



Age-specific COVID-19 case-fatality rate: no evidence of changes over time

Carlo Signorelli¹ · Anna Odone¹

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More than 5 months after the World Health Organization (WHO) declared the coronavirus infectious disease 2019 (COVID-19) outbreak a pandemic, and almost 900,000 deaths around the world, we are still far from fully understanding COVID-19 epidemiology and natural history. As we fear the consequences of second epidemic waves, as stated in a recent commentary (Middleton et al. 2020), it is not clear why the clinical burden of COVID-19 has decreased (Johns Hopkins University 2020). Experts claim this to be possibly related to infection transmission in younger age groups, as compared to the past (current average age of COVID-19 cases in Italy is 31 years versus 70 years in the first 2 months of the outbreak) (Italian National Institute of Health 2020), to decreased disease severity or to better therapeutic approaches.

National-level COVID-19 surveillance system data from Italy, the first European country to be hit by the COVID-19 outbreak and one of the countries with the highest number of reported cases and deaths in Europe (together with France, Spain and the UK) (Odone et al. 2020), are to be explored to better understand age-specific COVID-19 case-fatality rate over time.

Table 1 reports the number of confirmed COVID-19 cases and deaths at, respectively, 2, 4 and 6 months since the onset of the epidemic, by age group. The large differences in case fatality rates by age (ranging from less than 3% in people younger than 60 years, up to more 30% in people 80 years or older) are well known and associated,

among other factors, with higher rates of chronic comorbidities in elder populations. It also explains—as we have previously demonstrated—the high number of COVID-19 deaths in Italy, the country with one of the highest average age in the world (Signorelli et al. 2020).

More interestingly, as it emerges from Table 1, age-specific COVID-19 case-fatality rates seem not to vary over time, supporting the hypothesis that the less severe COVID-19 clinical outcomes (i.e. decreasing overall death rates) reported in recent times in Italy and Europe might be due to infection community transmission in younger populations.

We acknowledge the limitations linked to using surveillance data to derive insight on the COVID-19 epidemiology, linked to under-notification, heterogeneous testing strategies and time lag between notification and death (average time 12 days; Italian National Institute of Health 2020). Still, we believe this data provide solid evidence to support the argument that should infection start to circulate again among older adults and elder populations (including those living in nursing homes), this might have detrimental clinical impacts in the weeks to come. If we add that no conclusive evidence has emerged so far on other potential factors influencing COVID-19 epidemiology, including the clinical effect of viral mutations or the impact of environmental temperature and weather conditions, it is of crucial importance to keep effective containment and mitigation measures in place and protect vulnerable subgroups of the population.

✉ Carlo Signorelli
signorelli.carlo@hsr.it

¹ School of Medicine, University Vita-Salute San Raffaele, Via Olgettina 60, 20132 Milan, Italy

Table 1 COVID-19 cumulative deaths and case-fatality rates (CFRs) per age group at three different time points (Italy 2020)

Age group	By April 16th			By June 16 th			By August 18th		
	Deaths (<i>n</i>)	CFR (%)	Cases (<i>n</i>)	Deaths (<i>n</i>)	CFR (%)	Cases (<i>n</i>)	Deaths (<i>n</i>)	CFR (%)	Cases (<i>n</i>)
0-19	1	0.0	2.927	4	0.1	5.843	4	0.1	8.516
20-29	7	0.1	7.737	15	0.1	13.673	16	0.1	16.757
30-39	40	0.3	11.686	65	0.3	18.755	67	0.3	21.293
40-49	178	0.9	20.519	286	0.9	31.057	313	0.9	33.462
50-59	756	2.5	29.858	1.159	2.7	42.704	1.241	2.8	44.775
60-69	2.284	9.5	24.040	3.367	10.6	31.777	3.592	10.9	33.097
70-79	6.203	24.1	25.717	8.830	26.0	33.916	9.335	26.7	34.925
≥ 80	10.525	28.8	36.519	19.483	32.3	60.317	21.275	34.6	61.436
Total	19.996	12.6	159.107	33.209	13.9	238.082	35.843	14.1	254.283

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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