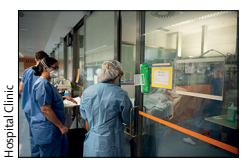
Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Likelihood of survival of coronavirus disease 2019


Hospital Clinic

Published Online
March 30, 2020
https://doi.org/10.1016/S1473-3099(20)30257-7

This online publication has been corrected. The corrected version first appeared at thelancet./infection com on April 6, 2020

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A case fatality ratio of an infectious disease measures the proportion of all individuals diagnosed with a disease who will die from that disease. For an emerging infectious disease, this ratio is thus a very important indicator not only of disease severity but also of its significance as a public health problem. For instance, WHO estimated a case fatality ratio of approximately 14–15% for severe acute respiratory syndrome (SARS) in 2003,[1] and approximately 35% for Middle East respiratory syndrome (MERS) in 2012.[2]

The ongoing pandemic of coronavirus disease 2019 (COVID-19) is caused by a virus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), belonging to a large family of coronaviruses that also includes SARS coronavirus (SARS-CoV) and MERS coronavirus (MERS-CoV). COVID-19 was first reported in December, 2019, in Wuhan, in the Hubei province of China, and spread very rapidly to all other prefectures in Hubei, as well as all other provinces, autonomous regions, municipalities, and special administrative regions of China, and more than 180 other countries and territories. As of March 21, 2020, there have been 292 142 confirmed cases of COVID-19 worldwide, with 12 784 deaths reported.[3]

Estimating the case fatality ratio for COVID-19 in real time during its epidemic is very challenging. Nevertheless, this ratio is a very important piece of data that will help to guide the response from various government and public health authorities worldwide. The disease has brought tremendous pressure and disastrous consequences for the public health and medical systems in Wuhan, as well as in Iran, Italy, and in other countries. However, current estimates of case fatality ratio for COVID-19 vary depending on the datasets and time periods examined. A study of nearly 1100 patients from China suggested a case fatality ratio of 1·4%.[4] From a dataset of 44 672 confirmed cases in China, a report from the Chinese Center for Disease Control and Prevention (CDC)[5] estimated an overall case fatality ratio of 2·3%, and pointed out that the ratio varied by location and intensity of transmission (eg, 2·9% in Hubei *vs* 0·4% in other areas of China), in different phases of the outbreak (eg, 14·4% before Dec 31, 15·6% for Jan 1–10, 5·7% for Jan 11–20, 1·9% Jan for 21–31, and 0·8% after Feb 1), as well as by sex (2·8% for males *vs* 1·7% for females). Moreover, the Chinese CDC reported that the case fatality ratio increases with age (from 0·2% for people aged 11–19 years, to 14·8% for people aged ≥80 years), and with the presence of comorbid conditions (10·5% for cardiovascular disease, 7·3% for diabetes, 6·0% for hypertension, 6·3% for chronic respiratory disease, and 5·6% for cancer). The WHO–China Joint Mission on COVID-19 provided similar data and reported a case fatality ratio of 3·8%, based on the 55 924 laboratory-confirmed cases in China.[6]

In *The Lancet Infectious Diseases*, Robert Verity and colleagues[7] provide an estimate of the case fatality ratio for COVID-19. The authors argue that crude case fatality ratios obtained by simply dividing the number of deaths by the number of cases can be misleading because there can be a period of 2–3 weeks between a person developing symptoms and that case being detected and reported, and because surveillance of a novel virus is biased towards detecting severe cases, especially at the beginning of an outbreak when test capacity is low. By using individual-case data from mainland China (3665 cases) and 1334 cases detected outside of mainland China, assuming a constant attack rate by age, and adjusting for demography and age-based and location-based under-ascertainment, Verity and colleagues estimate the mean duration from symptom onset to death to be 17·8 days (95% credible interval [CrI] 16·9–19·2)

	SARS	COVID-19 (95% CrI)	Influenza
Overall	14–15%	1·38% (1·23–1·53)	0·0962%
Age, years			
0–4	0·0%	0·00260% (0·000312–0·0382)	0·0073%
5–9			0·0028%
10–14		0·0148% (0·00288–0·0759)	
15–17	0·5%		
18–19			0·0206%
20–24		0·0600% (0·0317–0·132)	
25–29	1·6%		
30–34		0·146% (0·103–0·255)	
35–39	10·0%		
40–44		0·295% (0·221–0·422)	
45–49	13·0%		
50–54		1·25% (1·03–1·55)	0·0614%
55–59	25·3%		
60–64		3·99% (3·41–4·55)	
65–69	52·5%		0·8315%
70–74		8·61% (7·48–9·99)	
75–79	69·6%		
≥80		13·4% (11·2–15·9)	

Figure: **Comparison of case fatality ratios for SARS,[1,8] COVID-19,[7] and seasonal influenza[9]**
SARS=severe acute respiratory syndrome. COVID-19=coronavirus disease 2019. CrI=credible interval.

and from onset-of-symptoms to hospital discharge to be 24·7 days (22·9–28·1). The study findings give an estimate of the overall case fatality ratio in China of 1·38% (95% CrI 1·23–1·53), which becomes higher as age increases (figure).

Estimates of case fatality ratios might vary slightly from country to country because of differences in prevention, control, and mitigation policies implemented, and because the case fatality ratio is substantially affected by the preparedness and availability of health care. Early studies[5,6] have shown that delaying the detection of infected cases not only increases the probability of spreading the virus to others (most likely family members, colleagues, and friends) but also makes the infection worse in some cases, thereby increasing the case fatality ratio.[7]

Comparisons of case fatality ratios for SARS, COVID-19, and seasonal influenza in different age groups are shown in the figure. Even though the fatality rate is low for younger people, it is very clear that any suggestion of COVID-19 being just like influenza is false: even for those aged 20–29 years, once infected with SARS-CoV-2, the case fatality ratio is around three times higher than that of seasonal influenza in people aged 18–49 years. For people aged 60 years and older, the chance of survival following SARS-CoV-2 infection is approximately 95% in the absence of comorbid conditions. However, the chance of survival will be considerably decreased if the patient has underlying health conditions, and continues to decrease with age beyond 60 years.[5,6]

Although China seems to be out of the woods now, many other countries are facing tremendous pressure from the COVID-19 pandemic. The strategies of early detection, early diagnosis, early isolation, and early treatment that were practised in China[6] are likely to be not only useful in controlling the outbreak, but also contribute to decreasing the case fatality ratio of the disease.

I declare no competing interests.

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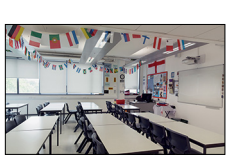
Scientific and ethical basis for social-distancing interventions against COVID-19

On Dec 31, 2019, the WHO China Country Office received notice of a cluster of pneumonia cases of unknown aetiology in the Chinese city of Wuhan, Hubei province.[1] The incidence of coronavirus disease 2019 (COVID-19; caused by severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2]) has since risen exponentially, now affecting all WHO regions. The number of cases reported to date is likely to represent an underestimation of the true burden as a result of shortcomings in surveillance and diagnostic capacity affecting case ascertainment in both high-resource and low-resource settings.[2] By all scientifically meaningful criteria, the world is undergoing a COVID-19 pandemic.

In the absence of any pharmaceutical intervention, the only strategy against COVID-19 is to reduce mixing of susceptible and infectious people through early ascertainment of cases or reduction of contact. In *The Lancet Infectious Diseases*, Joel Koo and colleagues[3]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Published **Online** March 23, 2020 https://doi.org/10.1016/S1473-3099(20)30190-0

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