

Supplement

Number of patients		All patients	SIMD Present	SIMD Missing
COVID-19 positive and admitted to Critical Care	n	735	688	47
Age on admission (years)	Median (IQR)	61 (53,68)	61 (53,69)	59 (54,64)
Sex	Male	515 (70.1%)	480 (69.8%)	35 (74.5%)
	Female	220 (29.9%)	208 (30.2%)	12 (25.5%)
Ethnicity	White	387 (91.1%)	368 (90.9%)	19 (95.0%)
	Black/Caribbean/African	7 (1.6%)	*	*
	Asian	26 (6.1%)	*	*
	Other	5 (1.2%)	*	*
Previous health status				
Comorbidity count	0	481 (65.4%)	455 (66.1%)	26 (55.3%)
	1	157 (21.4%)	140 (20.3%)	17 (36.2%)
	2 plus	97 (13.2%)	93 (13.5%)	4 (8.5%)
Comorbidities	Cardiovascular Disease	62 (8.4%)	57 (8.3%)	5 (10.6%)
	Respiratory Disease	88 (12.0%)	81 (11.8%)	7 (14.9%)
	Diabetes Mellitus	85 (11.6%)	*	*
	Cancer	52 (7.1%)	*	*
	Other	70 (9.5%)	62 (9.0%)	8 (17.0%)
Emergency hospital admissions in previous year	0	640 (87.1%)	601 (87.4%)	39 (83.0%)
	1	57 (7.8%)	*	*
	2 plus	38 (5.2%)	*	*
Illness severity and organ support				
APACHE II score	Median (IQR)	15 (12,19)	15 (12,19)	16.5 (12.5,20.5)
PF ratio (kPa)	Median (IQR)	15.4 (11.1,21.3)	15.4 (11.1,21.4)	17.0 (11.3,19.8)
Time from hospital admission to ICU admission (days)	Median (IQR)	1 (0,2)	1 (0,3)	1 (0,2)
Number of organ systems supported on ICU admission	0	230 (31.3%)	213 (31.0%)	17 (36.2%)
	1	277 (37.7%)	256 (37.2%)	21 (44.7%)
	2 or more	228 (31.0%)	219 (31.8%)	9 (19.1%)
Advanced respiratory support on admission	n (%)	330 (44.9%)	317 (46.1%)	13 (27.7%)
Non-invasive respiratory support on admission	n (%)	160 (21.8%)	144 (20.9%)	16 (34.0%)
Other basic respiratory support	n (%)	245 (33.3%)	227 (33.0%)	18 (38.3%)
Cardiovascular support on admission	n (%)	239 (32.5%)	229 (33.3%)	10 (21.3%)

Number of patients		All patients	SIMD Present	SIMD Missing
Renal replacement therapy on admission	n (%)	10 (1.4%)	*	*

Table S1. Baseline characteristics comparison of those with and without missing data for the socioeconomic deprivation variable. 310 records have unknown ethnicity. 216 records have missing APACHE score. 254 records have missing PF ratios. *Output suppressed due to disclosure risk.

Number of patients		All patients	Received Invasive ventilation	Did not receive Invasive ventilation
COVID-19 positive and admitted to Critical Care	n	735	421	314
Age on admission (years)	Median (IQR)	61 (53,68)	61 (54,67)	61 (53,72)
Sex	Male	515 (70.1%)	306 (72.7%)	209 (66.6%)
	Female	220 (29.9%)	115 (27.3%)	105 (33.4%)
Socioeconomic status quintile (SIMD)	1 - Most deprived	183 (26.6%)	105 (26.1%)	78 (27.4%)
	2	167 (24.3%)	93 (23.1%)	74 (26.0%)
	3	124 (18.0%)	79 (19.6%)	45 (15.8%)
	4	114 (16.6%)	64 (15.9%)	50 (17.5%)
	5 - Least deprived	100 (14.5%)	62 (15.4%)	38 (13.3%)
Ethnicity	White	387 (91.1%)	307 (90.0%)	80 (95.2%)
	Black/Caribbean/African	7 (1.6%)	*	*
	Asian	26 (6.1%)	*	*
	Other	5 (1.2%)	*	*
Previous health status				
Comorbidity count	0	481 (65.4%)	307 (72.9%)	174 (55.4%)
	1	157 (21.4%)	79 (18.8%)	78 (24.8%)
	2 plus	97 (13.2%)	35 (8.3%)	62 (19.7%)
Comorbidities	Cardiovascular Disease	62 (8.4%)	23 (5.5%)	39 (12.4%)
	Respiratory Disease	88 (12.0%)	29 (6.9%)	59 (18.8%)
	Diabetes Mellitus	85 (11.6%)	33 (7.8%)	52 (16.6%)
	Cancer	52 (7.1%)	27 (6.4%)	25 (8.0%)
	Other	70 (9.5%)	30 (7.1%)	40 (12.7%)
Emergency hospital admissions in previous year	0	640 (87.1%)	386 (91.7%)	254 (80.9%)
	1	57 (7.8%)	24 (5.7%)	33 (10.5%)
	2 plus	38 (5.2%)	11 (2.6%)	27 (8.6%)
Illness severity and organ support				
APACHE II score	Median (IQR)	15 (12,19)	16 (13,20)	12 (9,15)
PaO ₂ :FiO ₂ ratio (kPa)	Median (IQR)	15.4 (11.1,21.3)	15.2 (10.8,20.7)	17.1 (12.7,25.7)
Time from hospital admission to ICU admission (days)	Median (IQR)	1 (0,2)	1 (0,3)	1 (0,2)
Number of organ systems supported on ICU admission	0	230 (31.3%)	37 (8.8%)	193 (61.5%)
	1	277 (37.7%)	163 (38.7%)	114 (36.3%)

Number of patients		All patients	Received Invasive ventilation	Did not receive Invasive ventilation
	2 or more	228 (31.0%)	221 (52.5%)	7 (2.2%)
Advanced respiratory support on admission	n (%)	330 (44.9%)	330 (78.4%)	0 (0.0%)
Non-invasive respiratory support on admission	n (%)	160 (21.8%)	51 (12.1%)	109 (34.7%)
Other basic respiratory support	n (%)	245 (33.3%)	40 (9.5%)	205 (65.3%)
Cardiovascular support on admission	n (%)	239 (32.5%)	223 (53.0%)	16 (5.1%)
Renal replacement therapy on admission	n (%)	10 (1.4%)	*	*

Table S2. Baseline characteristics stratified by receipt of invasive mechanical ventilation. 47 records have an unknown SIMD quintile. 310 records have unknown ethnicity. 216 records have missing APACHE score. 254 records have missing PF ratios. *Output suppressed due to disclosure risk.

		Patients	Deaths (%)	Univariable Odds Ratio	Multivariable Model 1	Multivariable Model 2
Total		403	170 (42.2%)			
SIMD quintile	5 - Least deprived	62	24 (38.7%)	1 (ref)	1 (ref)	1 (ref)
	4	64	28 (43.8%)	1.23 (0.61,2.51) p=0.566	1.40 (0.66,2.97) p=0.386	1.40 (0.64, 3.04) p=0.398
	3	79	27 (34.2%)	0.82 (0.41,1.64) p=0.578	1.06 (0.51,2.21) p=0.871	0.89 (0.42, 1.90) p=0.770
	2	93	36 (38.7%)	1.00 (0.51,1.93) p=1.000	1.31 (0.65,2.63) p=0.453	1.29 (0.63, 2.64) p=0.491
	1 - Most deprived	105	55 (52.4%)	1.74 (0.92,3.30) p=0.089	2.47 (1.24,4.91) p=0.010	2.23 (1.10, 4.51) p=0.026
Age on admission		-	-	1.06 (1.04,1.09) p<0.001	1.07 (1.04,1.09) p<0.001	1.07 (1.04, 1.09) p<0.001
Sex	Male	293	138 (47.1%)	1 (ref)	1 (ref)	1 (ref)
	Female	110	32 (29.1%)	0.46 (0.29,0.74) p<0.001	0.52 (0.32,0.86) p=0.010	0.53 (0.32, 0.88) p=0.015
Ethnicity	White	292	129 (44.2%)	1 (ref)	1 (ref)	1 (ref)
	Black/Caribbean/ African/Asian/Other	33	13 (39.4%)	0.82 (0.39,1.71) p=0.600	1.10 (0.49,2.46) p=0.816	1.15 (0.50, 2.63) p=0.746
	Missing	78	28 (35.9%)	0.71 (0.42,1.19) p=0.190	0.74 (0.42,1.28) p0.279	0.80 (0.46, 1.42) p=0.451
Comorbidity count	0	294	112 (38.1%)	1 (ref)		1 (ref)
	1	75	41 (54.7%)	1.96 (1.17,3.27) p=0.010		1.64 (0.93, 2.89) p=0.090
	2 or more	34	17 (50.0%)	1.63 (0.80,3.31) p=0.182		1.27 (0.57, 2.87) p=0.558
Emergency hospital admissions in previous year	0	369	152 (41.2%)	1 (ref)		1 (ref)
	1 or more	34	18 (52.9%)	1.61 (0.79,3.25) p=0.188		1.33 (0.58, 3.07) p=0.506
Acute Physiology Score	Tertile 1 (0-4)	92	33 (35.9%)	1 (ref)		1 (ref)
	Tertile 2 (5-8)	126	43 (34.1%)	0.93 (0.53,1.63) p=0.790		0.96 (0.52, 1.76) p=0.883
	Tertile 3 (9-28)	172	86 (50.0%)	1.79 (1.06,3.01) p=0.029		1.78 (1.00, 3.17) p=0.050
	Missing	13	8 (61.5%)	2.86 (0.87,9.46) p=0.085		2.59 (0.74, 9.07) p=0.137

Table S3. Regression models reporting association between socioeconomic deprivation and 30-day mortality restricted to patients receiving invasive mechanical ventilation. Data in the table relate to 403 patients (421 mechanically ventilated excluding 17 of those lacking SIMD). Note that only the adjusted effect estimate for SIMD on mortality can be interpreted as a causal association, and effect estimates for potential confounders on the outcome cannot be

interpreted in the same way. This is because casual pathway between covariates and outcomes have not been explicitly considered in the modelling approach, unlike for the exposure and outcome. For example, age will impact on 30-day mortality directly, and its effect will also be mediated through comorbidity and number of emergency hospital admissions. Therefore the effect estimate reported in the table for age on mortality is likely an underestimate of its total effect. For further detail see: Westreich D, Greenland S. The table 2 fallacy: presenting and interpreting confounder and modifier coefficients. *Am J Epidemiol*. 2013;177(4):292-298. doi:10.1093/aje/kws412

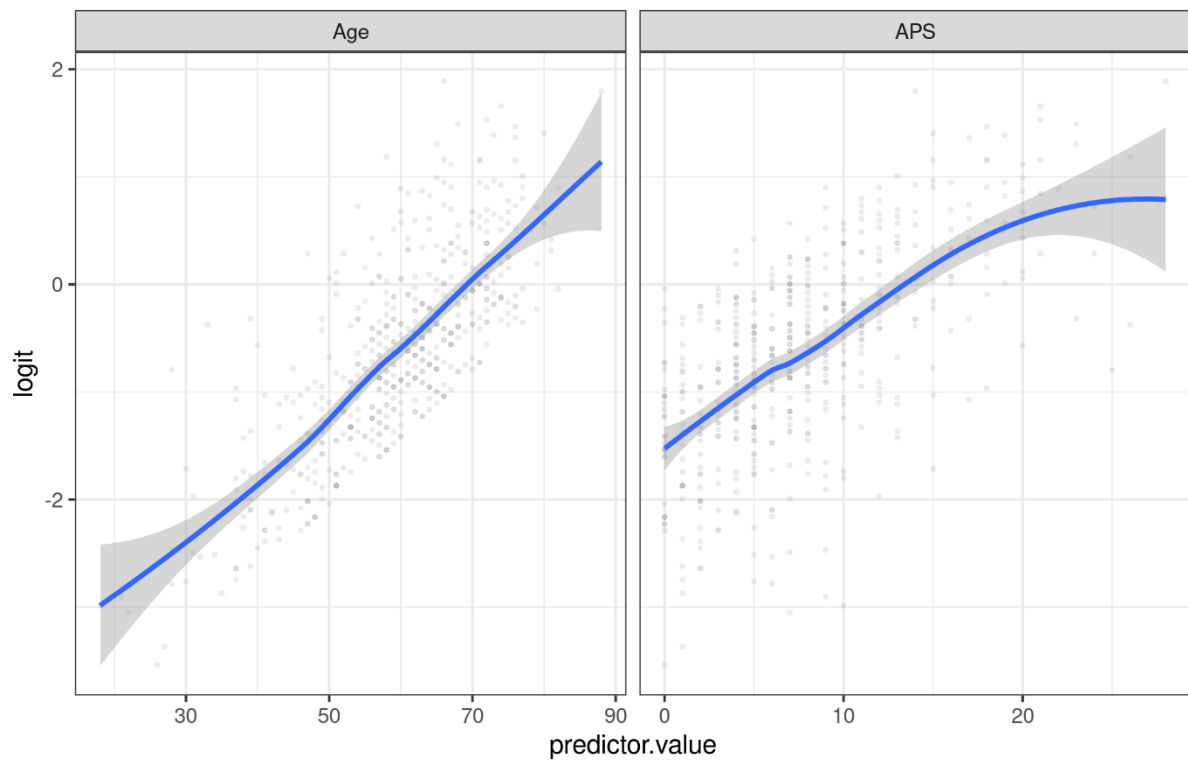


Figure S1. Evaluating linearity assumptions for continuous variables.

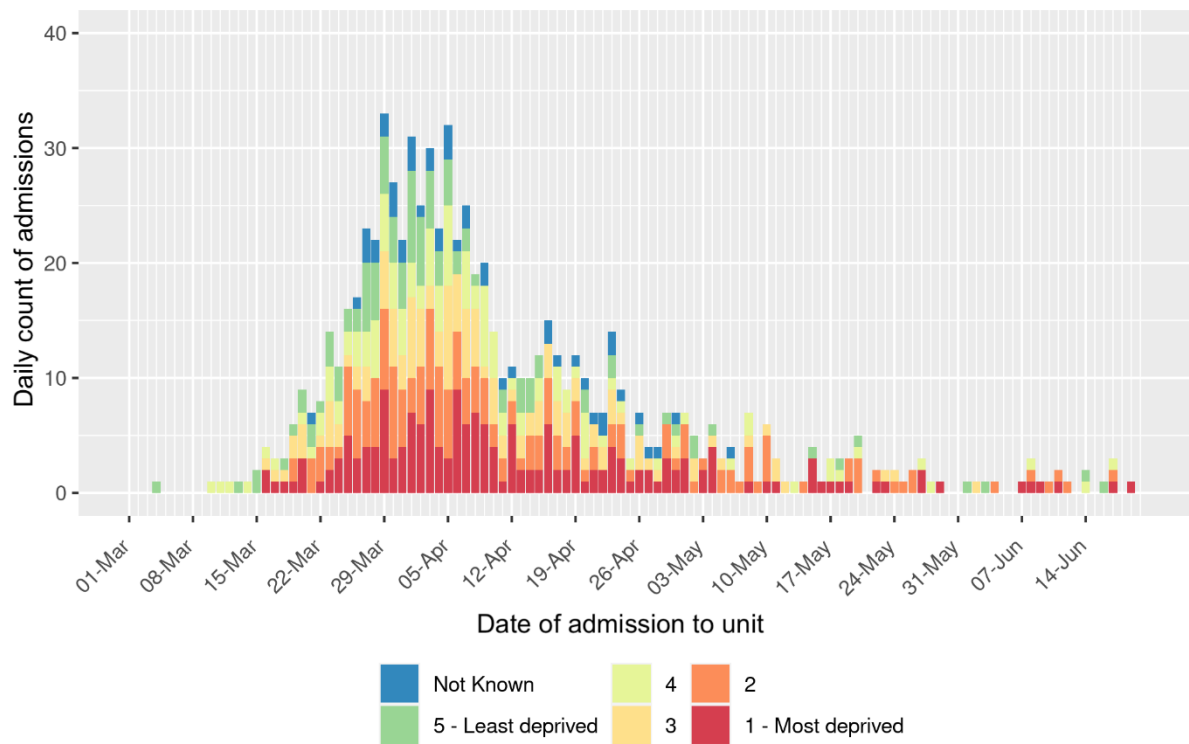


Figure S2. Admission frequency of patients with COVID-19 admitted to critical care units stratified by socioeconomic deprivation quintile.

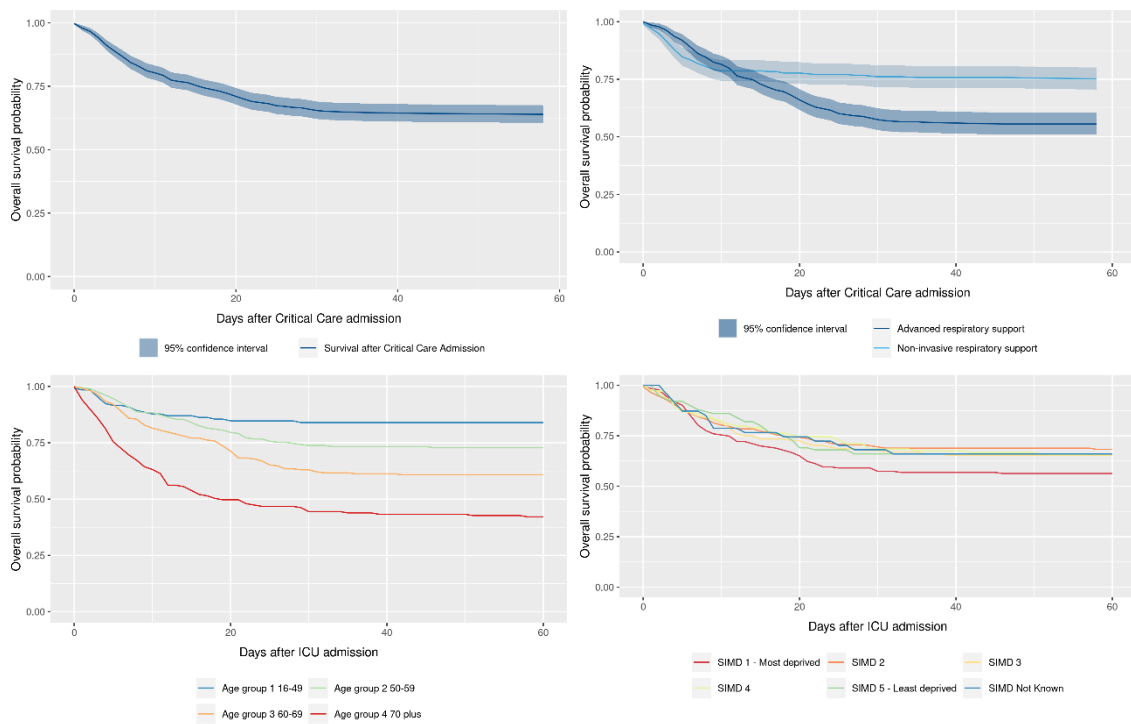


Figure S3. Kaplan-Meier plots for overall survival after critical care admission, and stratified by respiratory support status, age and socioeconomic deprivation. Abbreviations: SIMD, Scottish Index of Multiple Deprivation.