

Cardiovascular features and risk of mortality in COVID-19 hospitalized patients in Spain during 2020. A nationwide study from the Minimum Basic Data Set

C. Risco Risco¹, L. Ayerbe Garcia-Monzon², P. Villares Fernandez¹, A. Martin Arnau¹, D. Andaluz Ojeda¹

¹Madrid Hospital Group: HM Hospitales, Madrid, Spain; ²Queen Mary University of London, London, United Kingdom

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Introduction: During the last two years scientific evidence has been gathered regarding the cardiovascular complications of Covid-19. Nevertheless nationwide studies are still required to better understand both the incidence of less frequent clinical findings, and the prognostic implications of cardiovascular COVID-19 complications.

Purpose: The aim of this study was to estimate the incidence of cardiovascular diseases among COVID-19 hospitalized patients in Spain during 2020, as well as their association with mortality, besides other clinical and epidemiological factors.

Methods: We used the Minimum Basic Data Set from the Spanish Ministry of Health (RAE-CMBD) to analyze the data of all COVID-19 hospitalized patients in Spain during 2020. This national database includes concurrent diagnostics of all studied patients codified according to the Tenth International Classification of Diseases (ICD-10).

Logistic regression analysis was performed to evaluate the influence of the different clinical and epidemiological variables in the evolution of COVID-19 hospitalized patients. Odds ratios were obtained for each variable adjusting by age and sex, and also adjusting by the rest of clinical factors. The software used for analysis was STATA v 16.1.

Results: 75585 men (55.15%) and 61468 women (44.85%) were hospitalized due to COVID-19 during 2020 in Spain. The median age was 66 in men and 71 in women. Mortality was 14.92% in males, and 13.81% in females. 9.62% of patients were admitted to intensive care unit (ICU). Mortality in ICU was 29.13%.

Heart Failure (7.8%), Atrial Fibrillation (7.7%), Pulmonary Embolism (3.46%), Supraventricular Arrhythmias (1.18%), Cardiomyopathy (1.06%), Acute Coronary Syndrome (0.87%), Ischemic Stroke (0.33%), Myocarditis (0.12%), Pericarditis (0.06%), or Takotsubo Disease (0.05%), were relevant cardiovascular findings in COVID-19 hospitalized patients (Table 1).

In the logistic regression multivariate analysis in COVID-19 patients we found epidemiological predictors of in-hospital mortality such as age (OR 2.38 for each decade), or male sex (OR 1.39). Among the clinical predictors of mortality we differentiated cardiovascular ones as Acute Coronary Syndrome (OR 1.51), Ischemic Stroke (OR 1.46), or Heart Failure (OR 1.43); and non cardiovascular ones such as admission to ICU (OR 3.12), Adult Respiratory Distress Syndrome (OR 2.74), need for Mechanical Ventilation (OR 2.52), Acute Kidney Failure (OR 2.07), Liver damage (OR 1.67), or Dementia (OR 1.66), (Table 2)

Conclusion(s): Heart Failure, Pulmonary Embolism, Ischaemic Heart Disease, Atrial fibrillation, Ischemic Stroke, or Cardiomyopathy were among the main cardiovascular diseases associated to COVID-19. They increased in a different measure the risk of mortality in COVID-19, together with factors such as Mechanical ventilation, ICU admission, Acute kidney failure, Dementia, Liver damage, Adult Respiratory Distress Syndrome, older age, or male sex.

Table 1 - Clinical characteristics of COVID-19 hospitalized patients -Spain 2020

	Men		Women		Total	
	N	%	N	%	N	%
	75585	55,15	61468	44,85	137053	100
Arterial Hypertension	25902	34,27	21522	35,01	47424	34,6
Diabetes Mellitus	18853	24,94	13265	21,58	32118	23,43
Hypercholesterolemia	2727	3,61	2498	3,93	5145	3,75
Chronic Obstructive Pulmonary Disease	6472	8,56	1370	2,23	7842	5,72
Asthma	2632	3,48	4482	7,29	7114	5,19
Obesity	7700	10,19	7870	12,8	15570	11,36
Chronic Kidney Disease	4157	5,5	3364	5,47	7521	5,49
Acute Renal Failure	8933	11,82	5703	9,28	14636	10,68
Hypertransaminasemia/Coagulopathy	3066	4,06	1594	2,59	4660	3,4
Alzheimer/Vascular Dementia	2730	3,61	4494	7,31	7224	5,27
Delirium	3718	4,92	2663	4,33	6381	4,66
Acute Myocardial Infarction	511	0,68	274	0,45	785	0,57
Angina pectoris	242	0,32	165	0,27	407	0,3
Atrial Fibrillation	5786	7,65	4764	7,75	10550	7,7
Atrial Flutter	681	0,9	394	0,64	1075	0,78
Ventricular Fibrillation	25	0,03	13	0,02	38	0,03
Ventricular Tachycardia	110	0,15	45	0,07	155	0,11
Supraventricular Tachycardia	213	0,28	192	0,31	405	0,3
Ventricular Flutter	3	0	1	0	4	0
Sinus Disease	59	0,08	68	0,11	127	0,09
Pulmonary Embolism	2715	3,59	2031	3,3	4746	3,46
Ischemic Stroke	275	0,36	183	0,3	458	0,33
Heart Failure	5038	6,67	5648	9,19	10686	7,8
Cardiomyopathy	1017	1,35	440	0,72	1457	1,06
Pericarditis	48	0,06	34	0,06	82	0,06
Myocarditis	93	0,12	66	0,11	159	0,12
Takotsubo Disease	19	0,03	51	0,08	70	0,05
Adult Respiratory Distress Syndrome	4193	5,55	2113	3,44	6306	4,6
Intensive Care Unit Admission	9019	11,93	4162	6,77	13181	9,62
Invasive Mechanical Ventilation	4764	6,3	1971	3,21	6735	4,91
Death	11277	14,92	8242	13,81	19519	14,24
Age (IQR)	66	(53-79)	71	(54-84)	68	(53-81)

Table 2 - Odds Ratio (OR) for in-hospital Mortality in COVID-19 hospitalized patients. Spain 2020

	OR Adjusted by Age & Sex			OR Adjusted by Age, Sex, and Comorbidities		
	OR	CI 95%	p	OR	CI 95%	p
Arterial Hypertension	0,75	0,72-0,78	<0,001	0,83	0,80-0,86	<0,001
Diabetes Mellitus	1,09	1,05-1,13	<0,001	1,05	1,01-1,09	<0,001
Hypercholesterolemia	0,84	0,77-0,91	<0,001	0,84	0,77-0,91	<0,001
Obesity	1,2	1,14-1,27	<0,001	1,06	0,99-1,12	0,066
Chronic Obstructive Pulmonary Disease	1,13	1,07-1,20	<0,001	1,17	1,10-1,24	<0,001
Asthma	0,76	0,70-0,83	<0,001	0,76	0,70-0,83	<0,001
Chronic Kidney Disease	1,38	1,30-1,45	<0,001	1,01	0,95-1,07	0,697
Acute Kidney Failure	2,9	2,78-3,02	<0,001	2,07	1,98-2,17	<0,001
Hypertransaminasemia/Coagulopathy/Hepatic Failure	2,43	2,23-2,65	<0,001	1,67	1,51-1,84	<0,001
Alzheimer/Vascular Dementia	1,43	1,35-1,51	<0,001	1,66	1,56-1,75	<0,001
Acute Ischemic Cardiomyopathy	2,05	1,79-2,33	<0,001	1,51	1,31-1,74	<0,001
Atrial Fibrillation	1,4	1,33-1,46	<0,001	1,1	1,03-1,18	0,004
Acute Pulmonary Embolism	1,61	1,47-1,77	<0,001	1,19	1,08-1,31	<0,001
Ischemic Stroke	1,5	1,20-1,87	<0,001	1,46	1,15-1,84	<0,001
Heart Failure	1,73	1,65-1,81	<0,001	1,43	1,35-1,50	<0,001
Cardiomyopathy	1,45	1,28-1,65	<0,001	1,25	1,09-1,44	<0,001
Adult Respiratory Distress Syndrome	6,37	6,00-6,77	<0,001	2,74	2,56-2,93	<0,001
Intensive Care Unit Admission	7,1	6,75-7,47	<0,001	3,12	2,91-3,34	<0,001
Invasive Mechanical Ventilation	10,01	9,42-10,63	<0,001	2,52	2,33-2,74	<0,001
Age (decade)	2,08	2,05-2,11	<0,001	2,38	2,34-2,42	<0,001
Sex (Male)	1,13	1,10-1,17	<0,001	1,39	1,34-1,44	<0,001