continuous	
Department of residence	Factor (departments outside Paris region were regrouped)	
Diagnosis of Covid-19		
Admission during « first wave »	Binary	
Time between PCR sample and admission	Continuous (logarithmic transformation)	
Initial care site	Factor	
Medical history		
ICD-10 codes available for previous visits	Binary	
Modified Charlson comorbidity index	Ordered factor (classes: 0, 1, (1-2], (2-3], (3-5], (5-23])	
Cardiac disease	Binary	0 (0)
Congestive heart failure		
Myocardial infarction		
Valvular heart disease		
Peripheral vascular disease		
Cerebrovascular disease		
Ischemic stroke		
Dementia		
Hemiplegia		
Arterial hypertension		
Diabetes		
Diabetes with end-organ damage		
Chronic pulmonary disease		
Asthma		
Chronic obstructive pulmonary disease		
Moderate or severe renal disease		
Mild liver disease		
Moderate or severe liver disease		
Any tumor		
Metastatic solid tumor		
Lymphoma		
Connective tissue disease		
Ulcer disease		
HIV infection		
Obesity (ICD-10 codes only)		
Extreme obesity (ICD-10 codes only)		
Vital signs on admission		
Heart rate, beats per minute	Continuous	3344 (23.3)
Respiratory rate, cycles per minute	Continuous	5615 (39.1)
Altered consciousness (i.e. Glasgow Coma Scale < 15)	Binary	8581 (59.8)
Diastolic blood pressure, mmHg	Continuous	5980 (41.7)
Mean blood pressure, mmHg	Continuous	6477 (45.2)
Systolic blood pressure, mmHg	Continuous	5976 (41.7)
Pulse saturometry, %	Continuous (square root transformation)	4551 (31.7)
Temperature, °C	Continuous	3374 (23.5)
Body mass index (BMI), kg/m²	Continuous	5435 (37.9)
Biological values on admission		
Haemoglobin, g/dl	Continuous	1759 (12.3)
Leukocytes, G/l	Continuous	1762 (12.3)
Neutrophils, G/l	Continuous	1990 (13.9)
Lymphocytes, G/l	Continuous (logarithmic transformation)	2020 (14.1)
Eosinophils, G/l	Continuous (logarithmic transformation)	2026 (14.1)
Monocytes, G/l	Continuous (logarithmic transformation)	2019 (14.1)
Basophils, G/l	Continuous (logarithmic transformation)	2027 (14.1)
Platelets count, G/l	Continuous	1769 (12.3)
Sodium, mmol/l	Continuous	599 (4.2)
Potassium, mmol/l	Continuous	848 (5.9)
Bicarbonates, mmol/l	Continuous	6557 (45.7)
Proteins, g/l	Continuous	982 (6.8)
Calcium, mmol/l	Continuous	5842 (40.7)
Urea, mmol/l	Continuous (logarithmic transformation)	831 (5.8)
Serum creatinine, µmol/l	Continuous (logarithmic transformation)	560 (3.9)
Alanine aminotransferase, IU/l	Continuous (logarithmic transformation)	2477 (17.3)
Asparate aminotransferase, IU/l	Continuous (logarithmic transformation)	2926 (20.4)
Total bilirubin, µmol/l	Continuous (logarithmic transformation)	2427 (16.9)
Lactate dehydrogenase, IU/l	Continuous (logarithmic transformation)	6961 (48.5)
Creatinine phosphokinase, IU/l	Continuous (logarithmic transformation)	6670 (46.5)
Troponin, ng/l	Continuous (logarithmic transformation)	7432 (51.8)
Activated partial thromboplastin time	Continuous	3160 (22)
Prothrombin time, %	Continuous (logarithmic transformation)	2773 (19.3)
Fibrinogen, g/l	Continuous	5200 (36.3)
D-dimers, µg/l	Continuous (logarithmic transformation)	6205 (43.3)
C-reactive protein, mg/l	Continuous (logarithmic transformation)	1365 (9.5)
Procalcitonin, µg/l	Continuous (logarithmic transformation)	7236 (50.4)
Albumin, g/l	Continuous	9451 (65.9)
Outcomes		
Death	Binary	0 (0)
ICU admission	Binary	
Mechanical ventilation	Binary	

Table S4. Summary of variables used for multiple imputations.

Variable	First wave of admission (n = 6142)		Subsequent waves of admission (n = 8201)		All patients (n = 14343)	
Demographic data	*Missing*		*Missing*		*Missing*	
Female sex, n (%)		2553 (41.6)		3636 (44.3)		6189 (43.1)
Age, years		68.9 (SD 17.1)		68 (SD 17.8)		68.4 (SD 17.5)
Diagnosis of Covid-19						
Time between PCR and admission, days		0 [-0.1, 0]		-0.1 [-0.2, 0]		-0.1 [-0.1, 0]
Medical history, n (%)						
Modified Charlson comorbidity index, pts		1 [0, 2]		0 [0, 2]		1 [0, 2]
Congestive heart failure		817 (13.3)		1048 (12.8)		1865 (13)
Myocardial infarction		419 (6.8)		544 (6.6)		963 (6.7)
Peripheral vascular disease		388 (6.3)		496 (6)		884 (6.2)
Cerebrovascular disease		626 (10.2)		735 (9)		1361 (9.5)
Hemiplegia		297 (4.8)		302 (3.7)		599 (4.2)
Dementia		996 (16.2)		1006 (12.3)		2002 (14)
Arterial hypertension		2681 (43.7)		3445 (42)		6126 (42.7)
Diabetes		1455 (23.7)		1960 (23.9)		3415 (23.8)
Diabetes with end-organ damage		839 (13.7)		1183 (14.4)		2022 (14.1)
Chronic pulmonary disease		733 (11.9)		1030 (12.6)		1763 (12.3)
Moderate or severe renal disease		976 (15.9)		1220 (14.9)		2196 (15.3)
Moderate or severe liver disease		66 (1.1)		94 (1.1)		160 (1.1)
Any tumor		624 (10.2)		920 (11.2)		1544 (10.8)
Metastatic solid tumor		145 (2.4)		266 (3.2)		411 (2.9)
Connective tissue disease		93 (1.5)		212 (2.6)		305 (2.1)
HIV infection		114 (1.9)		124 (1.5)		238 (1.7)
Obesity (ICD-10 codes only)		1067 (17.4)		1648 (20.1)		2715 (18.9)
Vital signs on admission						
Heart rate, beats per minute	*1486 (24.2)*	88.9 (SD 17.9)	*1858 (22.7)*	88.2 (SD 17.6)	*3344 (23.3)*	88.5 (SD 17.7)
Respiratory rate, cycles per minute	*2466 (40.1)*	25.5 (SD 7.7)	*3149 (38.4)*	24.4 (SD 7.4)	*5615 (39.1)*	24.9 (SD 7.5)
Altered consciousness (i.e. GCS < 15), n (%)	*4095 (66.7)*	110 (5.4)	*4486 (54.7)*	135 (3.6)	*8581 (59.8)*	245 (4.3)
Diastolic blood pressure, mmHg	*2538 (41.3)*	75 (SD 15.1)	*3442 (42)*	74.6 (SD 15)	*5980 (41.7)*	74.8 (SD 15.1)
Mean blood pressure, mmHg	*3127 (50.9)*	94.2 (SD 15.7)	*3350 (40.8)*	93.7 (SD 15.6)	*6477 (45.2)*	93.9 (SD 15.6)
Systolic blood pressure, mmHg	*2545 (41.4)*	131.6 (SD 21.9)	*3431 (41.8)*	130.9 (SD 22)	*5976 (41.7)*	131.2 (SD 22)
Pulse saturometry, %	*1930 (31.4)*	96 [93, 98]	*2621 (32)*	95 [92, 97]	*4551 (31.7)*	96 [93, 98]
Temperature, °C	*1483 (24.1)*	37.5 (SD 1)	*1891 (23.1)*	37.4 (SD 0.9)	*3374 (23.5)*	37.5 (SD 1)
Body mass index (BMI), kg/m²	*2638 (43)*	27 (SD 6.5)	*2797 (34.1)*	27.1 (SD 6.5)	*5435 (37.9)*	27.1 (SD 6.5)
Biological values on admission						
Haemoglobin, g/dl	*765 (12.5)*	13.1 (SD 2)	*994 (12.1)*	13 (SD 2)	*1759 (12.3)*	13 (SD 2)
Leukocytes, G/l	*767 (12.5)*	7.3 (SD 4)	*995 (12.1)*	7.1 (SD 4)	*1762 (12.3)*	7.2 (SD 4)
Neutrophils, G/l	*873 (14.2)*	5.6 (SD 3.4)	*1117 (13.6)*	5.4 (SD 3.3)	*1990 (13.9)*	5.5 (SD 3.4)
Lymphocytes, G/l	*883 (14.4)*	1 [0.7, 1.3]	*1137 (13.9)*	0.9 [0.7, 1.3]	*2020 (14.1)*	0.9 [0.7, 1.3]
Platelets count, G/l	*773 (12.6)*	219.7 (SD 95)	*996 (12.1)*	219.7 (SD 92.1)	*1769 (12.3)*	219.7 (SD 93.4)
Sodium, mmol/l	*309 (5)*	136.4 (SD 5)	*290 (3.5)*	135.8 (SD 4.4)	*599 (4.2)*	136 (SD 4.7)
Potassium, mmol/l	*415 (6.8)*	4.1 (SD 0.6)	*433 (5.3)*	4.1 (SD 0.6)	*848 (5.9)*	4.1 (SD 0.6)
Bicarbonates, mmol/l	*3000 (48.8)*	23.8 (SD 3.9)	*3557 (43.4)*	24.4 (SD 3.9)	*6557 (45.7)*	24.2 (SD 3.9)
Proteins, g/l	*532 (8.7)*	71.8 (SD 7.4)	*450 (5.5)*	71.2 (SD 7.3)	*982 (6.8)*	71.5 (SD 7.3)
Urea, mmol/l	*398 (6.5)*	6.4 [4.5, 10.4]	*433 (5.3)*	6.5 [4.6, 9.7]	*831 (5.8)*	6.5 [4.6, 9.9]
Serum creatinine, µmol/l	*269 (4.4)*	82 [66, 111]	*291 (3.5)*	83 [65.5, 109]	*560 (3.9)*	82.4 [66, 110]
Alanine aminotransferase, IU/l	*1155 (18.8)*	29.5 [20, 48]	*1322 (16.1)*	29.5 [19.2, 46.8]	*2477 (17.3)*	29.5 [20, 47]
Asparate aminotransferase, IU/l	*1283 (20.9)*	43 [30, 64.4]	*1643 (20)*	41.5 [29, 62]	*2926 (20.4)*	42 [29.2, 63]
Total bilirubin, µmol/l	*1136 (18.5)*	8 [6, 12]	*1291 (15.7)*	8 [6, 12]	*2427 (16.9)*	8 [6, 12]
Lactate dehydrogenase, IU/l	*2694 (43.9)*	366 [277, 503]	*4267 (52)*	359 [273, 494]	*6961 (48.5)*	362 [275, 499]
Creatinine phosphokinase, IU/l	*2673 (43.5)*	136 [69.6, 325]	*3997 (48.7)*	127 [65, 282]	*6670 (46.5)*	132 [67, 300]
Troponine, ng/l	*2901 (47.2)*	15 [10, 31.4]	*4531 (55.2)*	15 [9.5, 31]	*7432 (51.8)*	15 [10, 31]
Activated partial thromboplastin time	*1611 (26.2)*	1.2 (SD 0.3)	*1549 (18.9)*	1.2 (SD 0.3)	*3160 (22)*	1.2 (SD 0.3)
Prothrombin time, %	*1453 (23.7)*	86 [75, 96]	*1320 (16.1)*	87 [75, 98]	*2773 (19.3)*	87 [75, 97]
Fibrinogen, g/l	*2614 (42.6)*	5.9 (SD 1.6)	*2586 (31.5)*	5.7 (SD 1.6)	*5200 (36.3)*	5.8 (SD 1.6)
D-dimers, µg/l	*3616 (58.9)*	1014 [593, 1780]	*2589 (31.6)*	950 [580, 1661]	*6205 (43.3)*	964 [585, 1690]
C-reactive protein, mg/l	*638 (10.4)*	77 [34.2, 137.1]	*727 (8.9)*	65.9 [27, 121]	*1365 (9.5)*	70 [30, 129]
Procalcitonin, µg/l	*3057 (49.8)*	0.2 [0.1, 0.4]	*4179 (51)*	0.2 [0.1, 0.4]	*7236 (50.4)*	0.2 [0.1, 0.4]
Albumin, g/l	*4235 (69)*	32.1 (SD 5.7)	*5216 (63.6)*	32.5 (SD 5.4)	*9451 (65.9)*	32.4 (SD 5.5)
Outcomes						
Death		1279 (20.8)		1304 (15.9)		2583 (18)
ICU admission		1326 (21.6)		1963 (23.9)		3289 (22.9)
Mechanical ventilation		695 (11.3)		939 (11.4)		1634 (11.4)

Continuous variables are reported as mean (standard deviation (SD)) for normally distributed variables and median [interquartile range] for non-normally distributed variables. GCS: Glasgow Coma Scale.

Table S5. Baseline characteristics and outcomes according to wave of admission.

	Centre 1 (n=1742)	Centre 2 (n=1538)	Centre 3 (n=1283)	Centre 4 (n=1129)	Centre 5 (n=1123)	Centre 6 (n=1076)	Centre 7 (n=957)	Centre 8 (n=711)	Centre 9 (n=636)	Centre 10 (n=613)	Centre 11 (n=605)	Centre 12 (n=563)	Centre 13 (n=361)	Centre 14 (n=323)	Centre 15 (n=243)	Centre 16 (n=160)	Centres 17-28† (n=1203)	Centres 29-33‡ (n=77)
Demographic data																		
Female sex, n (%)	675 (38.7)	660 (42.9)	539 (42)	442 (39.1)	436 (38.8)	444 (41.3)	388 (40.5)	306 (43)	276 (43.4)	288 (47)	269 (44.5)	214 (38)	148 (41)	120 (37.2)	101 (41.6)	62 (38.8)	776 (64.5)	45 (58.4)
Age, years	65.7 (SD 16.9)	66.3 (SD 18)	65.8 (SD 16.6)	67.4 (SD 17)	65.2 (SD 16.5)	68.3 (SD 16.2)	69.1 (SD 16.3)	68.6 (SD 17.5)	64.1 (SD 17.5)	69.2 (SD 19.2)	73 (SD 17.3)	67.3 (SD 16.6)	66.2 (SD 17.3)	63.3 (SD 16.5)	64.9 (SD 17.8)	61.1 (SD 15.7)	85.7 (SD 8.4)	49.3 (SD 20.2)
Diagnosis of Covid-19																		
Time between PCR and admission, days	-0.1 [-0.1,0]	-0.1 [-0.2,0]	-0.1 [-0.2,0]	-0.1 [-0.1,0]	-0.1 [-0.2,0]	-0.1 [-0.2,-0.1]	-0.1 [-0.2,0]	-0.1 [-0.2,0]	-0.1 [-0.1,0]	-0.1 [-0.2,0]	0 [-0.1,0]	-0.1 [-0.1,0]	-0.1 [-0.1,0]	-0.1 [-0.1,0]	-0.1 [-0.2,0]	-0.1 [-0.2,0]	1.1 [0.5,1.7]	0 [-0.1,0.3]
Medical history																		
ICD-10 codes available for previous visits, n (%)	791 (45.4)	800 (52)	638 (49.7)	575 (50.9)	535 (47.6)	586 (54.5)	517 (54)	334 (47)	291 (45.8)	280 (45.7)	338 (55.9)	287 (51)	89 (24.7)	120 (37.2)	110 (45.3)	43 (26.9)	1074 (89.3)	51 (66.2)
Modified Charlson comorbidity index, pts	0 [0,2]	0 [0,2]	0 [0,2]	1 [0,2]	0 [0,2]	1 [0,2]	0 [0,2]	1 [0,2]	0 [0,1]	0 [0,2]	1 [0,2]	0 [0,2]	0 [0,2]	0 [0,1.5]	0 [0,1]	0 [0,2]	3 [2,5]	1 [0,2]
Missing data, n (%)																		
Altered consciousness	1736 (99.7)	1535 (99.8)	1274 (99.3)	655 (58)	269 (24)	103 (9.6)	110 (11.5)	475 (66.8)	43 (6.8)	36 (5.9)	110 (18.2)	90 (16)	359 (99.4)	322 (99.7)	37 (15.2)	157 (98.1)	1195 (99.3)	75 (97.4)
Systolic blood pressure	1178 (67.6)	601 (39.1)	574 (44.7)	490 (43.4)	287 (25.6)	284 (26.4)	282 (29.5)	420 (59.1)	184 (28.9)	181 (29.5)	263 (43.5)	150 (26.6)	242 (67)	90 (27.9)	45 (18.5)	60 (37.5)	593 (49.3)	52 (67.5)
Mean blood pressure	1189 (68.3)	1348 (87.6)	1006 (78.4)	449 (39.8)	192 (17.1)	109 (10.1)	90 (9.4)	302 (42.5)	26 (4.1)	38 (6.2)	87 (14.4)	39 (6.9)	257 (71.2)	268 (83)	18 (7.4)	113 (70.6)	895 (74.4)	51 (66.2)
Arterial oxygen saturation	1710 (98.2)	418 (27.2)	775 (60.4)	117 (10.4)	15 (1.3)	16 (1.5)	14 (1.5)	467 (65.7)	13 (2)	7 (1.1)	30 (5)	16 (2.8)	331 (91.7)	38 (11.8)	7 (2.9)	13 (8.1)	494 (41.1)	70 (90.9)
Body mass index	741 (42.5)	672 (43.7)	500 (39)	402 (35.6)	318 (28.3)	410 (38.1)	277 (28.9)	252 (35.4)	310 (48.7)	270 (44)	189 (31.2)	287 (51)	140 (38.8)	178 (55.1)	95 (39.1)	50 (31.2)	309 (25.7)	35 (45.5)
Blood urea nitrogen	24 (1.4)	53 (3.4)	98 (7.6)	18 (1.6)	9 (0.8)	16 (1.5)	8 (0.8)	51 (7.2)	10 (1.6)	14 (2.3)	6 (1)	16 (2.8)	7 (1.9)	7 (2.2)	2 (0.8)	153 (95.6)	319 (26.5)	20 (26)
Sodium	23 (1.3)	53 (3.4)	85 (6.6)	18 (1.6)	5 (0.4)	65 (6)	8 (0.8)	15 (2.1)	9 (1.4)	6 (1)	6 (1)	6 (1.1)	7 (1.9)	5 (1.5)	1 (0.4)	4 (2.5)	267 (22.2)	16 (20.8)
Haemoglobin	22 (1.3)	21 (1.4)	49 (3.8)	1121 (99.3)	7 (0.6)	13 (1.2)	6 (0.6)	11 (1.5)	12 (1.9)	4 (0.7)	7 (1.2)	5 (0.9)	8 (2.2)	5 (1.5)	1 (0.4)	5 (3.1)	450 (37.4)	12 (15.6)
Lymphocytes count	22 (1.3)	33 (2.1)	81 (6.3)	1121 (99.3)	9 (0.8)	13 (1.2)	38 (4)	41 (5.8)	13 (2)	35 (5.7)	9 (1.5)	5 (0.9)	8 (2.2)	66 (20.4)	2 (0.8)	11 (6.9)	497 (41.3)	16 (20.8)
C-reactive protein	104 (6)	54 (3.5)	151 (11.8)	96 (8.5)	26 (2.3)	70 (6.5)	30 (3.1)	41 (5.8)	24 (3.8)	277 (45.2)	30 (5)	36 (6.4)	15 (4.2)	10 (3.1)	5 (2.1)	85 (53.1)	291 (24.2)	20 (26)
D-dimers	725 (41.6)	442 (28.7)	550 (42.9)	528 (46.8)	279 (24.8)	443 (41.2)	508 (53.1)	294 (41.4)	167 (26.3)	287 (46.8)	348 (57.5)	245 (43.5)	63 (17.5)	129 (39.9)	49 (20.2)	60 (37.5)	1034 (86)	54 (70.1)
Outcomes																		
In-hospital death, n (%)	286 (16.4)	284 (18.5)	224 (17.5)	233 (20.6)	201 (17.9)	202 (18.8)	153 (16)	110 (15.5)	92 (14.5)	120 (19.6)	118 (19.5)	97 (17.2)	25 (6.9)	62 (19.2)	48 (19.8)	20 (12.5)	302 (25.1)	6 (7.8)
ICU admission, n (%)	408 (23.4)	434 (28.2)	399 (31.1)	268 (23.7)	262 (23.3)	226 (21)	235 (24.6)	220 (30.9)	132 (20.8)	113 (18.4)	166 (27.4)	133 (23.6)	98 (27.1)	75 (23.2)	44 (18.1)	44 (27.5)	9 (0.7)	23 (29.9)

† : hospitals with a predominant activity in geriatric medicine or in physical medicine and rehabilitation. ‡ : other hospitals. Continuous variables are reported as mean (standard deviation (SD)) for normally distributed variables and median [interquartile range] for non-normally distributed variables.

Table S6. Baseline characteristics, rate of missing data and outcomes according to initial care site.

Score name	AUROC [95% CI]			
	In-hospital mortality within 30 days		In-hospital mortality or ICU admission within 30 days	
	Principal analysis: Multiple imputed datasets	Sensitivity analysis: Complete dataset†	Principal analysis: Multiple imputed datasets	Sensitivity analysis: Complete dataset†
4C Mortality Score	0.793 [0.783-0.803]	0.784 [0.763-0.804]	0.659 [0.649-0.670]	0.650 [0.631-0.669]
ABCS	0.790 [0.780-0.801]	0.765 [0.742-0.788]	0.682 [0.672-0.692]	0.642 [0.620-0.664]
COVID-GRAM*	0.771 [0.760-0.783]	0.777 [0.756-0.799]	0.688 [0.677-0.699]	0.696 [0.676-0.716]
RISE UP	0.770 [0.759-0.782]	0.750 [0.712-0.788]	0.660 [0.650-0.671]	0.629 [0.593-0.664]
CORONATION-TR*	0.769 [0.757-0.780]	0.740 [0.717-0.764]	0.724 [0.714-0.733]	0.687 [0.666-0.707]
ANDC	0.759 [0.748-0.769]	0.751 [0.736-0.765]	0.642 [0.632-0.652]	0.627 [0.614-0.640]
COVID-19 SEIMC*	0.752 [0.743-0.762]	0.764 [0.751-0.777]	0.587 [0.578-0.597]	0.611 [0.598-0.624]
COVID-AID*	0.747 [0.737-0.757]	0.766 [0.752-0.780]	0.566 [0.557-0.576]	0.600 [0.586-0.615]
COPS*	0.745 [0.734-0.755]	0.757 [0.741-0.773]	0.611 [0.599-0.622]	0.637 [0.622-0.653]
PLANS	0.745 [0.734-0.757]	0.745 [0.734-0.756]	0.635 [0.625-0.646]	0.630 [0.620-0.640]
Mei et al. (Full)*	0.737 [0.726-0.749]	0.731 [0.708-0.755]	0.684 [0.674-0.694]	0.694 [0.675-0.714]
A-DROP*	0.737 [0.725-0.749]	0.768 [0.750-0.786]	0.601 [0.589-0.614]	0.648 [0.630-0.665]
Hu et al.	0.733 [0.722-0.744]	0.716 [0.700-0.732]	0.656 [0.646-0.666]	0.635 [0.622-0.648]
Hachim et al.	0.732 [0.721-0.743]	0.730 [0.713-0.746]	0.622 [0.612-0.633]	0.608 [0.593-0.623]
SIMI	0.731 [0.720-0.742]	0.715 [0.698-0.732]	0.675 [0.666-0.685]	0.649 [0.636-0.663]
CURB-65	0.731 [0.718-0.743]	0.744 [0.728-0.759]	0.608 [0.596-0.620]	0.626 [0.611-0.642]
Wang et al. (Clinical)	0.726 [0.717-0.736]	0.726 [0.717-0.736]	0.550 [0.540-0.560]	0.550 [0.540-0.560]
Bennouar et al.	0.725 [0.714-0.736]	0.704 [0.683-0.725]	0.694 [0.685-0.704]	0.673 [0.656-0.691]
Mei et al. (Simple)	0.724 [0.712-0.735]	0.729 [0.716-0.742]	0.639 [0.628-0.650]	0.665 [0.652-0.677]
COVID-SimpleLab	0.721 [0.710-0.732]	0.716 [0.701-0.731]	0.674 [0.665-0.684]	0.671 [0.657-0.685]
COVID-NoLab	0.703 [0.692-0.715]	0.699 [0.686-0.712]	0.637 [0.627-0.647]	0.651 [0.639-0.663]
STSS	0.697 [0.683-0.712]	0.712 [0.693-0.731]	0.607 [0.593-0.621]	0.649 [0.632-0.667]
PREDI-CO	0.696 [0.684-0.708]	0.706 [0.681-0.730]	0.703 [0.694-0.712]	0.707 [0.689-0.726]
CHA(2)DS(2)-VASc	0.684 [0.673-0.694]	0.684 [0.673-0.694]	0.551 [0.542-0.561]	0.551 [0.542-0.561]
Wang et al. (Laboratory)	0.646 [0.633-0.659]	0.621 [0.598-0.644]	0.669 [0.659-0.679]	0.656 [0.639-0.673]
ABC-GOALSc*	0.646 [0.633-0.659]	0.670 [0.647-0.692]	0.656 [0.646-0.667]	0.667 [0.650-0.685]
NEWS2*	0.634 [0.618-0.651]	0.626 [0.603-0.649]	0.655 [0.641-0.668]	0.646 [0.627-0.664]
LOW-HARM Score*	0.614 [0.598-0.629]	0.628 [0.594-0.662]	0.549 [0.537-0.561]	0.567 [0.540-0.594]
PRESEP	0.595 [0.580-0.610]	0.588 [0.565-0.611]	0.626 [0.613-0.638]	0.616 [0.598-0.635]
qSOFA	0.594 [0.577-0.611]	0.598 [0.578-0.619]	0.577 [0.562-0.591]	0.588 [0.572-0.605]
KPI Score	0.586 [0.575-0.597]	0.586 [0.569-0.604]	0.614 [0.605-0.623]	0.616 [0.602-0.630]
SIRS	0.549 [0.535-0.562]	0.542 [0.526-0.558]	0.590 [0.580-0.601]	0.586 [0.574-0.599]

†i.e., considering only patients with all variables available to compute a given score (see Table S2 for sample sizes for each score). *alterations were used to compute these scores. AUROC: area under the receiver operating characteristic curve; CI: confidence interval.

Table S7. Discriminative performance of scores included in the study, ordered by performance to predict in-hospital mortality.

Score name	Low-risk cut-off value			High-risk cut-off value		
	Cut-off value	Sensitivity [95% CI]	Specificity [95% CI]	Cut-off value	Sensitivity [95% CI]	Specificity [95% CI]
4C Mortality Score	3	0.998 [0.996-1.000]	0.084 [0.077-0.092]	15	0.215 [0.196-0.234]	0.968 [0.964-0.972]
ABCS	137*	0.992 [0.988-0.996]	0.112 [0.105-0.119]	212*	0.882 [0.867-0.897]	0.512 [0.496-0.527]
RISE UP	0.05	0.998 [0.995-1.000]	0.068 [0.062-0.075]	0.5	0.508 [0.482-0.534]	0.840 [0.831-0.849]
ANDC	59	0.980 [0.974-0.986]	0.188 [0.180-0.197]	101	0.634 [0.611-0.657]	0.734 [0.719-0.749]
COVID-19 SEIMC	2	0.995 [0.991-0.998]	0.109 [0.102-0.115]	9	0.780 [0.763-0.797]	0.610 [0.601-0.619]

*Correspond to “2% mortality risk” and “9% mortality risk” in previously published study, respectively. CI: confidence interval.

Table S8. Sensitivities and specificities to predict in-hospital mortality using cut-off values from previous studies (see **Table S1**) for scores with an AUROC >0.75 in the analysis using multiple imputed data.

Score name	AUROC [95% CI]					
	In-hospital death within 30 days			In-hospital death or ICU admission within 30 days		
	First wave	Subsequent waves	p-value	First wave	Subsequent waves	p-value
4C Mortality Score	0.793 [0.779-0.807]	0.793 [0.779-0.806]	0.833	0.658 [0.643-0.673]	0.660 [0.647-0.674]	0.887
ABC-GOALSc*	0.627 [0.608-0.647]	0.660 [0.643-0.678]	**0.043**	0.648 [0.633-0.664]	0.661 [0.648-0.675]	0.355
ABCS	0.789 [0.774-0.804]	0.792 [0.778-0.806]	0.979	0.691 [0.677-0.706]	0.674 [0.661-0.688]	**0.040**
A-DROP*	0.744 [0.729-0.760]	0.730 [0.714-0.746]	0.332	0.605 [0.588-0.622]	0.598 [0.583-0.613]	0.677
ANDC	0.757 [0.741-0.772]	0.759 [0.745-0.773]	0.486	0.647 [0.632-0.662]	0.637 [0.624-0.650]	0.703
Bennouar et al.	0.721 [0.705-0.737]	0.726 [0.711-0.742]	0.837	0.694 [0.680-0.709]	0.694 [0.681-0.706]	0.828
CHA(2)DS(2)-VASc	0.674 [0.659-0.689]	0.694 [0.680-0.708]	0.077	0.543 [0.529-0.558]	0.558 [0.545-0.570]	0.184
COPS*	0.742 [0.727-0.757]	0.745 [0.730-0.749]	0.580	0.611 [0.595-0.627]	0.609 [0.595-0.623]	0.975
CORONATION-TR*	0.760 [0.743-0.777]	0.774 [0.759-0.789]	0.375	0.724 [0.710-0.739]	0.723 [0.710-0.735]	0.433
COVID-19 SEIMC*	0.750 [0.736-0.764]	0.755 [0.742-0.768]	0.555	0.589 [0.574-0.603]	0.586 [0.573-0.598]	0.437
COVID-AID*	0.741 [0.727-0.756]	0.754 [0.741-0.767]	0.063	0.562 [0.547-0.577]	0.569 [0.556-0.582]	0.352
COVID-GRAM*	0.759 [0.743-0.775]	0.779 [0.765-0.794]	0.601	0.681 [0.664-0.697]	0.692 [0.679-0.706]	0.683
COVID-NoLab	0.710 [0.694-0.726]	0.698 [0.683-0.713]	0.209	0.630 [0.615-0.646]	0.642 [0.628-0.655]	0.330
COVID-SimpleLab	0.720 [0.704-0.737]	0.720 [0.705-0.735]	0.673	0.673 [0.658-0.688]	0.674 [0.662-0.687]	0.680
CURB-65	0.733 [0.717-0.750]	0.727 [0.710-0.743]	0.805	0.610 [0.593-0.627]	0.606 [0.591-0.621]	0.923
Hachim et al.	0.731 [0.714-0.747]	0.733 [0.719-0.747]	0.844	0.631 [0.616-0.647]	0.615 [0.602-0.628]	0.150
Hu et al.	0.730 [0.713-0.746]	0.735 [0.720-0.750]	0.089	0.660 [0.646-0.675]	0.651 [0.638-0.664]	0.571
KPI Score	0.579 [0.564-0.595]	0.590 [0.575-0.605]	0.979	0.605 [0.592-0.618]	0.619 [0.607-0.632]	0.967
LOW-HARM Score*	0.610 [0.587-0.632]	0.619 [0.598-0.640]	0.141	0.549 [0.532-0.567]	0.549 [0.534-0.565]	0.341
Mei et al. (Full)*	0.730 [0.713-0.748]	0.743 [0.728-0.758]	0.226	0.684 [0.669-0.699]	0.683 [0.670-0.697]	0.446
Mei et al. (Simple)	0.714 [0.698-0.731]	0.730 [0.715-0.746]	0.373	0.634 [0.618-0.651]	0.641 [0.627-0.655]	0.441
NEWS2*	0.648 [0.627-0.668]	0.618 [0.596-0.639]	**0.002**	0.654 [0.636-0.672]	0.654 [0.638-0.670]	0.225
PLANS	0.737 [0.721-0.753]	0.754 [0.739-0.769]	0.112	0.638 [0.623-0.653]	0.633 [0.620-0.647]	0.622
PREDI-CO	0.696 [0.679-0.713]	0.693 [0.677-0.709]	0.344	0.709 [0.695-0.723]	0.697 [0.685-0.710]	0.150
PRESEP	0.604 [0.585-0.623]	0.583 [0.562-0.604]	0.057	0.629 [0.611-0.646]	0.622 [0.607-0.637]	0.364
qSOFA	0.598 [0.578-0.619]	0.584 [0.562-0.606]	0.228	0.576 [0.557-0.594]	0.575 [0.558-0.592]	0.800
RISE UP	0.765 [0.750-0.781]	0.773 [0.758-0.788]	0.583	0.661 [0.645-0.676]	0.659 [0.646-0.673]	0.936
SIMI	0.739 [0.722-0.755]	0.722 [0.707-0.737]	**0.047**	0.681 [0.667-0.695]	0.670 [0.658-0.683]	0.089
SIRS	0.547 [0.529-0.566]	0.545 [0.526-0.563]	0.611	0.588 [0.573-0.604]	0.590 [0.576-0.604]	0.893
STSS	0.706 [0.689-0.723]	0.688 [0.668-0.707]	0.120	0.607 [0.588-0.625]	0.607 [0.590-0.623]	0.755
Wang et al. (Clinical)	0.718 [0.704-0.732]	0.734 [0.722-0.747]	**0.022**	0.545 [0.530-0.559]	0.553 [0.541-0.566]	0.174
Wang et al. (Laboratory)	0.654 [0.636-0.672]	0.636 [0.619-0.653]	0.334	0.671 [0.656-0.685]	0.667 [0.654-0.680]	0.640

*alterations were used to compute these scores. P-value for interaction between score and wave of admission using multivariate logistic regression (formula: outcome~score+wave+score:wave).

Table S9. Discriminative performance of scores examined in the study according to wave of admission.

Score name	AUROC [95% CI]					
	In-hospital death within 30 days			In-hospital death or ICU admission within 30 days		
	Age ≤ 65	Age > 65	p-value	Age ≤ 65	Age > 65	p-value
4C Mortality Score	0.762 [0.736-0.788]	0.724 [0.711-0.738]	0.807	0.704 [0.688-0.719]	0.673 [0.658-0.687]	0.416
ABC-GOALSc*	0.696 [0.664-0.728]	0.636 [0.621-0.651]	**0.002**	0.673 [0.657-0.690]	0.644 [0.630-0.657]	**0.002**
ABCS	0.778 [0.750-0.805]	0.729 [0.715-0.742]	0.066	0.699 [0.684-0.714]	0.681 [0.668-0.694]	0.214
A-DROP*	0.645 [0.611-0.679]	0.660 [0.645-0.675]	0.213	0.603 [0.585-0.621]	0.595 [0.579-0.611]	**<0.001**
ANDC	0.707 [0.679-0.736]	0.686 [0.672-0.700]	0.365	0.676 [0.661-0.692]	0.636 [0.623-0.650]	0.092
Bennouar et al.	0.718 [0.690-0.746]	0.672 [0.659-0.686]	0.080	0.704 [0.689-0.719]	0.686 [0.674-0.698]	0.596
CHA(2)DS(2)-VASc	0.626 [0.595-0.657]	0.552 [0.538-0.565]	**<0.001**	0.576 [0.560-0.591]	0.500 [0.487-0.512]	**<0.001**
COPS*	0.719 [0.690-0.747]	0.653 [0.638-0.668]	**0.018**	0.644 [0.628-0.660]	0.589 [0.573-0.605]	**0.004**
CORONATION-TR*	0.768 [0.741-0.794]	0.717 [0.703-0.731]	0.113	0.733 [0.718-0.748]	0.722 [0.709-0.734]	**0.040**
COVID-19 SEIMC*	0.721 [0.693-0.749]	0.650 [0.637-0.663]	**<0.001**	0.687 [0.672-0.703]	0.535 [0.522-0.547]	**<0.001**
COVID-AID*	0.712 [0.684-0.739]	0.643 [0.630-0.656]	0.654	0.617 [0.601-0.633]	0.530 [0.517-0.543]	**0.004**
COVID-GRAM*	0.778 [0.750-0.805]	0.708 [0.694-0.723]	0.358	0.710 [0.694-0.726]	0.679 [0.665-0.694]	**0.046**
COVID-NoLab	0.685 [0.656-0.715]	0.606 [0.592-0.620]	0.276	0.635 [0.619-0.651]	0.623 [0.611-0.635]	**<0.001**
COVID-SimpleLab	0.694 [0.663-0.724]	0.652 [0.638-0.667]	0.420	0.680 [0.665-0.696]	0.674 [0.662-0.686]	0.172
CURB-65	0.669 [0.635-0.702]	0.641 [0.625-0.657]	0.087	0.607 [0.588-0.626]	0.602 [0.586-0.619]	0.136
Hachim et al.	0.740 [0.710-0.770]	0.654 [0.640-0.668]	**<0.001**	0.631 [0.615-0.647]	0.605 [0.592-0.618]	**0.005**
Hu et al.	0.675 [0.644-0.706]	0.674 [0.660-0.688]	0.123	0.678 [0.663-0.693]	0.647 [0.634-0.660]	**<0.001**
KPI Score	0.600 [0.575-0.626]	0.584 [0.571-0.596]	0.406	0.619 [0.605-0.633]	0.609 [0.597-0.621]	0.977
LOW-HARM Score*	0.577 [0.534-0.620]	0.579 [0.563-0.595]	**<0.001**	0.575 [0.557-0.594]	0.559 [0.545-0.574]	**0.001**
Mei et al. (Full)*	0.703 [0.671-0.735]	0.690 [0.677-0.704]	0.113	0.700 [0.684-0.716]	0.675 [0.663-0.688]	**<0.001**
Mei et al. (Simple)	0.710 [0.679-0.740]	0.658 [0.643-0.672]	0.218	0.664 [0.647-0.681]	0.611 [0.597-0.625]	**0.002**
NEWS2*	0.615 [0.579-0.650]	0.657 [0.641-0.674]	**0.035**	0.651 [0.631-0.670]	0.661 [0.644-0.677]	0.387
PLANS	0.680 [0.650-0.710]	0.672 [0.658-0.687]	0.531	0.666 [0.651-0.682]	0.628 [0.615-0.642]	**<0.001**
PREDI-CO	0.653 [0.625-0.681]	0.677 [0.663-0.690]	0.074	0.707 [0.692-0.721]	0.696 [0.683-0.708]	0.310
PRESEP	0.586 [0.553-0.620]	0.628 [0.612-0.644]	**0.030**	0.623 [0.604-0.642]	0.635 [0.620-0.651]	0.366
qSOFA	0.578 [0.543-0.612]	0.599 [0.582-0.617]	0.253	0.567 [0.547-0.587]	0.582 [0.563-0.600]	0.263
RISE UP	0.744 [0.715-0.774]	0.698 [0.682-0.713]	**<0.001**	0.698 [0.683-0.714]	0.653 [0.639-0.668]	**<0.001**
SIMI	0.651 [0.622-0.680]	0.673 [0.659-0.686]	0.318	0.685 [0.670-0.699]	0.670 [0.658-0.683]	0.441
SIRS	0.561 [0.529-0.593]	0.586 [0.571-0.601]	0.115	0.591 [0.574-0.608]	0.600 [0.587-0.614]	0.238
STSS	0.596 [0.560-0.633]	0.617 [0.599-0.634]	0.135	0.594 [0.574-0.614]	0.606 [0.587-0.625]	0.306
Wang et al. (Clinical)	0.705 [0.678-0.733]	0.601 [0.587-0.614]	**<0.001**	0.612 [0.596-0.627]	0.510 [0.498-0.523]	**<0.001**
Wang et al. (Laboratory)	0.610 [0.577-0.643]	0.635 [0.621-0.650]	**0.005**	0.673 [0.657-0.688]	0.661 [0.648-0.674]	0.893

*alterations were used to compute these scores. P-value for interaction between score and age group using multivariate logistic regression (formula: outcome~score+age group+score:age group).

Table S10. Discriminative performance of scores examined in the study according to age.

Score name	Area under the precision-recall curve	
	In-hospital death within 30 days	In-hospital death or ICU admission within 30 days
4C Mortality Score	0.459	0.521
ABCS	0.449	0.531
CORONATION-TR	0.432	0.583
RISE UP	0.429	0.512
COVID-GRAM	0.407	0.534
Hu et al.	0.393	0.515
ANDC	0.392	0.498
PLANS	0.391	0.479
Mei et al. (full)	0.382	0.539
COVID-AID	0.380	0.416
COVID-19 SEIMC	0.379	0.418
A-DROP	0.376	0.453
COPS	0.370	0.443
SIMI	0.364	0.504
Mei et al. (simple)	0.361	0.486
COVID-SimpleLab	0.358	0.541
CURB-65	0.355	0.453
STSS	0.351	0.477
Bennouar et al.	0.344	0.533
Hachim et al.	0.332	0.454
PREDI-CO	0.326	0.548
COVID-NoLab	0.324	0.499
Wang et al. (Clinical)	0.315	0.376
Wang et al. (Laboratory)	0.294	0.531
CHA(2)DS(2)-VASc	0.284	0.385
NEWS2	0.276	0.507
ABC-GOALSc	0.276	0.493
PRESEP	0.245	0.479
qSOFA	0.237	0.412
KPI Score	0.215	0.425
SIRS	0.199	0.425
LOW-HARM Score	0.161	0.350

Table S11. Area under the precision-recall curve of scores included in the study, ordered by performance to predict in-hospital mortality.

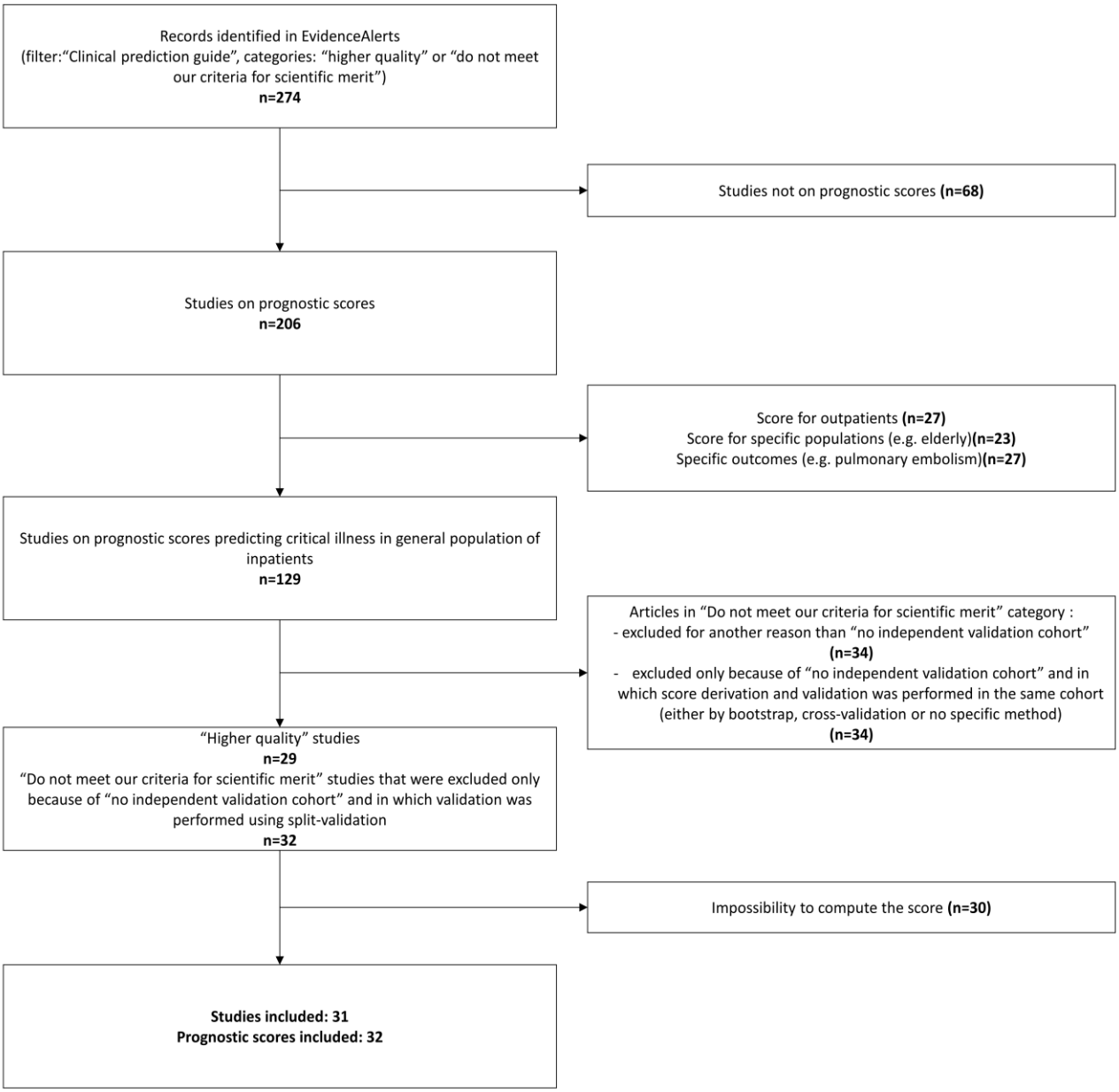
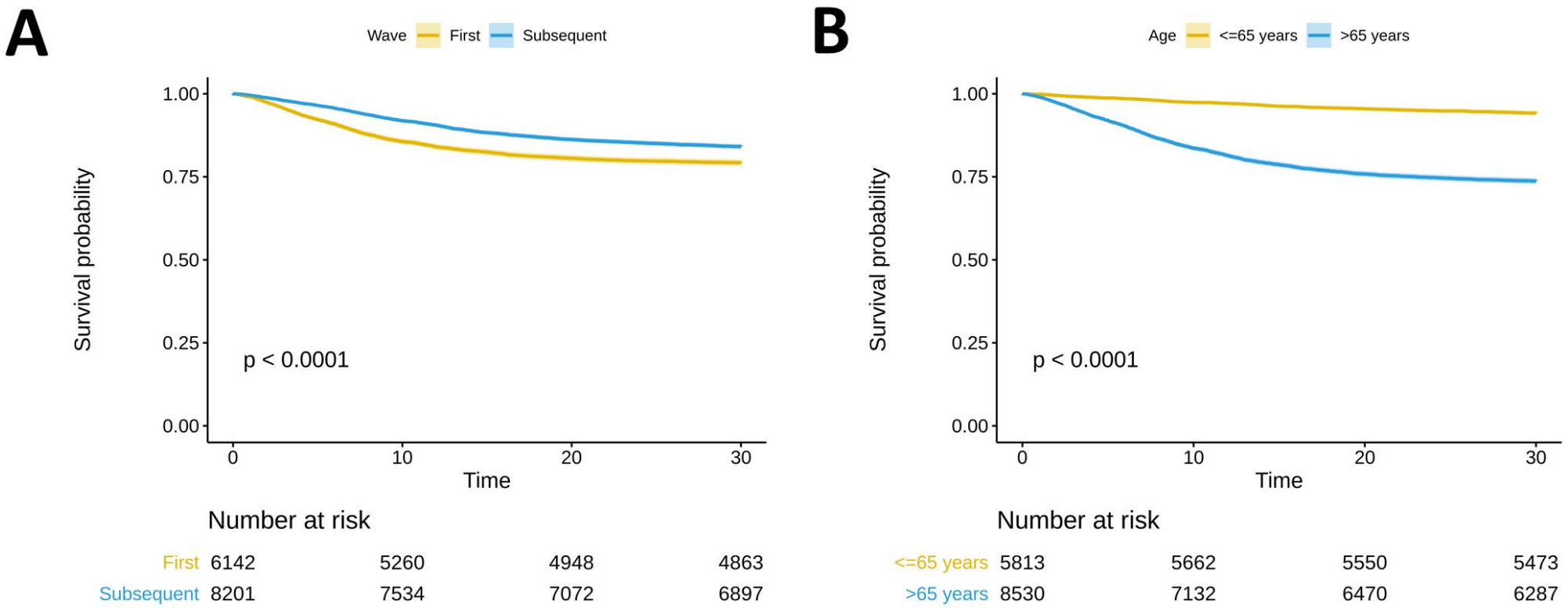


Figure S1. Flow chart for scores' selection. See **Appendix 3** for details on scores included and excluded.



All patients hospitalized for Covid-19 were considered for this analysis. P-values are from Log-Rank tests.

Figure S2. Kaplan-Meier curves for in-hospital mortality according to wave of admission or age.

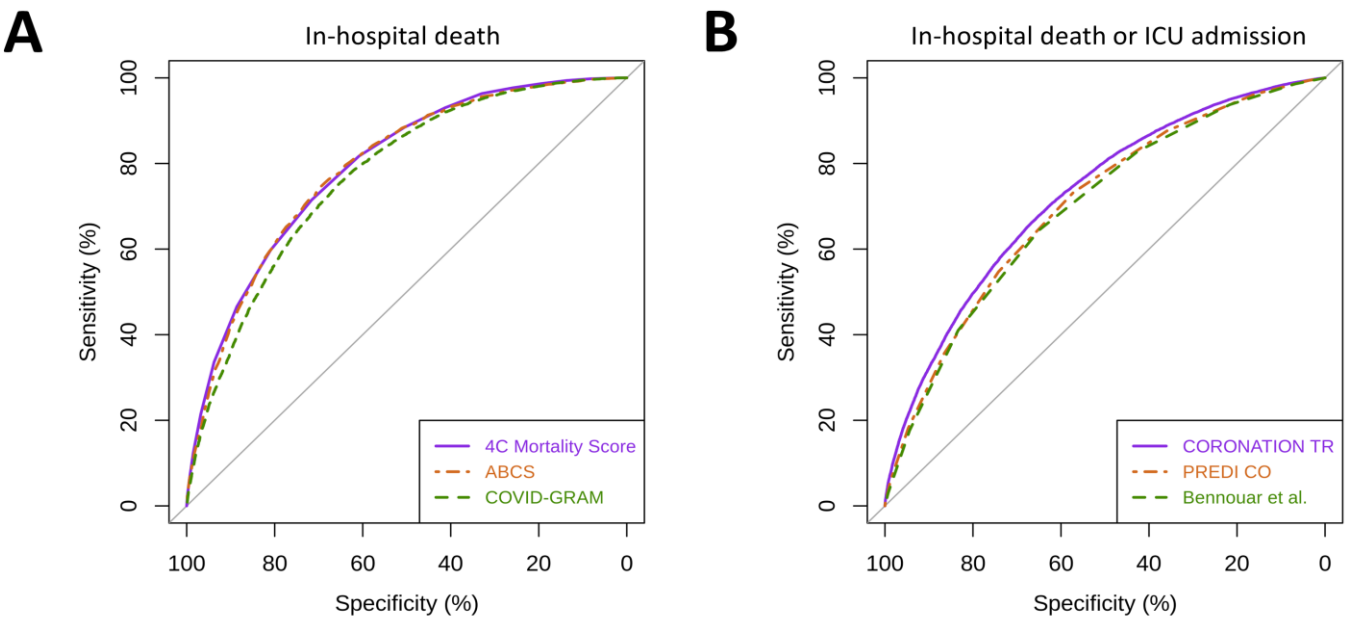
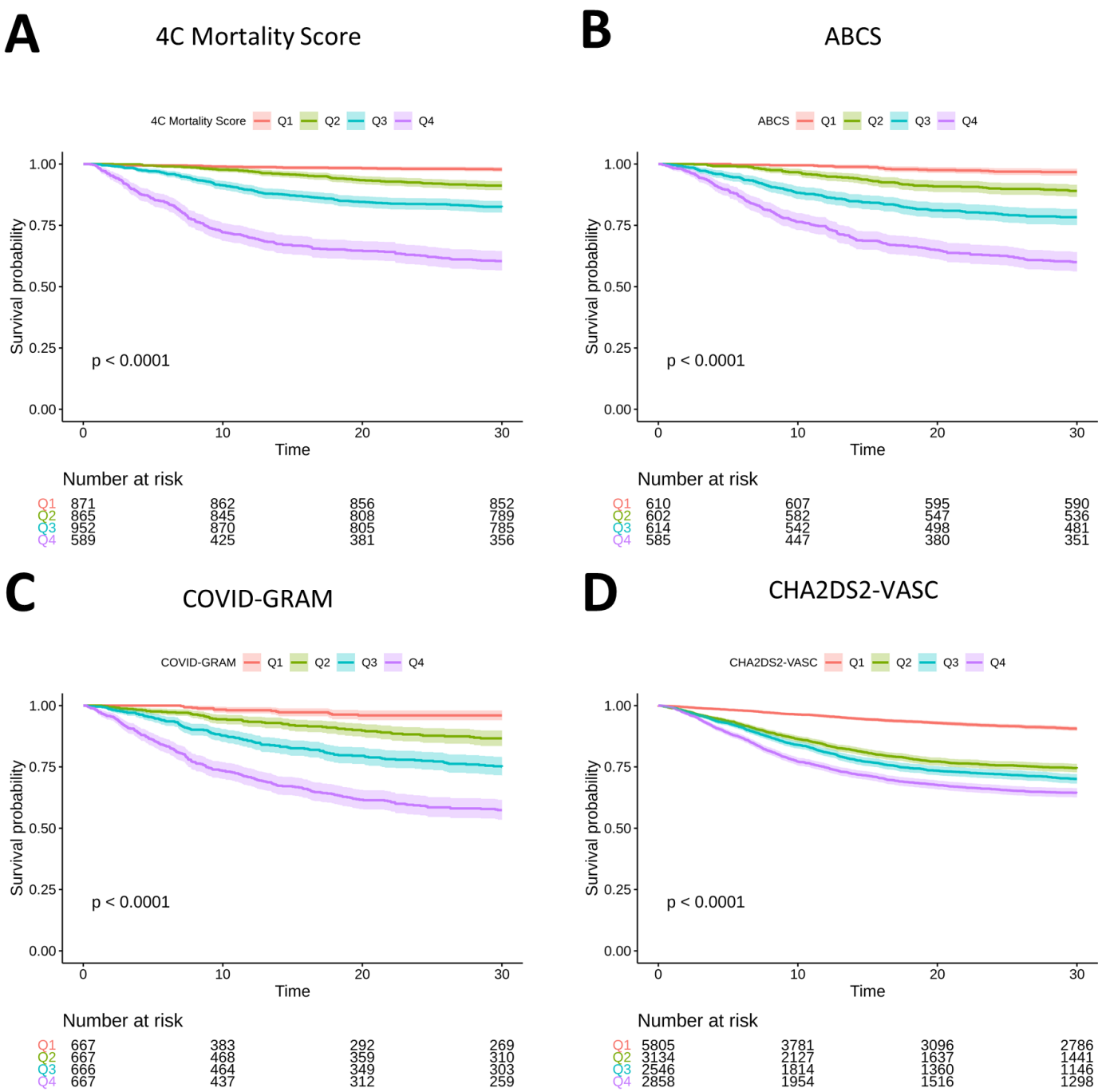


Figure S3. Receiver operating characteristic curves for prediction of in-hospital death within 30 days from admission (**A**) and in-hospital death or ICU admission within 30 days of admission (**B**) among patients hospitalized for Covid-19.



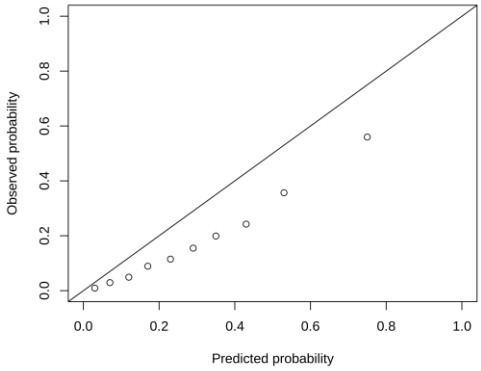
The three scores that performed best to predict in-hospital death are shown (4C Mortality Score, ABCS, COVID-GRAM), and CHA(2)DS(2)-VASc is shown for comparison purposes. For each score, complete data were used (i.e., patients with all data available to compute the score), and patients were grouped according to quartiles (Q1: lowest quartile, to Q4: highest quartile). P-values are from Log-Rank tests.

Figure S4. Kaplan-Meier curves for in-hospital mortality according to the score's value.

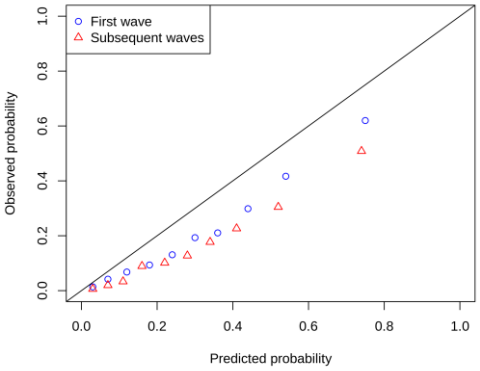
Regardless of wave of admission

According to wave of admission

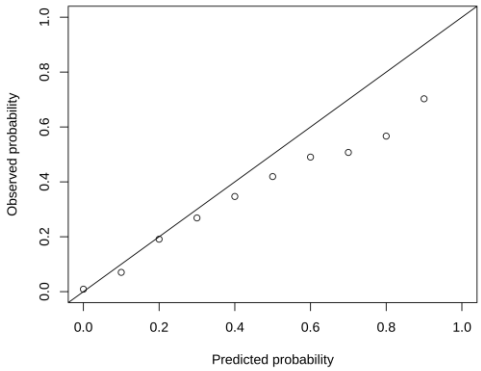
4C Mortality Score



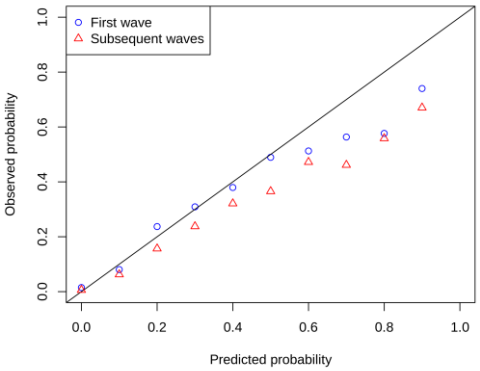
4C Mortality Score



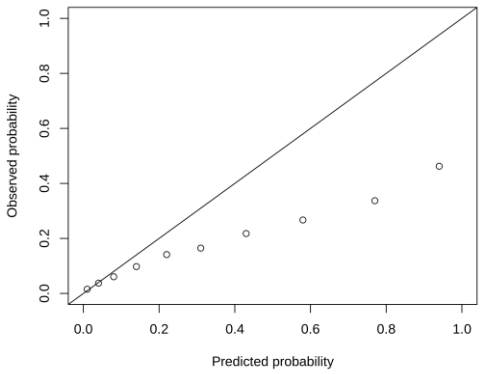
ABCS



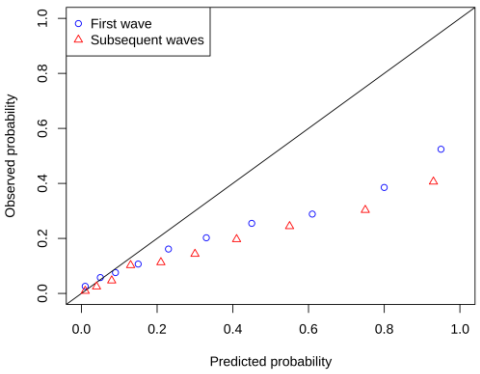
ABCS



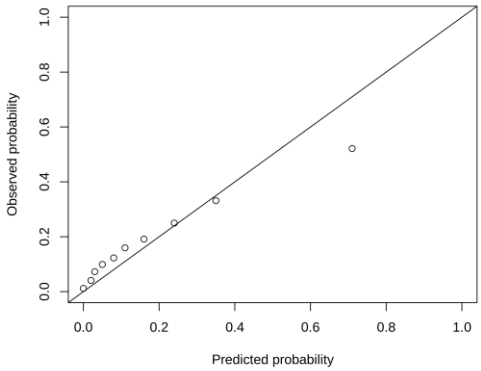
ANDC



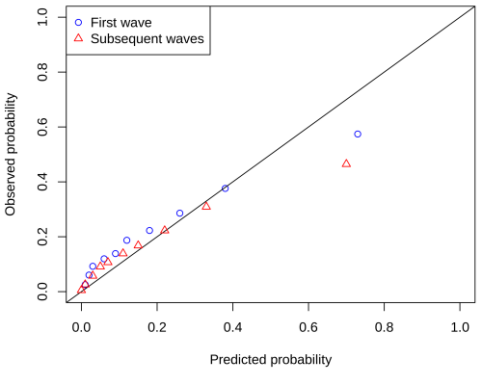
ANDC

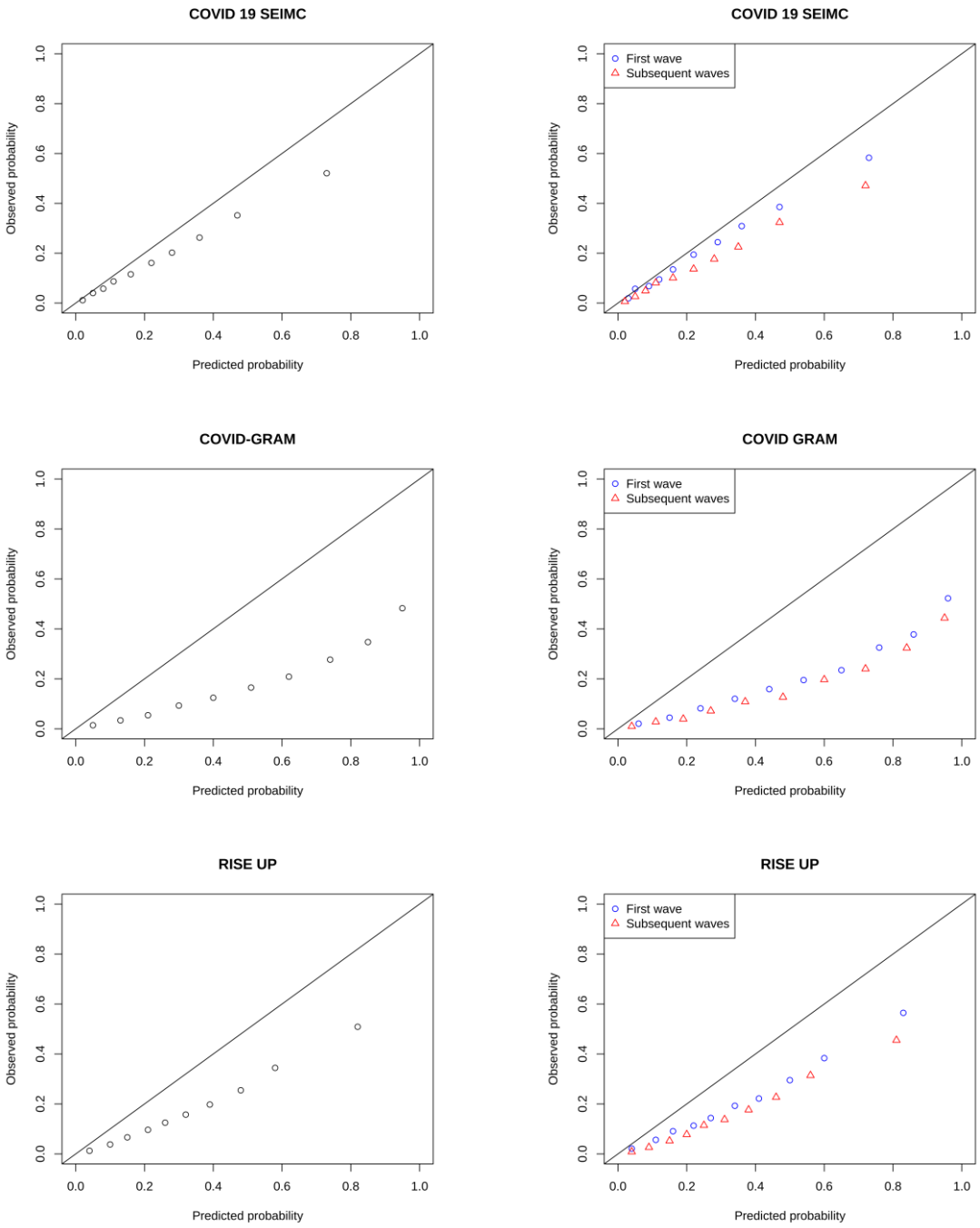


CORONATION TR



CORONATION TR

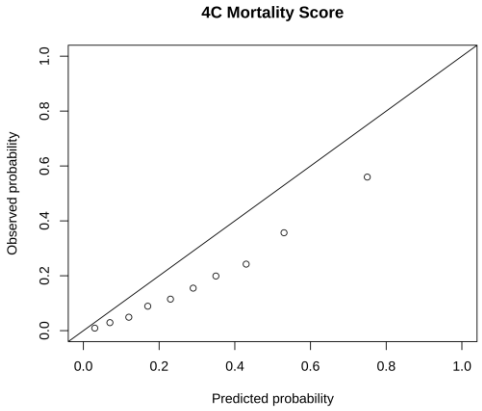


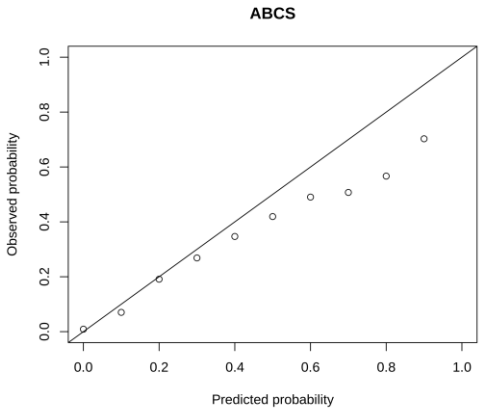


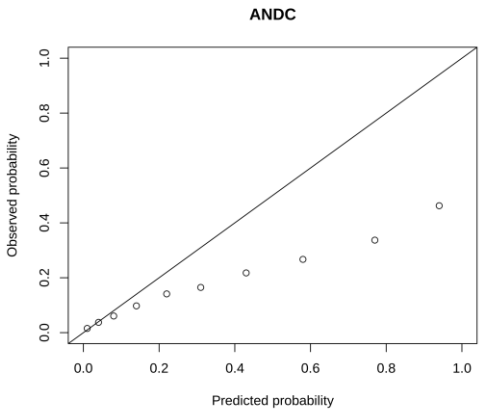
Patients are grouped according to deciles of predicted probability, except for the ABCS score where patients are grouped in classes of fixed width (0.1). Data used is from pooled multiple imputed datasets.

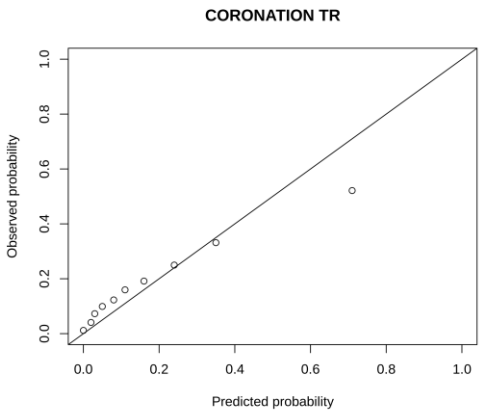
Figure S5. Calibration curves for prediction of 30-day in-hospital mortality for the seven scores with an AUROC > 0.75, considering patients regardless of (left panel) or according to (right panel) wave of admission.

Before revision

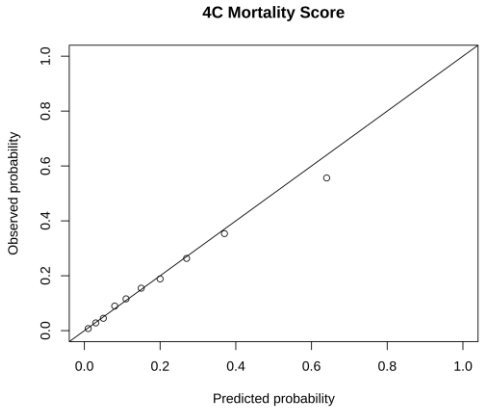


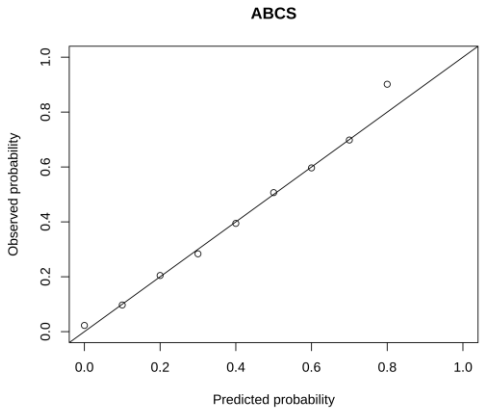


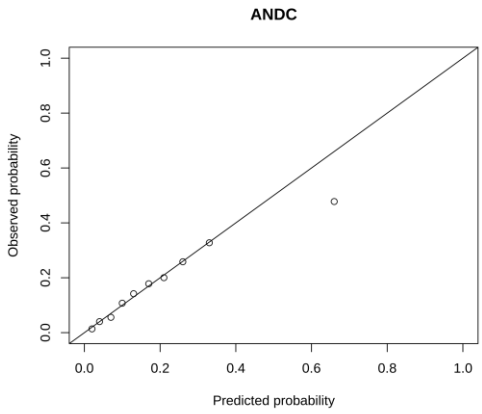


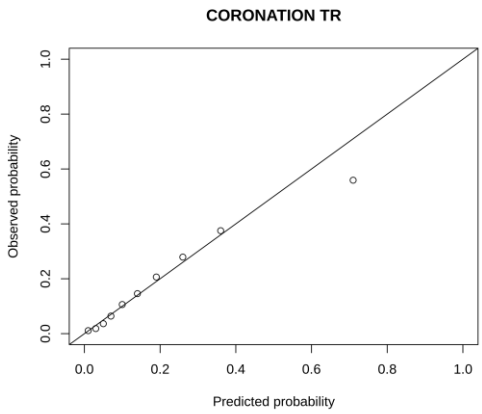


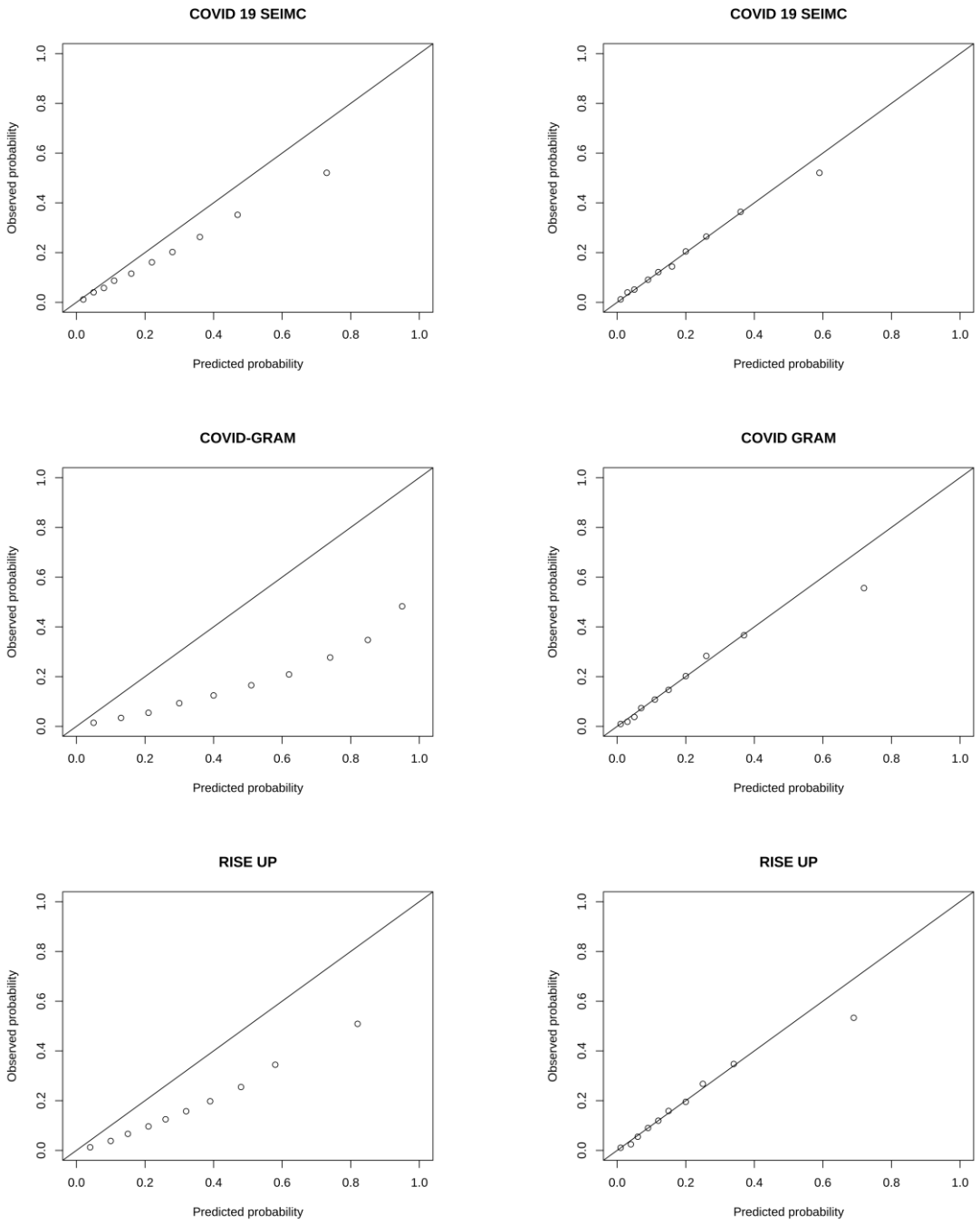
After revision





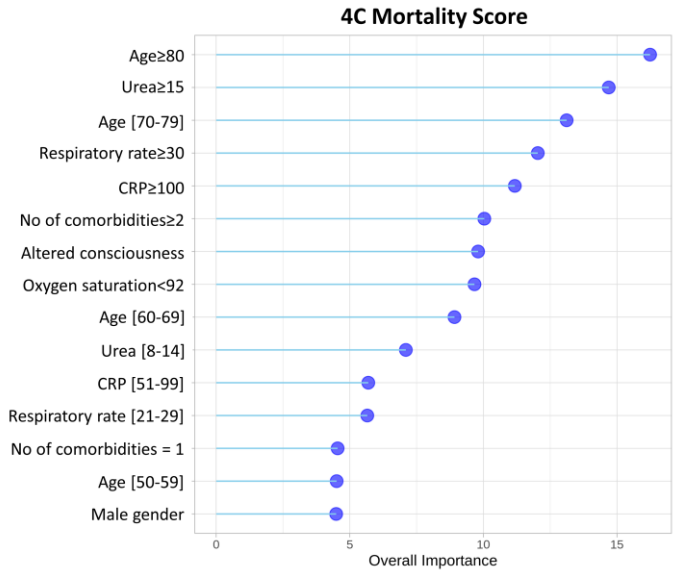


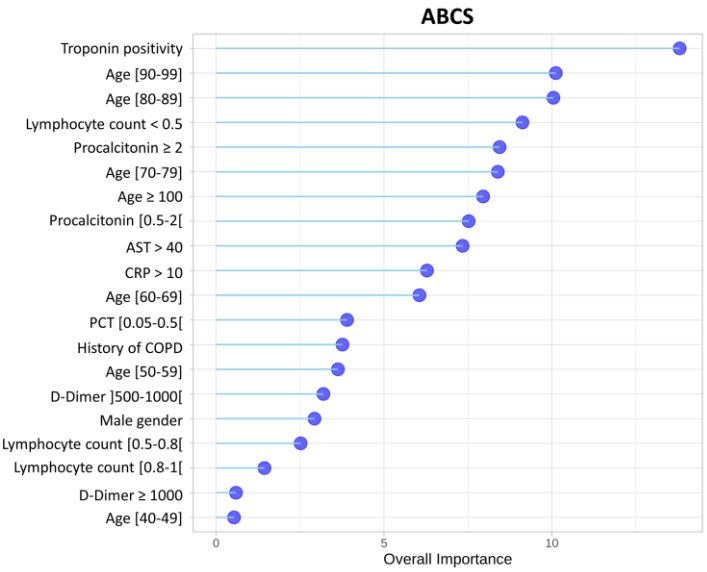


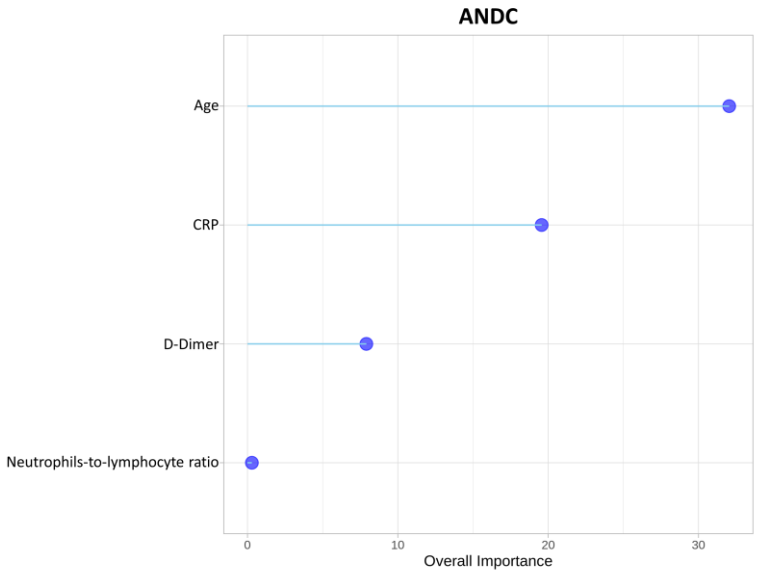


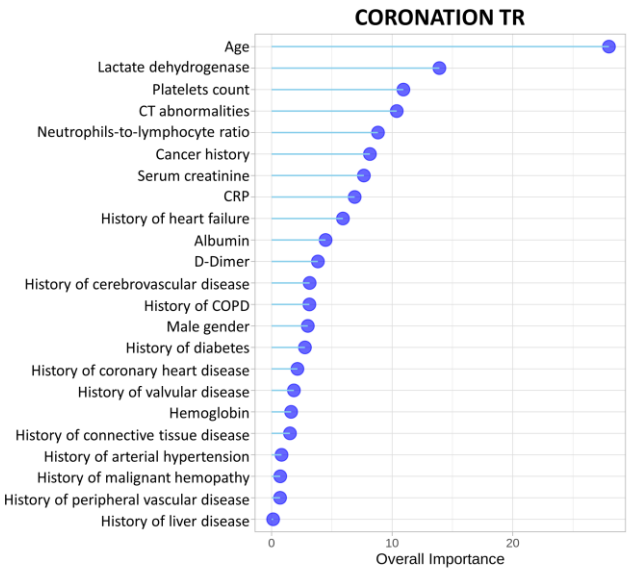
Patients are grouped according to deciles of predicted probability, except for ABCS Score where patients are grouped in classes of fixed width. Data used is from pooled multiple imputed datasets.

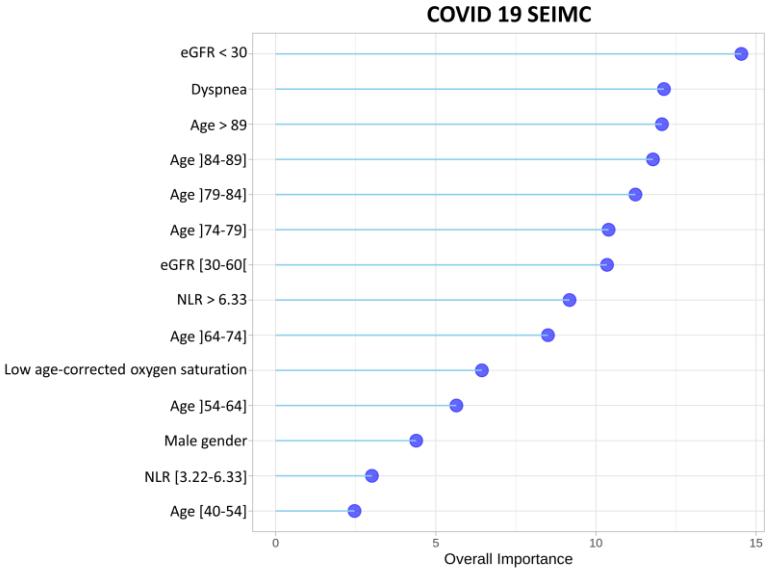
Figure S6. Calibration curves for prediction of 30-day in-hospital mortality for the seven scores with an AUROC > 0.75, before (left panel) and after (right panel) revision.

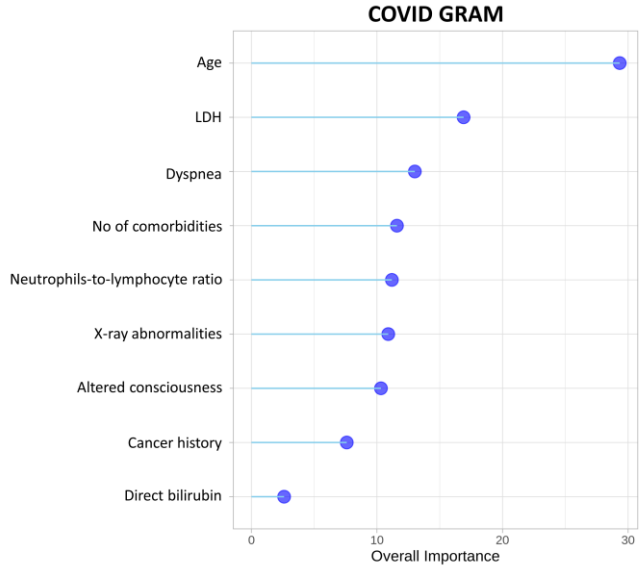

4C Mortality Score
Age≥80
Urea≥15
Age [70-79]
Respiratory rate≥30
CRP≥100
No of comorbidities≥2
Altered consciousness
Oxygen saturation<92
Age [60-69]
Urea [8-14]
CRP [51-99]
Respiratory rate [21-29]
No of comorbidities = 1
Age [50-59]
Male gender
0
5
10
15
Overall Importance

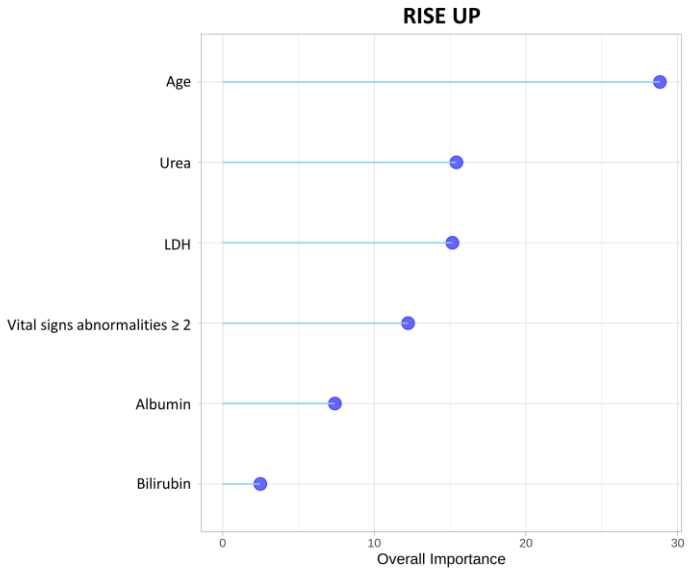

ABCS
Troponin positivity
Age [90-99]
Age [80-89]
Lymphocyte count < 0.5
Procalcitonin ≥ 2
Age [70-79]
Age ≥ 100
Procalcitonin [0.5-2[
AST > 40
CRP > 10
Age [60-69]
PCT [0.05-0.5[
History of COPD
Age [50-59]
D-Dimer]500-1000[
Male gender
Lymphocyte count [0.5-0.8[
Lymphocyte count [0.8-1[
D-Dimer ≥ 1000
Age [40-49]
0
5
10
Overall Importance


ANDC
Age
CRP
D-Dimer
Neutrophils-to-lymphocyte ratio
0
10
20
30
Overall Importance


CORONATION TR
Age
Lactate dehydrogenase
Platelets count
CT abnormalities
Neutrophils-to-lymphocyte ratio
Cancer history
Serum creatinine
CRP
History of heart failure
Albumin
D-Dimer
History of cerebrovascular disease
History of COPD
Male gender
History of diabetes
History of coronary heart disease
History of valvular disease
Hemoglobin
History of connective tissue disease
History of arterial hypertension
History of malignant hemopathy
History of peripheral vascular disease
History of liver disease
0
10
20
Overall Importance


COVID 19 SEIMC
eGFR < 30
Dyspnea
Age > 89
Age]84-89]
Age]79-84]
Age]74-79]
eGFR [30-60[
NLR > 6.33
Age]64-74]
Low age-corrected oxygen saturation
Age]54-64]
Male gender
NLR [3.22-6.33]
Age [40-54]
0
5
10
15
Overall Importance


COVID GRAM
Age
LDH
Dyspnea
No of comorbidities
Neutrophils-to-lymphocyte ratio
X-ray abnormalities
Altered consciousness
Cancer history
Direct bilirubin
0
10
20
30
Overall Importance



For the ABCS Score, classes of age [0-20[, [20-30[and [30-40[were regrouped for the analysis to be interpretable, as otherwise the reference class (i.e., [0-20[) would have had few patients (n=27). Data used is from the first imputed dataset.

Figure S7. Variable importance analysis for prediction of 30-day in-hospital mortality for the seven scores with an AUROC > 0.75.

Appendix 3. Selection, reasons for exclusion and information on scores included in the study.

Articles whose main purpose was not to derive or test prognostic scores for Covid-19 : (n = 68)

10.1007/s00330-020-07087-y. ; 10.3390/jpm11010036. ; 10.2196/23897. ; 10.7759/cureus.12565. ; 10.3389/fmed.2020.577609.; 10.1016/j.media.2020.101844.; 10.1007/s11739-020-02534-6. ; 10.1007/s00330-020-06829-2. ; 10.2196/24478. ; 10.1111/tmi.13476.; 10.1177/1753466620963019.; 10.1093/qjmed/hcaa305.; 10.3390/jcm9103350. ; 10.7326/M20-3905.; 10.1016/j.dsx.2020.03.017. ; 10.1371/journal.pone.0239474.; 10.3390/diagnostics11010041. ; 10.18632/aging.104132. ; 10.1183/13993003.03498-2020.; 10.1007/s00261-020-02823-w.; 10.1007/s11357-020-00294-x.; 10.1016/j.chest.2020.05.580. ; 10.1097/MD.0000000000022980. ; 10.1016/j.jcv.2020.104502. ; 10.1016/j.amjmed.2020.10.044. ; 10.1515/cclm-2020-0593.; 10.1007/s42979-020-00394-7.; 10.1016/j.bjid.2020.07.003.; 10.1007/s00521-020-05437-x. ; 10.1111/acem.14182. ; 10.1016/j.rmed.2020.106206. ; 10.31661/jbpe.v0i0.2008-1153. ; 10.1007/s42979-020-00394-7.; 10.1016/j.ijid.2020.09.022.; 10.1159/000512209.; 10.3390/diagnostics10090619. ; 10.1111/ijcp.13926.; 10.1007/s42399-020-00603-7.; 10.1016/j.jamda.2020.08.030. ; 10.1093/cid/ciaa322. ; 10.1038/s41598-020-76141-y. ; 10.1371/journal.pone.0243414.; 10.1016/j.dsx.2020.10.022.; 10.1016/j.bjid.2020.06.009. ; 10.1007/s00259-020-05075-4; 10.1016/j.ejrad.2020.109041.; 10.1136/bmj.m1328.; 10.1016/j.cca.2020.11.019.; 10.21037/atm.2020.03.132. ; 10.3233/XST-200735. ; 10.1016/j.ajog.2020.10.032. ; 10.1016/j.media.2020.101824. ; 10.1038/s41746-020-00372-6.; 10.4269/ajtmh.20-0730 ; 10.1371/journal.pone.0237202 ; 10.3390/jcm10040570 ; 10.1038/s41598-021-82885-y ; 10.1136/bmjopen-2020-047110 ; 10.1093/cid/ciab177 ; 10.1371/journal.pone.0248438 ; 10.1371/journal.pone.0247773 ; 10.2196/23582 ; 10.1186/s12879-021-05930-1 ; 10.18632/aging.202735 ; 10.11622/smedj.2021019 ; 10.21037/atm-20-3073 ; 10.1038/s41598-021-86735-9 ; 10.1007/s40121-021-00437-3.

f

Articles on scores to be used partially or completely for outpatients : (n = 27)

10.1038/s41598-020-75767-2. ; 10.1016/j.archger.2020.104240.; 10.1136/bmj.m3731.; 10.1093/ofid/ofaa463.; 10.1111/ijcp.13705.; 10.1093/ije/dyaa209. ; 10.1016/j.annemergmed.2020.07.022.; 10.1080/07853890.2020.1828616. ; 10.24875/RIC.20000295. ; 10.2196/21801. ; 10.1371/journal.pone.0237419.; 10.1371/journal.pone.0241825.; 10.3390/jcm9113726. ; 10.3389/fpubh.2020.587937.; 10.1136/jitc-2020-001314. ; 10.1016/S2213-8587(20)30405-8. ; 10.1371/journal.pmed.1003374. 10.1371/journal.pone.0237202. ; 10.1371/journal.pone.0236554.; 10.1016/j.ajem.2020.10.068. ; 10.1093/infdis/jiaa663. ; 10.1371/journal.pone.0240346. ; 10.1016/S2589-7500(20)30217-X. ; 10.1136/thoraxjnl-2020-216425 ; 10.1016/j.pmedr.2020.101298 ; 10.1186/s12967-021-02720-w ; 10.1002/jmv.26890 ; 10.1111/jgs.17089.

Articles on scores to be used partially or completely in a specific population (e.g. ICU patients or elderly) : (n = 23)

10.1093/ageing/afaa240. ; 10.1002/jmv.26572.; 10.7717/peerj.10083.; 10.2147/CIA.S273720. ; 10.1097/CCM.0000000000004549. ; 10.1016/j.ajem.2020.07.019.; 10.2196/23128. ; 10.3389/fonc.2020.01560. ; 10.1016/j.amsu.2020.09.044.; 10.1016/j.eclinm.2020.100426. ; 10.7717/peerj.10018.; 10.1080/03007995.2020.1825365.; 10.1371/journal.pone.0247275 ; 10.1016/j.archger.2021.104383 ; 10.3390/membranes11030170 ; 10.5603/ARM.a2020.0176 ; 10.21037/atm-20-7447 ; 10.2196/23026 ; 10.1186/s13054-021-03487-8 ; 10.1097/MD.0000000000024901 ; 10.1136/jitc-2020-002277 ; 10.7759/cureus.14051 ; 10.1093/ckj/sfab037.

Articles on scores to predict outcomes other than ICU admission, death, mechanical ventilation, or outcomes considered equivalent to those (e.g. septic shock was considered, pulmonary embolism or need for oxygen therapy was not considered) : (n = 27)

10.1016/j.ajem.2020.09.051.; 10.3389/fmed.2020.556886.; 10.1136/annrheumdis-2020-218323. ; 10.1371/journal.pone.0239172.; 10.1093/cid/ciaa443. ; 10.2147/IDR.S263157.; 10.2196/22131. ; 10.1002/iid3.353. ; 10.1093/cid/ciaa414. ; 10.1007/s11606-020-06353-5. ; 10.1007/s15010-020-01446-z. ; 10.1111/crj.13296.; 10.7883/yoken.JJID.2020.718.; 10.1038/s41746-020-00343-x.; 10.1186/s12911-020-01338-0. ; 10.7717/peerj.9945. ; 10.2214/AJR.20.24044.; 10.1016/j.ebiom.2020.102880. ; 10.1186/s12880-020-00513-z. ; 10.1093/qjmed/hcaa224. ; 10.2147/IDR.S261725.; 10.7150/ijms.47193. ; 10.7150/ijms.50007 ; PMC7821745 ; 10.1016/j.jaclp.2020.12.005 ; 10.1371/journal.pone.0248230. ; 10.1097/MD.0000000000024441

Articles in the "do not meet our criteria for scientific merit" group excluded for another reason than "no independent validation cohort": (n = 34)

10.1007/s11547-020-01200-3. ; 10.1016/j.chest.2020.04.010. ; 10.1016/j.resuscitation.2020.08.124. ; 10.1093/cid/ciaa963.; 10.1080/23744235.2020.1784457. ; 10.3346/jkms.2020.35.e234. ; 10.2196/25442. ; 10.1007/s00521-020-05592-1.; 10.3389/fpubh.2020.00475.; 10.1038/s41551-020-00633-5. ; 10.1016/j.ijid.2020.06.038. ; 10.1016/j.chest.2020.12.009. ; 10.1513/AnnalsATS.202006-698OC.; 10.5603/ARM.a2020.0176.; 10.1136/jim-2020-001525. ; 10.1183/13993003.01104-2020.; 10.1093/cid/ciaa793. ; 10.3389/fmed.2020.590460.; 10.1371/journal.pone.0236618.; 10.3348/kjr.2020.0485. ; 10.1371/journal.pone.0233328. ; 10.1097/CCM.0000000000004411. ; 10.2196/24246 ; 10.1016/S2589-7500(20)30274-0 ; 10.1016/j.media.2021.101975 ; 10.1093/jamia/ocab018 ; 10.1503/cmaj.202795; 10.1007/s11606-021-06626-7 ; 10.4414/smw.2021.20471 ; 10.1038/s41467-020-20816-7 ; 10.1016/S2666-7568(21)00006-4 ; 10.1371/journal.pone.0247676 ; 10.1080/07853890.2021.1891453 ; 10.26355/eurrev_202102_25118.

Articles in the "do not meet our criteria for scientific merit" group excluded only because of "no independent validation cohort", and in which score derivation and validation was performed in the same cohort (either by bootstrap, cross-validation or no specific method) : (n = 34)

10.1186/s12911-020-01316-6. ; 10.1136/bmjopen-2020-041983. ; 10.1016/j.acra.2020.09.004.; 10.1002/jmv.26713. ; PMID: 32913530 ; 10.1016/j.ijantimicag.2020.106110. ; 10.3390/pathogens9110880. ; 10.1016/j.bja.2020.11.034. ; 10.1183/23120541.00359-2020. ; 10.2196/24973.; 10.3390/pathogens10010058. ; 10.1017/dmp.2021.8.; 10.1016/j.jaci.2020.07.009. ; 10.7759/cureus.11786. ; 10.1088/1361-6560/abbf9e. ; 10.1111/dth.14828 ; 10.2196/24572 ; 10.3389/fmed.2020.597791; 10.1038/s41746-021-00383-x ; 10.1186/s12911-020-01359-9 ; 10.1016/j.echo.2021.02.003 ; 10.4269/ajtmh.20-1039 ; 10.1080/07853890.2021.1884744 ; 10.1038/s41598-021-83054-x ; 10.1038/s41598-021-83784-y ; 10.1136/jclinpath-2020-207157 ; 10.1038/s41598-021-83967-7 ; 10.3389/fmed.2021.608107 ; 10.1155/2021/8840835 ; 10.21037/jtd-20-2580 ; 10.2196/23948 ; 10.2196/27060 ; 10.2196/26211. ; 10.1007/s11239-021-02405-7

Articles that could not be computed in our cohort, either in the "high quality studies" group or in the "do not meet our criteria for scientific merit" group excluded only because of "no independent validation cohort" and using split validation: (n = 30)

10.26355/eurrev_202003_20709. (classifier prediction model with no information on how to compute; variables with significant importance missing or not applicable in our cohort: region, confirmed date, group, infection reason, country)

10.1016/j.jcrc.2020.10.033. (random forest with need for repeated data in a 24 hours period)

10.1259/bjr.20200634. (CT-based radiomics nomogram)

10.1055/s-0040-1716544. (score derived on patients hospitalized in GPUH hospitals)

10.1080/07853890.2020.1868564. (variables with significant importance missing or not applicable in our cohort: score mainly based on IL-10)

10.7717/peerj.10337. (deep learning prediction model with no information on how to compute)

10.1186/s12879-020-05561-y. (sample with complete data in our cohort was considered too small, mainly due to the concomitant use of LDH, ferritin, procalcitonin and D-Dimer in the score ; furthermore, sample size for split validation was considered too small: 66 patients)

10.1136/bmjspcare-2020-002602. (variables with significant importance missing or not applicable in our cohort: many variables missing among a total of 51 variables used in this score)

10.3390/ijerph17228386. (the main purpose of this study was to create various machine-learning models that cannot be computed in our cohort; for the logistic regression analysis, variables with significant importance missing or not applicable in our cohort: residential institution, oncological patient deterioration)

10.1177/0300060520955037. (sample with complete data in our cohort was considered too small, mainly due to the concomitant use of D-dimer and ferritin in the score ; furthermore, sample size for split validation was considered too small: 44 patients)

10.7717/peerj.9885. (the main purpose of this study was to create various machine-learning models that cannot be computed in our cohort; for the logistic regression analysis, variables with significant importance missing or not applicable in our cohort: BNP, platelets volume)

10.1371/journal.pone.0242953. (sample with complete data in our cohort was considered too small, mainly due to the concomitant use of LDH, troponin I, ferritin and procalcitonin in the score)

10.3389/fmed.2020.00518.(variables with significant importance missing or not applicable in our cohort: bacterial coinfection, multilobular infiltration)

10.2196/21788. (variables with significant importance missing or not applicable in our cohort: RBC distribution width, chlorine)

10.1186/s13049-020-00795-w. (variable with significant importance missing or not applicable in our cohort: smoking status)

10.1016/j.medj.2020.12.013 (variable with significant importance missing or not applicable in our cohort: platlet count decrease, neutrophils count increase, WBC count increase)

10.1038/s41598-021-81844-x (machine learning model with no information on how to compute and use of repeated data)

10.1186/s40779-021-00315-6 (variable with significant importance missing or not applicable in our cohort: IL-6)

10.1371/journal.pone.0245840 . (variable with significant importance missing or not applicable in our cohort: performance status)

10.1038/s41598-021-81732-4 (variable with significant importance missing or not applicable in our cohort: CD8+ T-cells count)

10.1038/s41598-021-82492-x (multiple machine-learnjng models to predict ARDS, using variables with significant importance missing or not applicable in our cohort)

10.1080/03007995.2021.1891036 (variable with significant importance missing or not applicable in our cohort: SaFiO2)
10.7326/M20-6754 (use of time-varying variables)
10.1038/s41598-021-84603-0 (variable with significant importance missing or not applicable in our cohort: smoking status, ethnicity)
10.1016/j.compbiomed.2021.104304 (variable with significant importance missing or not applicable in our cohort: imaging data)
10.3389/fmed.2021.629296 (variable with significant importance missing or not applicable in our cohort: alpha-hydroxybutyrate dehydrogenase, IL-6)
10.33393/jcb.2021.2194 (the main purpose of this study was to create various machine-learning models that cannot be computed in our cohort)
10.3348/kjr.2020.1104 (variable with significant importance missing or not applicable in our cohort: imaging data)
10.1016/S2589-7500(21)00039-X (variable with significant importance missing or not applicable in our cohort: imaging data)
10.1371/journal.pone.0249285 (the main purpose of this study was to create a machine-learning model that cannot be computed in our cohort)

Articles selected for further evaluation, and scores considered if multiple scores were examined : (n = 26)
10.1016/j.cmi.2020.08.003. (PREDI-CO)
10.3389/fmed.2020.585003. (Hachim et al.)
10.1371/journal.pone.0239536. (COVID-AID)
10.1016/j.resplu.2020.100042. (SIRS)
10.1093/ije/dyaa171. (Hu et al.)
10.1080/1354750X.2020.1841296. (KPI Score)
10.1136/bmj.m3339. (4C Mortality Score, A-DROP, CURB-65, qSOFA)*
10.1186/s12879-020-05688-y. (PLANS)
10.1001/jamainternmed.2020.2033. (COVID-GRAM)
10.1136/bmjopen-2020-044028. (Mei et al.: full and clinical)
10.21149/11684. (ABC-GOALSc)
10.1186/s13049-020-00764-3. (NEWS2)
10.1016/j.amjcard.2020.09.029. (CHA2DS2-VASC)
10.1002/emp2.12259. (LOW-HARM)
10.1093/cid/ciaa538. (Wang et al.: clinical and laboratory)
10.1186/s12967-020-02505-7. (ANDC)
10.22088/cjim.11.0.536 (PRESEP)
10.1136/bmjopen-2020-045141 (RISE UP)
10.1007/s11739-020-02617-4 (SIMI)
10.1136/thoraxjnl-2020-216001 (COVID-19 SEIMC)
10.1590/1516-3180.2020.0649.r1.10122020 (STSS)
10.21037/atm-20-6205 (ABCS)
10.1016/j.iccn.2021.103012 (Bennouar et al.)
10.1002/jmv.26844 (CORONATION-TR)
10.2196/26257 (COPS)
10.3122/jabfm.2021.S1.200464 (COVID-NoLab and COVID-SimpleLab)

* PSI and E-CURB were also examined in this article but were not considered as they could not be computed in our cohort (for PSI, variables not collected : nursing home, chest X-ray, hematocrit, glucose, pH; for E-CURB : sample with complete data in our cohort was considered too small, mainly due to the concomitant use of albumin and LDH) ; NEWS was not considered as NEWS2 was already considered

Articles on scores already included : (n = 5)**
10.7861/clinmed.2020-0688 (NEWS2)
10.3389/fmed.2020.624255. (NEWS2)
10.1136/bmjopen-2020-043721. (NEWS2)
10.1111/ijcp.14121 (NEWS***)
10.1007/s11239-021-02427-1. (CHA2DS2-VASC)

** the first published article on a given score was considered to get data on this score's performances
*** NEWS was not considered as NEWS2 was already considered