

Epidemiology, logistics and outcome of cardiogenic shock before and during COVID-19 pandemic: a matched cohort Nationwide analysis

- On behalf of GiViTI

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INTRODUCTION Few reports exist on epidemiology and outcomes in CS patients during COVID-19 pandemic, but none on comparison between pre- and during COVID-19 outbreak at European Nationwide level.

METHODS Data of all patients consecutively admitted with a diagnosis of CS to 145 Italian general ICUs from February to December 2020 from the GiViTI registry were analysed. Patients admitted during the same timeframe in 2018 and 2019 were used as matched cohort.

RESULTS The incidence of CS was similar (3.98% in 2018; 3.96% in 2019; 3.27% in 2020; $p > 0.05$). Mechanical circulatory support use did not differ over the years ($p > 0.1$) No differences were observed in ICU length of stay (4 days; IQR 1-6; $p > 0.05$). In 2020 patient's transfer occurred more frequently to other ICUs for logistical/organization reasons rather than up-grade to specialized centers ($p < 0.001$). ICU mortality was similar (43.5%, 44.8% and 44.9%; $p > 0.05$) although in-hospital mortality was higher during COVID-19 (respectively 50.2%, 51.1% and 52.3%; $p = 0.003$). Amongst all patients admitted for CS in 2020, 88 (6.9%) resulted COVID-19 positive. Those patients had difference in term of CS etiologies (Table) and experienced longer hospitalization before ICU admission (3 [0-7] versus 1 [0-3] days; $p < 0.001$). COVID-19 patients had higher prevalence of septic shock (8% versus 3.1%; $p = 0.03$) and lower use of IABP (3.4% versus 17.5%; $p = 0.001$) and VA ECMO (0% versus 5.5% - $p = 0.04$). Additionally, the ICU and in-hospital mortality was consistently higher in CS COVID-19 patients (respectively, ICU 74.7% versus 42.6%; $p < 0.001$ and in-hospital 82.6% versus 50%; $p < 0.001$).

	2018	2019	2020	p value	2020 COVID-19 +	2020 NO COVID-19	p value
	N=1969	N=2013	N=1260		N=88	N=1172	
Age	73 (63-80)	72 (62-80)	72 (62-79)	0.12	71.5 (62.7-78.2)	72 (63-79)	0.886
BMI	25.95 (23.5-29.3)	26.12 (23.8-29.3)	26.12 (23.8-29.4)	0.316	27.55 (24.5-30.9)	26.12 (23.8-29.3)	0.063
Source of admission							
Same hospital	1712 (87%)	1782 (88.5%)	1084 (86%)	0.001	69 (78.4%)	1015 (86.6%)	0.001
Other hospital	240 (12.2%)	213 (10.6%)	176 (14%)		19 (21.6%)	157 (13.4%)	
Long-term hospital	16 (0.8%)	16 (0.8%)	0 (0%)		0 (0%)	0 (0%)	
Ward of admission							
Medical	366 (18.8%)	395 (19.8%)	270 (21.4%)	0.002	40 (45.5%)	230 (19.6%)	<0.001
Emergency	393 (20.1%)	359 (18%)	183 (14.5%)		2 (2.3%)	181 (15.4%)	
Surgical	813 (41.6%)	878 (44%)	573 (45.5%)		26 (29.5%)	547 (46.7%)	
Other ICU	213 (10.9%)	179 (9%)	129 (10.2%)		10 (11.4%)	119 (10.2%)	
HDU	167 (8.6%)	184 (9.2%)	105 (8.3%)		10 (11.4%)	95 (8.1%)	
Arterial Hypertension	1143 (58%)	1165 (57.9%)	747 (59.3%)	0.703	63 (71.6%)	684 (58.4%)	0.02
Renal failure							
None	724 (36.9%)	697 (34.7%)	408 (32.6%)	<0.001	32 (37.2%)	376 (32.2%)	0.689
Mild	436 (22.2%)	452 (22.5%)	359 (28.7%)		22 (25.6%)	337 (28.9%)	
Moderate	308 (15.7%)	347 (17.3%)	198 (15.8%)		15 (17.4%)	183 (15.7%)	
Severe	495 (25.2%)	510 (25.4%)	287 (22.9%)		17 (19.8%)	270 (23.2%)	
COPD							
None	1426 (72.4%)	1449 (72%)	884 (70.2%)	0.07	74 (84.1%)	927 (79.1%)	0.441
Moderate	319 (16.2%)	263 (13.1%)	182 (14.4%)		11 (12.5%)	171 (14.6%)	
Severe	132 (6.7%)	136 (6.8%)	77 (6.1%)		3 (3.4%)	74 (6.3%)	
Diabetes							
Type I	25 (1.3%)	18 (0.9%)	16 (1.3%)	0.58	1 (1.1%)	15 (1.3%)	0.626
Type II no insulin	326 (16.6%)	353 (17.5%)	239 (19%)		13 (14.8%)	226 (19.3%)	
Type II insulin	192 (9.8%)	193 (9.6%)	121 (9.6%)		11 (12.5%)	110 (9.4%)	
Organ Failure							
Respiratory	1781 (90.5%)	1802 (89.5%)	1143 (90.7%)	0.458	83 (94.3%)	1060 (90.4%)	0.308
Renal failure	1239 (62.9%)	1309 (65%)	844 (67%)	0.058	54 (61.4%)	790 (67.4%)	0.296
Neurological	581 (29.5%)	652 (32.4%)	377 (29.9%)	0.112	8 (9.1%)	369 (31.5%)	<0.001
Hepatic	15 (0.8%)	13 (0.6%)	6 (0.5%)	0.614	0 (0%)	6 (0.5%)	0.9
Etiologies							
LVHF	655 (33.3%)	622 (30.9%)	408 (32.4%)	0.277	13 (14.8%)	395 (33.7%)	<0.001
AMI	312 (15.8%)	337 (16.7%)	224 (17.8%)	0.352	3 (3.4%)	221 (18.9%)	<0.001
Right heart failure	141 (7.2%)	129 (6.4%)	93 (7.4%)	0.496	5 (5.7%)	88 (7.5%)	0.673
Cardiac arrest	673 (34.2%)	730 (36.3%)	429 (34%)	0.281	12 (13.6%)	417 (35.6%)	<0.001
Acute ischemia	221 (11.2%)	213 (10.6%)	139 (11%)	0.805	7 (8%)	132 (11.3%)	0.435

CONCLUSIONS Health care re-organization during pandemic did not affect significantly the management and outcome of CS patients. COVID-19 patients with CS exhibited different clinical phenotypes and remarkably higher mortality than those without.