



Characteristics of SARS-CoV-2 patients dying in Italy Report based on available data on October 4th, 2020

1. Sample

The present report describes characteristics of 36,008 SARS-CoV-2 patients dying in Italy.* Geographic distribution across the 19 regions and 2 autonomous provinces of Trento and Bozen is presented in the table below. Data are update to October 4th, 2020.

Table 1. Geographic distribution of deceased patients SARS-CoV-2 positive

REGION	N	%
Lombardia	16,942	47.1
Piemonte	4,471	12.4
Emilia Romagna	4,122	11.4
Veneto	2,194	6.1
Liguria	1,641	4.6
Toscana	1,166	3.2
Marche	988	2.7
Lazio	986	2.7
Puglia	598	1.7
Abruzzo	481	1.3
Campania	478	1.3
Trento	406	1.1
Friuli Venezia Giulia	362	1.0
Sicilia	339	0.9
Bolzano	292	0.8
Valle d'Aosta	155	0.4
Sardegna	146	0.4
Calabria	100	0.3
Umbria	85	0.2
Basilicata	31	0.1
Molise	25	0.1
Total	36,008	100.0

* SARS-CoV-2 related deaths presented in this report are those occurring in patients who test positive for SARS-CoV-2RT by PCR, independently from pre-existing diseases.

2. Demographics

Mean age of patients dying for SARS-CoV-2 infection was 80 years (median 82, range 0-109, IQR 74-88). Women were 15,365 (42.7%). *Figure 1* shows that median age of patients dying for SARS-CoV-2 infection was more than 25 years higher as compared with the national sample diagnosed with SARS-CoV-2 infection (median age 56 years). *Figure 2* shows the absolute number of deaths by age group. Women dying for SARS-CoV-2 infection had an older age than men (median age women 85 - median age men 79).

Figure 1. Median age of patients with SARS-CoV-2 infection and SARS-CoV-2 positive deceased patients

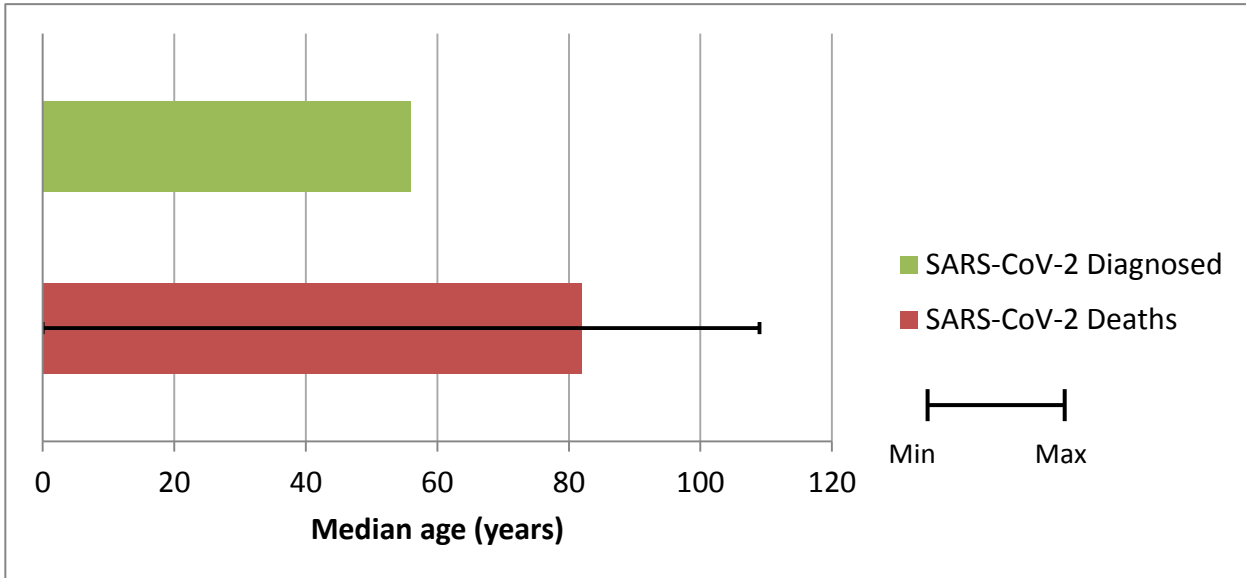
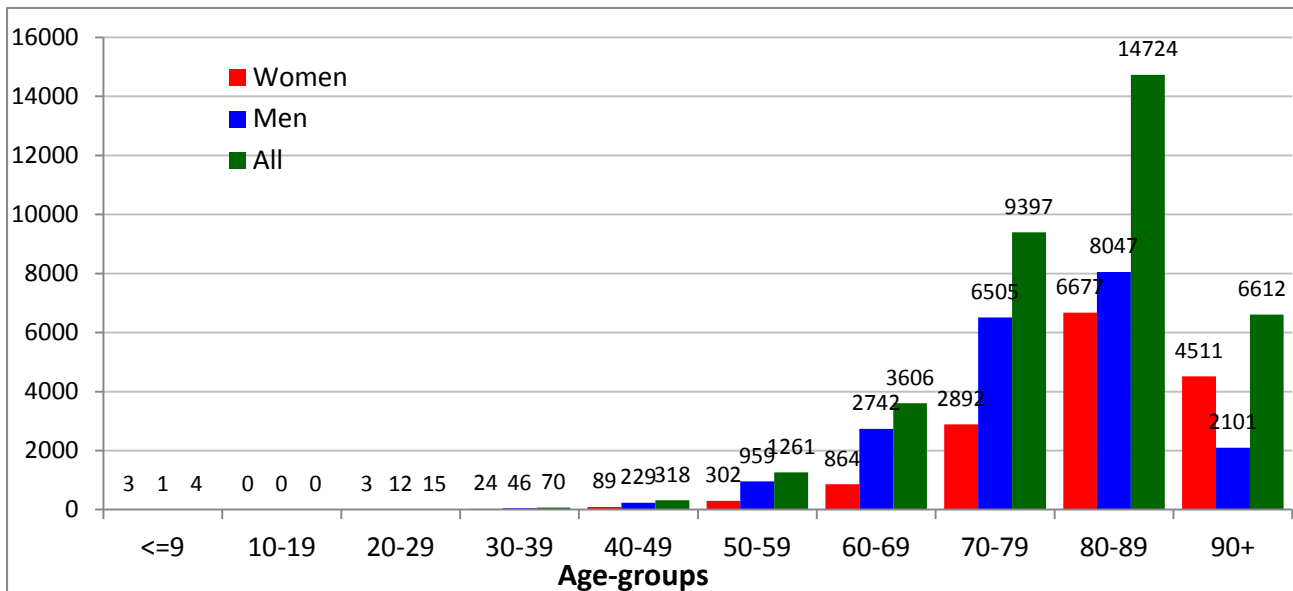


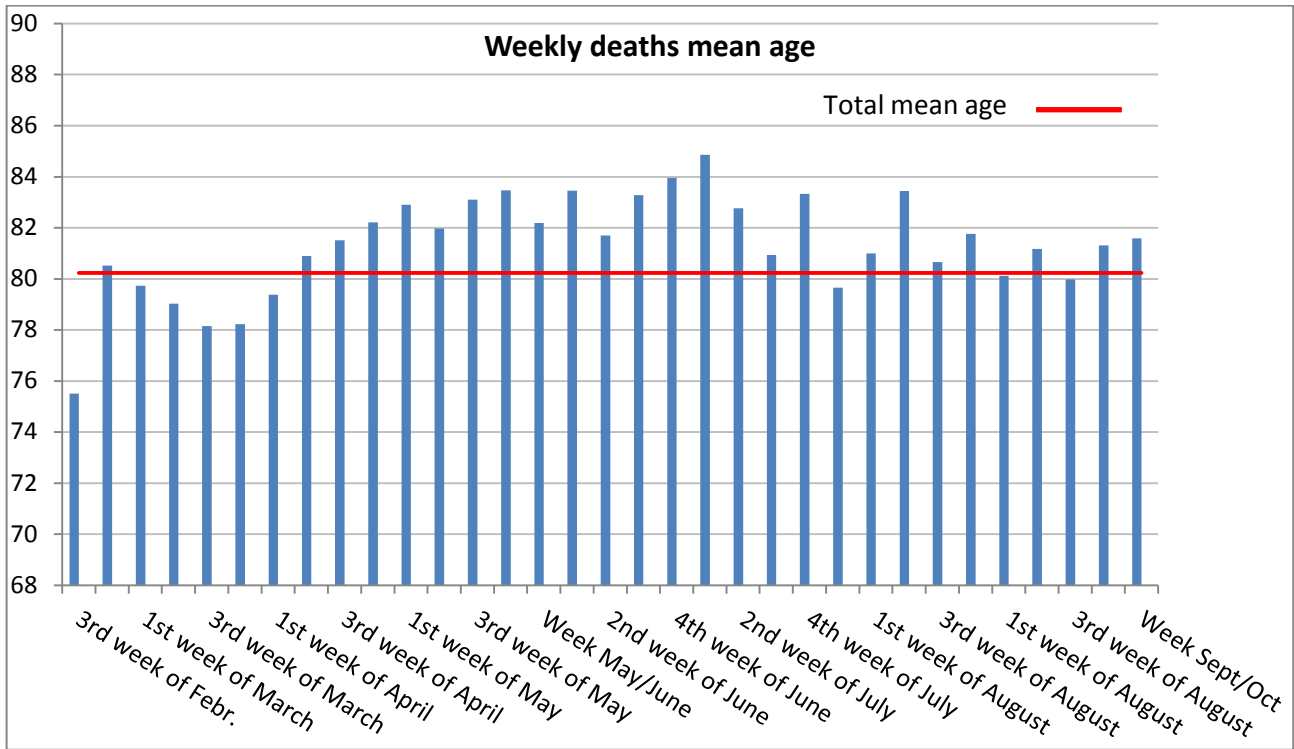
Figure 2. Absolute number of deaths by age group



Note: For 1 deceased person, age was not possible to be evaluated

Figure 3 shows the trend in the average age of SARS-CoV-2 positive deceased patients per calendar week, starting from the 3rd week of February 2020 (the date of the first death dates back to 21st February 2020). The average age of weekly deceased persons has substantially increased up to 85 years (1st week of July) and then dropped slightly.

Figure 3. Mean age of SARS-CoV-2 positive deceased patients by week of death



3. Pre-existing conditions

Table 2 presents most common comorbidities diagnosed before SARS-CoV-2 infection. Data on diseases were based on chart review and was available on 4,400 patients dying in-hospital for whom it was possible to analyse clinic charts. Mean number of diseases was 3.4 (median 3, SD 2.0). Overall, 3.6% of the sample presented with a no comorbidities, 13.6% with a single comorbidity, 19.9% with 2, and 62.9% with 3 or more.

Before hospitalization, 22% of SARS-CoV-2 positive deceased patients followed ACE-inhibitor therapy and 14% angiotensin receptor blockers-ARBs therapy. This information can be underestimated because data on drug treatment before admission were not always described in the chart.

Table 2. Most common comorbidities observed in SARS-CoV-2 positive deceased patients

Diseases	N	%
<i>Ischemic heart disease</i>	1238	28.1
<i>Atrial Fibrillation</i>	1033	23.5
<i>Heart failure</i>	705	16.0
<i>Stroke</i>	474	10.8
<i>Hypertension</i>	2887	65.6
<i>Type 2-Diabetes</i>	1304	29.6
<i>Dementia</i>	893	20.3
<i>COPD (Chronic Obstructive Pulmonary Disease)</i>	753	17.1
<i>Active cancer in the past 5 years</i>	749	17.0
<i>Chronic liver disease</i>	205	4.7
<i>Chronic renal failure</i>	900	20.5
<i>Dialysis</i>	91	2.1
<i>Respiratory failure</i>	263	6.0
<i>HIV Infection</i>	7	0.2
<i>Autoimmune diseases</i>	181	4.1
<i>Obesity</i>	457	10.4
Number of comorbidities		
<i>0 comorbidities</i>	160	3.6
<i>1 comorbidity</i>	599	13.6
<i>2 comorbidities</i>	874	19.9
<i>3 comorbidities and over</i>	2767	62.9

Table 3 presents the most common pre-existing chronic pathologies in patients who died, separately in men (n = 2,797 and women (n = 1,603). The average number of pathologies observed in women is 3.6 (median 3, Standard Deviation 2.0). In men the average number of pathologies observed is 3.3 (median 3, Standard Deviation 2.0).

Table 3. Most common comorbidities observed in SARS-CoV-2 positive deceased patients by gender

	Women		Men	
Diseases	N	%	N	%
<i>Ischemic heart disease</i>	370	23.1	868	31.0
<i>Atrial Fibrillation</i>	398	24.8	635	22.7
<i>Heart Failure</i>	295	18.0	410	14.4
<i>Stroke</i>	185	11.5	289	10.3
<i>Hypertension</i>	1075	67.1	1812	64.8
<i>Type 2-Diabetes</i>	438	27.3	866	31.0
<i>Dementia</i>	465	29.0	428	15.3
<i>COPD (Chronic Obstructive Pulmonary Disease)</i>	212	13.2	541	19.3
<i>Active cancer in the past 5 years</i>	266	16.6	483	17.3
<i>Chronic liver disease</i>	67	4.2	138	4.9
<i>Chronic renal failure</i>	301	18.8	599	21.4
<i>Dialysis</i>	27	1.7	64	2.3
<i>Respiratory failure</i>	104	6.5	159	5.7
<i>HIV Infection</i>	0	0.0	7	0.3
<i>Autoimmune diseases</i>	95	5.9	86	3.1
<i>Obesity</i>	169	10.5	288	10.3
Number of comorbidities				
<i>0 comorbidities</i>	37	2.3	123	4.4
<i>1 comorbidity</i>	196	12.2	403	14.4
<i>2 comorbidities</i>	308	19.2	566	20.2
<i>3 comorbidities and over</i>	1062	66.3	1705	61.0

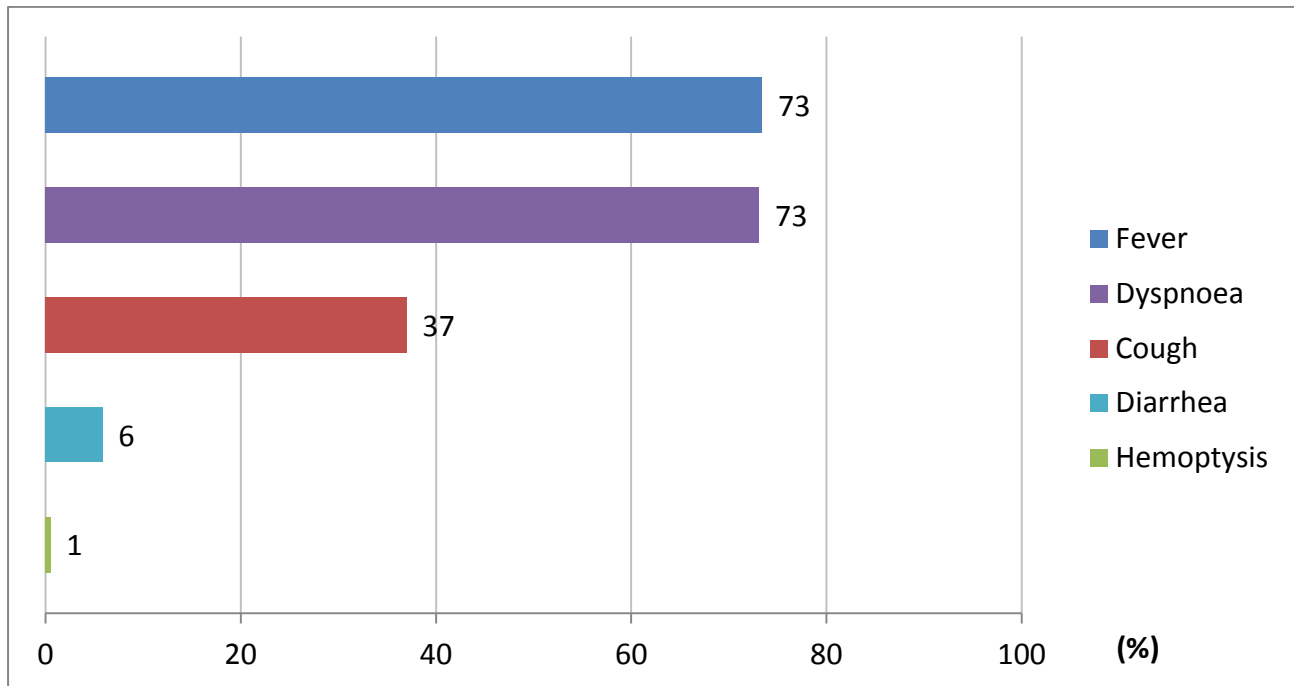
4. Diagnosis of hospitalization

In 91.3% of hospitalizations, conditions (e.g. pneumonia, respiratory failure) or symptoms (e.g. fever, dyspnoea, cough) compatible with SARS-CoV-2 were mentioned. In 349 cases (8.7% of cases) the diagnosis of hospitalization was not related to the infection. In 50 cases the diagnosis of hospitalization concerned exclusively neoplastic pathologies, in 122 cases cardiovascular pathologies (for example Acute Myocardial Infarction-AMI, heart failure, stroke), in 48 cases gastrointestinal pathologies (for example cholecystitis, perforation of the intestine, intestinal obstruction, cirrhosis), in 129 cases other pathologies.

5. Symptoms

Figure 4 shows symptoms most commonly observed at hospital admission. Fever, dyspnoea and cough were the most commonly observed symptoms, while diarrhoea and haemoptysis were less commonly observed. Overall, 7.1% of patients did not present any symptoms at hospital admission.

Figure 4. Most common symptoms observed in SARS-CoV-2 positive deceased patients



6. Acute conditions

Acute Respiratory Distress syndrome was observed in the majority of patients (94.7% of cases), followed by acute renal failure (23.2%). Superinfection was observed in 18.2% and acute cardiac injury in 10.9% of cases.

7. Treatments

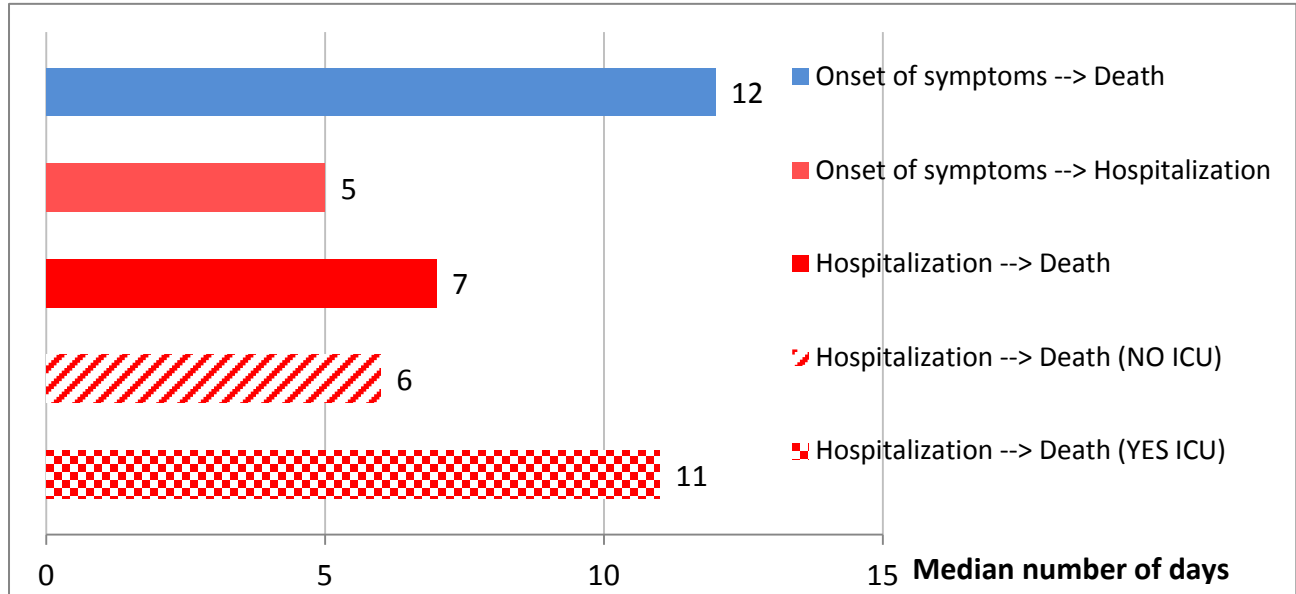
Antibiotics were used by 86.6% of patients during hospital stay, while less used were antivirals (57.9%) and corticosteroids (43.5%). Concomitant use of these 3 treatments was observed in 26.3% of cases.

Out of SARS-CoV-2 positive deceased patients, 4.6% were treated with Tocilizumab during hospitalization.

8. Time-line

Figure 5 shows, for SARS-CoV-2 positive deceased patients, the median times, in days, from the onset of symptoms to death (12 days), from the onset of symptoms to hospitalization (5 days) and from hospitalization to death (7 days). The time from hospitalization to death was 5 days longer in those who were transferred to intensive care than those who were not transferred (11 days vs. 6 days).

Figure 5. Median hospitalization times (in days) in SARS-CoV-2 positive deceased patients



9. Deaths under the age of 50 years

As of October 4th, 407 out of the 36,008 (1.1%) positive SARS-CoV-2 patients under the age of 50 died. In particular, 89 of these were less than 40 years (59 men and 30 women), age range between 0 and 39 years. For 11 patients under the age of 40 years no clinical information is available; out of the remaining ones, 64 had serious pre-existing pathologies (cardiovascular, renal, psychiatric pathologies, diabetes, obesity) and 14 had no major pathologies.

10. Comparison of death characteristics in the 2 quarters March-May and June-August 2020

Table 4 summarizes the main characteristics of deaths with COVID-19 that occurred in the 2 quarters from the beginning of the pandemic: the initial one, March-May 2020, and the second quarter, June-August 2020. In this analysis, only patients who died in hospital and whose death certificates included COVID-19 among the causes responsible for death (part 1 of the death certificate) were included. The sample represents 9.8% of those who died between March and May and 11.9% of those who died between June and August.

In the second quarter, the average age of deaths and the proportion of women slightly increased; deaths of people with 3 or more pre-existing pathologies increase and those of persons with fewer pathologies or none decrease: this seems to indicate that in the second period deaths concern older people and persons with a pre-existing health condition worse than those dying in the first quarter (table 4).

Table 4. Mean age, prevalence of women, number of pre-existing diseases, complications and treatments in deaths with COVID-19 by quarter of death

	All (n=3506)	March-May 2020 (n=3342)	June August 2020 (n=164)	p-value*
Age (years)	78.0	77.8	81.7	<0.001
	n (%)	n (%)	n (%)	
Women	1182 (33.7)	1097 (32.8)	85 (51.8)	<0.001
N of comorbidities				
0	140 (4.1)	139 (4.2)	1 (0.6)	<0.001
1	480 (14.0)	466 (14.2)	14 (8.6)	
2	722 (21.0)	699 (21.3)	23 (14.2)	
3 or more	2097 (61.0)	1973 (60.2)	124 (76.5)	
Complications during hospitalization				
Acute Respiratory Distress Syndrome	3271 (97.0)	3123 (97.3)	148 (90.8)	<0.001
Acute renal failure	767 (22.7)	727 (22.7)	40 (24.5)	0.566
Acute cardiac injury	361 (10.7)	349 (10.9)	12 (7.4)	0.193
Superinfection	566 (16.8)	488 (15.2)	78 (47.9)	<0.001
Treatments				
Antibiotics	2968 (87.2)	2825 (87.1)	143 (89.4)	0.467
Antivirals	2039 (59.9)	1976 (60.9)	63 (39.4)	<0.001
Steroids	1425 (41.9)	1319 (40.7)	106 (66.3)	<0.001
Tocilizumab	136 (4.5)	124 (4.3)	12 (7.7)	0.067

* p-value for difference between the two quarters

For deaths occurred in the second period, all pre-existing co-morbidities increase, except for obesity; deaths of persons with atrial fibrillation and dementia show a statistically significant increase (Figure 6).

Figure 6. Pre-existing pathologies in deaths with COVID-19 according to the quarter of death

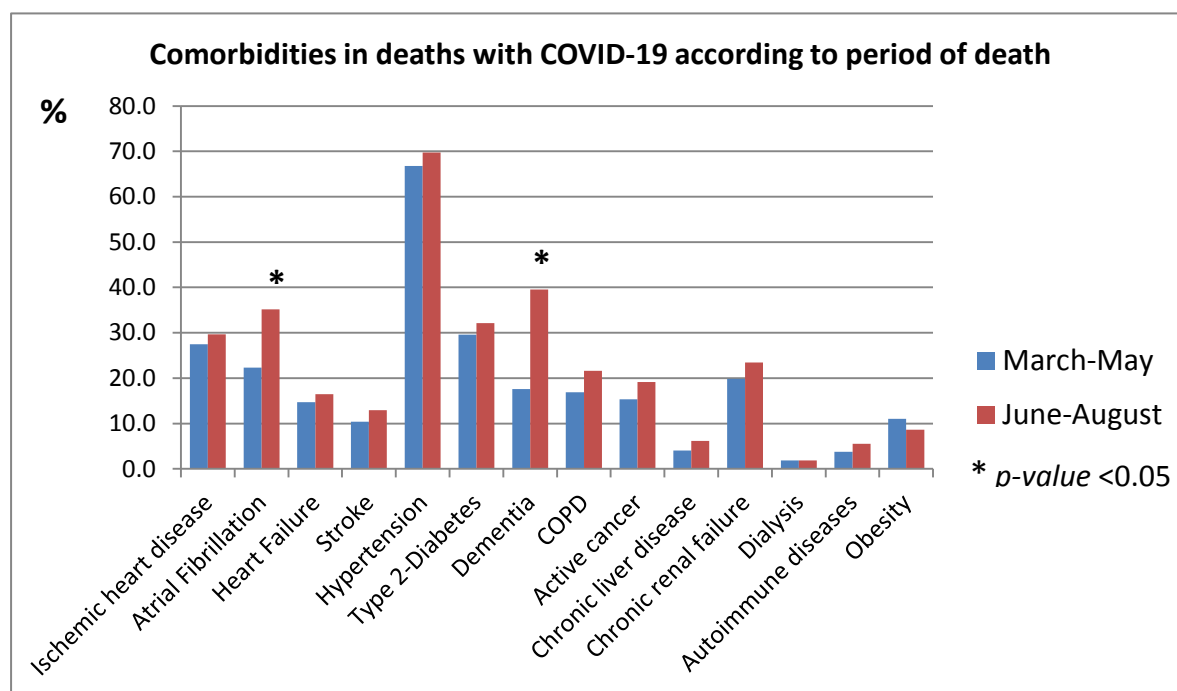


Table 5 shows the durations, as median times (in days), in the 2 quarters considered: the time that elapses from the onset of symptoms to death increases by about 3 times; the time that elapses from the onset of symptoms to the execution of the swab for detection SARS-CoV-2 infection decreases; the median duration in days from hospital admission to death increases by more than 4 times. These results seem to suggest that the timeliness of tests after the symptoms onset has improved and, above all, that survival times have increased from the onset of infection.

Table 5. Median times (in days) between symptoms onset, PCR test, hospitalization and death

	All (n=3439)		March-May 2020 (n=3277)		June August 2020 (n=162)		p-value*
	Median	IQR	Median	IQR	Median	IQR	
From symptoms onset to death	12	7-19	12	7-18	38	12-63	<0.001
From symptoms onset to SARS-CoV-2 testing	5	3-9	5	3-9	3	1-9	0.004
From symptoms onset to hospitalization	4	2-7	4	2-7	3	1-7	0.18
From hospitalization to death	6	3-13	6	3-12	26	7-54	<0.001

* p-value for difference between the two quarters

IQR=Inter-Quartile Range

The data here presented can be explained by a greater knowledge about the infection and a greater ability and timeliness of treatment in the period June-August in comparison to the previous quarter. In addition, it is likely that in the months of March and April SARS-CoV-2 infection was under-diagnosed in many frail elderly who died (such as those living in RSA). This may have led to an underestimation of the burden of the diseases in persons dying in that period

This report was produced by SARS-CoV-2 Surveillance Group

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