

Correction: Cardiovascular Risk Factors and Clinical Outcomes among Patients Hospitalized with COVID-19: Findings from the World Heart Federation COVID-19 Study



CORRECTION

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ABSTRACT

This article details a correction to: Prabhakaran D, Singh K, Kondal D, Raspail L, Mohan B, Kato T, et al. Cardiovascular Risk Factors and Clinical Outcomes among Patients Hospitalized with COVID-19: Findings from the World Heart Federation COVID-19 Study. *Global Heart*. 2022; 17(1): 40. DOI: <http://doi.org/10.5334/gh.1128>.

After the publication of *Cardiovascular Risk Factors and Clinical Outcomes among Patients Hospitalized with COVID-19: Findings from the World Heart Federation COVID-19 Study* [1], the authors noticed some minor errors that required correcting. These fell into four different categories:

1. Some of the tables required amendments.
2. The list of collaborators was incomplete.
3. Some wording throughout the text was not sufficiently precise.
4. The acknowledgement section was incomplete.

THE TABLE AMENDMENTS

One decimal point value was missed in **Tables 2a** and **2b**. **2a** was also missing the titles in the first two columns, which were 'Overall, N (%)' and 'Survivors, N(%)'. On **Table 3**, two decimal point values were added for the blood results: WBC, Troponin T.

	OVERALL N (%)	SURVIVORS N (%)	IN-HOSPITAL DEATHS N (%)	POST DISCHARGE 30-DAY DEATHS, N (%)	P-VALUE FOR DIFFERENCE
N	5313	4512 (84.9)	683 (12.9)	118 (2.6)	
Age, mean (SD)	57.0 (16.1)	55.6 (16.0)	64.8 (14.2)	65.4 (13.4)	<0.001
Male	3159 (59.4)	2642 (83.6)	431 (13.6)	86 (2.7)	<0.001
Female	2154 (40.5)	1870 (86.8)	252 (11.7)	32 (1.5)	
Ethnic Origin					<0.001
Caucasian	800 (15.1)	749 (93.6)	45 (5.6)	6 (0.8)	
Hispanic	542 (10.2)	403 (74.4)	134 (24.7)	5 (0.9)	
Black	796 (15.0)	669 (84)	117 (14.7)	10 (1.3)	
Middle Eastern	315 (5.9)	283 (89.8)	18 (5.7)	14 (4.4)	
Asian	2442 (46.0)	2046 (83.8)	324 (13.3)	72 (2.9)	
Other	346 (6.5)	303 (84.4)	45 (12.5)	11 (3.1)	
World Bank income groups					<0.001
LIC	376 (7.1)	331 (88.0)	39 (10.4)	6 (1.6)	
LMIC	2526 (47.5)	2141 (81.3)	403 (15.3)	89 (3.4)	
UMIC	1044 (19.6)	742 (79.2)	181 (19.3)	14 (1.5)	
HIC	1367 (25.7)	1298 (95)	60 (4.4)	9 (0.7)	
Education					<0.001
Up to primary	510 (9.6)	388 (76.1)	110 (21.6)	12 (2.4)	
Up to secondary	1162 (21.9)	1011 (87.0)	123 (10.6)	28 (2.4)	
College/University	1264 (23.8)	1140 (90.2)	111 (8.8)	13 (1.0)	
Unknown	2291 (43.1)	1906 (82.5)	338 (14.6)	65 (2.8)	
Smoking status					<0.001
Never	3080 (58.0)	2664 (86.5)	359 (11.7)	56 (1.8)	
Current	370 (7.0)	342 (92.2)	22 (5.9)	7 (1.9)	
Former	751 (14.1)	645 (85.9)	89 (11.9)	17 (2.3)	
Unknown	1110 (20.9)	861 (77.5)	212 (19.1)	38 (3.4)	
Body mass index (Kg/m²), mean (SD)	26.9 (5.3)				0.35
Underweight (<18)	71 (1.3)	65 (91.5)	5 (7.0)	1 (1.5)	
Normal weight (18–24)	1414 (26.6)	1246 (87.9)	147 (10.4)	25 (1.8)	0.57
Overweight (25–29)	1289 (24.3)	1137 (88.3)	139 (10.8)	12 (0.9)	
Obese (≥30)	831 (15.6)	730 (88.2)	88 (10.6)	10 (1.2)	

Table 2a Demographic and clinical characteristics of study participants.

SD = standard deviation; row percentage reported for all categorical variables.

COVID-SYMPTOMS AND VITAL SIGNS	OVERALL	SURVIVORS	IN-HOSPITAL DEATHS	POST DISCHARGE 30-DAY DEATHS
	N (%)	N (%)	N (%)	N (%)
Diagnosed by using RT-PCR	5050 (95.0)	4299(85.1)	644(12.8)	107(2.1)
Median time from symptom onset to admission (IQR) in minutes	5 (3–8)	5 (3–8)	5 (3–8)	4 (2–7)
History of self-reported fever	3526 (66.4)	3002 (85.1)	459 (13.0)	65 (1.9)
Cough	3624 (68.2)	3087 (85.2)	472 (13.0)	65 (1.8)
Dyspnoea OR Tachypnoea	3308 (62.3)	2689 (81.3)	534(16.1)	85 (2.6)
Heart rate (beats/min), mean (SD)	92.1 (17.8)	91.2 (17.0)	96.9 (21.6)	95.7 (17.3)
Bradycardia (HR<60bpm) mean (SD)	101 (1.9)	85 (84)	15 (15)	1 (1)
Tachycardia (HR>100bpm) mean (SD)	1409 (26.5)	1103 (78)	265 (19)	41 (3)
Systolic BP (mmHg), mean (SD)	128.8 (20.9)	128.7 (19.9)	129.7 (25.4)	129.7 (26.3)
Diastolic BP (mmHg), mean (SD)	78.2 (13.0)	78.5 (12.5)	76.4 (15.4)	77.0 (14.9)
Shortness of Breath (SOB)				
SOB < 100m	1336 (25.5)	1047(78.4)	252 (18.8)	37 (2.8)
SOB 100–500m	479 (9.1)	364(76.0)	96 (20.0)	19 (4.0)
SOB > 500m	225 (4.3)	203(90.2)	15 (6.7)	7 (3.1)
Co-morbidities (Cardiovascular)				
Hypertension	2511 (47.3)	2060 (82.0)	398 (16.0)	53 (2.0)
Diabetes	1700 (32.0)	1346 (79.2)	306 (17.8)	48 (3.0)
Coronary artery disease	580 (10.9)	446 (76.9)	103 (17.8)	31 (5.3)
Heart Failure	290 (5.5)	238 (82.1)	45 (15.5)	7 (2.4)
Stroke	197 (3.7)	159 (80.7)	28 (14.2)	10 (5.1)
Atrial Fibrillation	159 (3.0)	134 (84.3)	22 (13.8)	3 (1.9)
Peripheral vascular disease	106 (2.0)	85 (80.2)	18 (17.0)	3 (2.8)
Cardiomyopathies	60 (1.1)	53 (88.3)	6 (10.0)	1 (1.7)
Rheumatic Heart Disease	56 (1.1)	49 (87.5)	7 (12.5)	0 (0)
Chagas disease	36 (0.7)	34 (94.4)	2 (5.6)	0 (0)
Congenital heart disease	182 (3.4)	166 (91.2)	9 (4.9)	7 (3.8)
Valvular disease	118 (2.2)	94 (79.7)	21(17.8)	3 (2.5)
Co-morbidities (Non-Cardiovascular)				
Chronic kidney disease	404 (7.6)	299 (74.0)	86 (21.3)	19 (4.7)
Chronic pulmonary disease	208 (3.9)	160 (76.5)	44 (21.1)	5 (2.4)
Asthma	219 (4.1)	200 (91.3)	18 (8.2)	1 (0.5)
Chronic Immunosuppression	136 (2.6)	110 (80.9)	25 (18.4)	1 (0.7)
HIV	71 (1.3)	62 (87.3)	6 (8.5)	3 (4.2)
Tuberculosis	56 (1.1)	49 (87.5)	7 (12.5)	0 (0)
Cancer on chemotherapy	114 (2.1)	90 (78.9)	20 (17.5)	4 (3.6)
Renal replacement therapy	62 (1.2)	45 (72.6)	16 (25.8)	1 (1.6)
Previous organ transplant	45 (0.8)	38 (84.8)	7 (15.6)	0 (0)

Table 2b COVID-19 symptoms and comorbidities among study participants.

Rt-PCR = Reverse Transcription Polymerase Chain Reaction; SD = standard deviation; IQR = Inter quartile range; BP = blood pressure; SOB = Shortness of breath; HIC = high income countries; UMIC = upper middle-income countries; LMIC = lower middle-income countries; LIC = low-income countries; HIV = Human immunodeficiency virus. Row percentage reported for all categorical variables.

	OVERALL N (%)	SURVIVORS N (%)	IN-HOSPITAL DEATHS N (%)	POST DISCHARGE 30- DAY DEATHS N (%)	P-VALUE FOR DIFFERENCE
ECG data (N = 3490)					
Atrial fibrillation (yes)	131 (2.5)	97 (2.1)	31 (4.5)	3 (2.5)	0.003
T-wave changes (yes)	774 (14.6)	593 (13.1)	153 (22.4)	28 (23.7)	<0.001
QT/QTc duration, median (IQR)	419.0 (331.5, 447.0)	415.5 (259.0, 445.0)	428.0 (360.0, 457.0)	448.0 (413.5, 467.0)	<0.001
ECHO findings (Median, IQR) (N = 259)					
Ejection fraction 1. Teicholz (EF1),	59.1 (49.0, 64.0)	60.0 (52.0, 64.0)	55.0 (45.0, 64.0)	59.0 (59.0, 60.0)	0.23
Ejection fraction 2. Visual estimations (EF2),	55.0 (45.0, 60.0)	55.0 (45.0, 60.0)	51.5 (45.0, 59.0)	50.0 (35.0, 55.0)	0.082
Right ventricular function					0.002
Mildly/severely abnormal	47 (0.9)	28 (59.1)	18 (38.6)	1 (2.3)	
Laboratory parameters (median, IQR) (N = 4330)					
Hemoglobin, mmol/L	7.9 (7.1, 8.8)	8.0 (7.1, 8.8)	7.8 (6.6, 8.7)	7.5 (6.5, 8.4)	<0.001
WBC count, $\times 10^9/L$	4.7 (0.0, 8.4)	5.1 (0.0, 8.5)	0.018 (0.009, 7.5)	0.0184 (0.009, 6.9)	<0.001
Platelets, $10^3/\mu L$	230.5 (168.0, 336.0)	233.0 (170.0, 342.0)	219.0 (157.0, 306.0)	228.0 (154.0, 425.0)	<0.001
ALT/SGPT, $\mu mol/(s \cdot L)$	0.60 (0.38, 0.97)	0.58 (0.38, 0.95)	0.65 (0.40, 1.11)	0.63 (0.41, 1.09)	0.003
AST/SGOT, $\mu mol/(s \cdot L)$	0.67 (0.47, 1.05)	0.65 (0.45, 1.00)	0.79 (0.52, 1.37)	0.82 (0.53, 1.30)	<0.001
Creatinine-conversion, $\mu mol/L$	87.5 (70.6, 113.2)	85.0 (69.0, 107.0)	99.9 (74.3, 150.3)	104.3 (82.2, 195.4)	<0.001
Sodium, mmol/L	137.0 (134.0, 140.0)	137.0 (134.0, 140.0)	136.3 (133.0, 140.0)	136.0 (133.0, 139.0)	0.10
Potassium, mmol/L	4.2 (3.8, 4.7)	4.2 (3.8, 4.6)	4.3 (3.8, 4.9)	4.5 (4.1, 5.0)	<0.001
CRP, mg/L	53.8 (17.4, 110.7)	48.0 (15.7, 100.0)	93.2 (40.2, 174.0)	82.9 (21.5, 156.1)	<0.001
ESR, mm/hr	43.0 (25.0, 67.0)	41.0 (24.0, 65.0)	52.0 (34.0, 81.0)	53.0 (40.0, 79.0)	<0.001
Troponin, ng/mL	1.0 (0.1, 9.0)	1.0 (0.1, 9.0)	0.1 (0.037, 11.0)	20.0 (2.9, 32.0)	0.007
Troponin T, pg/mL	9.0 (0.5, 24.9)	8.0 (0.6, 20.0)	21.0 (5.5, 64.5)	0.123 (0.014, 16.0)	<0.001
BNP, pmol/L	7.8 (1.5, 28.1)	6.0 (1.2, 21.4)	16.0 (5.1, 49.4)	19.9 (2.2, 44.1)	<0.001
NT-proBNP, pmol/L	60.1 (12.1, 254.4)	46.7 (10.3, 224.2)	110.7 (34.3, 415.5)	505.5 (285.5, 1641.0)	<0.001
CK-Mb, ukat/L,	0.24 (0.017, 13.0)	0.23 (0.017, 13.0)	0.47 (0.034, 19.0)	0.049 (0.017, 0.613)	0.001
Total cholesterol, mmol/L	4.0 (3.1, 5.0)	4.2 (3.4, 5.2)	3.4 (2.7, 4.3)	3.9 (2.5, 4.4)	<0.001
HbA1c, %	6.9 (6.1, 8.5)	6.9 (6.1, 8.5)	7.0 (6.2, 8.4)	6.4 (5.9, 9.7)	0.80
D-dimer, mg/FEU/L	1.0 (0.4, 4.4)	0.9 (0.4, 3.9)	1.8 (0.7, 4.8)	2.5 (1.2, 26.5)	<0.001
Ferritin, $\mu g/L$	514.1 (225.3, 1001.9)	476.0 (197.5, 962.0)	687.7 (350.3, 1365.2)	656.6 (392.0, 1068.0)	<0.001
IL-6, pg/mL	25.2 (8.7, 64.7)	21.6 (7.0, 52.0)	65.8 (21.9, 125.0)	36.0 (17.6, 133.5)	<0.001
Urea (BUN), mmol/L,	8.5 (5.5, 14.6)	7.7 (5.2, 12.9)	13.9 (7.9, 23.8)	17.0 (10.4, 28.2)	<0.001
PT (seconds)	13.4 (12.0, 15.9)	13.3 (12.0, 15.6)	13.9 (12.1, 16.7)	13.2 (11.7, 16.7)	0.012
INR ratio	1.1 (0.9, 1.25)	1.1 (0.9, 1.23)	1.1 (0.96, 1.32)	1.1 (0.0119, 1.32)	0.015

THE COLLABORATOR LIST

Four collaborators were inadvertently missed off the original list: L. Tetteh Appiah, Nabil Varwani, Lucky Rose Adika, and Humphrey Robert Guya.

The full, corrected contributor list is:

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Table 3 ECG, ECHO, and laboratory findings among COVID-19 patients at admission.

IQR = interquartile range; mmol/L millimoles per liter; mg/L = milligrams per liter.

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NECESSARY REWORDING FOR CLARITY

Throughout the article, some sentences required rewording:

1. In the 'Data Collection' section:

Each hospital provided the following information at the beginning of the study: estimated size of population served, total number of beds, number of intensive care unit (ICU) beds, number of ventilators, number of cardiologists, availability of echocardiogram (ECG) and advanced care interventional and diagnostic capability (e.g., extracorporeal membrane oxygenation [ECMO], echocardiography [ECHO]), and number of COVID-19 patients admitted in the previous month.

Becomes:

Each hospital provided the following information at the beginning of the study: estimated size of population served, total number of beds, number of intensive care unit (ICU) beds, number of ventilators, number of specialists, availability of echocardiogram (ECG) and advanced care interventional and diagnostic capability (e.g., extracorporeal membrane oxygenation [ECMO], echocardiography [ECHO]), and number of COVID-19 patients admitted in the previous month.

2. In 'Ethical Considerations' the following sentence was added: 'Mandated national regulatory clearances were also obtained.'

3. In 'Results':

Non-survivors more often presented with significantly higher heart rate, lower diastolic blood pressures, shortness of breath and more frequently had hypertension, diabetes, coronary heart disease, atrial fibrillation, rheumatic heart disease, Chagas disease, valvular disease, and chronic kidney disease (Table 2b).

Becomes:

Non-survivors more often presented with significantly higher heart rate, lower diastolic blood pressures, shortness of breath and more frequently had hypertension, diabetes, coronary artery disease, stroke, chronic kidney disease, chronic pulmonary disease, asthma and renal replacement therapy (Table 2b).

4. Further on in the same section, 'ECG examinations (n = 3497 patients; 65.8%) indicated that 2.5% had atrial fibrillation' was corrected to 'ECG examinations (n = 3490 patients; 65.8%) indicated that 2.5% had atrial fibrillation'.

5. In the 'Discussion' section, the following passage was reworded from:

Our analysis demonstrated a greater rate of in-hospital deaths, post discharge 30-day deaths and MACE among Hispanics, and Asian populations compared to Caucasians. Higher prevalence of comorbidities such as hypertension, diabetes, renal disease and obesity among Asians, Hispanics, and other populations (such as Blacks and Middle Eastern populations) may play a role in the increased mortality and MACE in our cohort of COVID-19 patients.

To:

Our analysis demonstrated a greater rate of in-hospital deaths, and post discharge 30-day deaths among Hispanics, Asian, Blacks and Middle Eastern populations compared to Caucasians. Higher prevalence of comorbidities such as hypertension, diabetes, renal disease and obesity among Asians, Hispanics, Blacks and Middle Eastern populations may play a role in the increased mortality and MACE in our cohort of COVID-19 patients.

6. In 'Conclusions', the following sentence: 'The key predictors of mortality or MACE outcomes were older age (≥ 60 years), male sex, Asian/Hispanic/Black ethnicity, pre-existing coronary heart disease, diabetes, renal disease, severe infection of COVID-19 requiring ICU admission, oxygen therapy and higher respiratory rates, but no significant association was found with hypertension or RAAS inhibitors.' Was corrected by removing 'or MACE outcomes'.

7. In the 'Steering Committee' section, Karen Sliwa (study Co-PI), Dorairaj Prabhakaran (Study Co-PI), Pablo Perel (co-PI), should all have had the same role title of 'Study Co-PI'.

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COMPETING INTERESTS

The authors have no competing interests to declare.

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