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Mortality statistics in England and Wales: the SARS-CoV-2 paradox

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Abstract

Objective: To analyse mortality statistics in the United Kingdom during the initial phases of the severe acute respiratory coronavirus 2 (SARS-CoV-2) pandemic and to understand the impact of the pandemic on national mortality.

Methods: Retrospective review of weekly national mortality statistics in the United Kingdom over the past 5 years, including subgroup analysis of respiratory mortality rates.

Results: During the early phases of the SARS-CoV-2 pandemic in the first months of 2020, there were consistently fewer deaths per week compared with the preceding 5 years. This pattern was not observed at any other time within the past 5 years. We have termed this phenomenon the "SARS-CoV-2 paradox." We postulate potential explanations for this seeming paradox and explore the implications of these data.

Conclusions: Paradoxically, but potentially importantly, lower rather than higher weekly mortality rates were observed during the early stages of the SARS-CoV-2 pandemic. This paradox may have implications for current and future healthcare utilisation. A rebound increase in non-SARS-CoV-2 mortality later this year might coincide with the peak of SARS-CoV-2 admissions and mortality.

Keywords

SARS-CoV-2, COVID-19, mortality rate, respiratory disease, paradox, United Kingdom

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Introduction

At the time of writing, 1 month has elapsed since the first internally transmitted case of severe acute respiratory coronavirus 2 (SARS-CoV-2) was announced in the United Kingdom (UK) on 28 February 2020[1] and less than 3 weeks since the World Health Organization (WHO) classified the outbreak as a pandemic on 11 March 2020.[2]

There is much debate regarding the mortality rate of SARS-CoV-2, and accurate mortality data are unlikely to become available for many months or years. Difficulties arise in assessing the correct denominator: some countries have engaged in extensive testing and contact tracing while others, including the UK, only test suspected cases in hospital. In countries such as Singapore where extensive testing, contact tracing and containment have been undertaken, the mortality rate is believed to be approximately 0.3%.[3] On board the cruise ship Diamond Princess, the mortality rate was 0.99%; Rajgor et al.[3] emphasise that data collected from the captive population of the ship may be less prone of bias and variable factors affecting countries. In China, where the outbreak originated, the mortality rate is around 3.6%.[4] Statistical modelling by Baud et al. accounted for the potentially long duration (2–8 weeks) between symptom onset and death identified by the WHO. The authors concluded that the SARS-CoV-2 mortality rate was likely to be 5.6% in China and 15.2% outside of China.[4] As of 5 April 2020, the total number of deaths in the UK had reached 4934 with 47,806 confirmed cases (approximately 10.3% mortality).[5] It is likely that this figure was skewed by a lack of testing. The challenges associated with calculation of mortality rates and variation in the reported mortality of circulating pathogens are not new. For example, case fatality rates associated with SARS-CoV-1 in 2003 ranged from 3.8% to 38.5% depending on the country, disease progression, and calendar date.[6] According to the WHO, Middle East Respiratory Syndrome (MERS) had a case fatality rate of 34.4%; Saudi Arabia reported a similar figure (37.1%).[7]

In the UK, widespread social distancing measures have led to the closure of schools and offices and drastically reduced transport links and global travel.[8] Shops are unable to restock quickly enough to meet demand and purchasing restrictions have been put in place to mitigate mass panic buying. Current pandemic plans are preparing for an increase in yearly mortality of up to 315,000.[9] It is fair to assume that given such projections from the government and their advisories, we would expect to see an increase in the number of deaths recorded in England and Wales. In this study, we analysed weekly mortality rates within the UK to assess the impact of the SARS-CoV-2 pandemic on national mortality statistics.

Methods

We performed a retrospective analysis of Office of National Statistics mortality data in England and Wales, including deaths from respiratory causes.[10] The weekly data were compared with the average over the previous 5 years. We performed a comparative analysis of death rates from December 2019 until mid-March 2020 and death rates over the same period of the previous 5 years. We calculated the average respiratory mortality rate over the previous 5 years. Weekly comparison were made with the previous 5 year average starting in December 2019, the month when China officially announced cases of illness related to a new coronavirus, until April 2020. Taking into account population growth and associated mortality increases, we considered any trends and anomalies in the data.

Results

We used government data in England and Wales to compare weekly mortality rates during the COVID-19 pandemic and over the previous 5 years. Death rates were elevated during each week of December 2019 excepting one and throughout the first half of January 2020 (Table 1). However, since that time, there have been consistently fewer deaths each week compared with the average over the previous 5 years: the total number of weekly deaths dropped from 11,548 to 10,841 in mid-February and from 11,498 to 10,895 in mid-March. No pattern of this nature was observed at any time over the previous 5 years. The same pattern was also reflected in respiratory deaths, with increased fatalities reported in December 2019 and early January 2020 but fewer fatalities reported from mid-January 2020 onwards. The week of 20 March saw more deaths than the average over the previous 5 years; curiously, this did not reflect an increase in deaths from respiratory causes. Whilst the spike in SARS-CoV-2-related deaths at this point prompted more radical measures from the UK government, it had not yet impacted general trends in deaths from respiratory causes. Therefore, the total number of deaths reported nationally in England and Wales decreased between January and mid-March 2020 compared with previous years. Given the UK's ageing population (which increases year-on-year by around 0.6%)[11] and an on-going pandemic, this is a curious pattern. These data are presented graphically in Figure 1.

Discussion

In this study, we make an important and novel observation: despite being several weeks into the COVID-19 pandemic, we are observing lower mortality rates at the

Table 1. Death rates in England and Wales between December 2019 and March 2020 and over the same period within the previous 5 years.

Week number	Date	Deaths where COVID-19 was mentioned on the death certificate	Total deaths	Average previous 5 years	Deaths from respiratory causes	Average respiratory deaths, previous 5 years
48	29-Nov-19	–	10958	10,164	1566	1280
49	06-Dec-19	–	10816	10,585	1505	1461
50	13-Dec-19	–	11188	10,622	1637	1500
51	20-Dec-19	–	11926	11,499	1839	1647
52	27-Dec-19	–	7533	8,014	1166	1258
1	03-Jan-20	0	12254	12,175	2141	2176
2	10-Jan-20	0	14058	13,822	2477	2667
3	17-Jan-20	0	12990	13,216	2188	2490
4	24-Jan-20	0	11856	12,760	1894	2306
5	31-Jan-20	0	11612	12,206	1746	2117
6	07-Feb-20	0	10986	11,925	1572	2011
7	14-Feb-20	0	10944	11,627	1602	1926
8	21-Feb-20	0	10841	11,548	1618	1924
9	28-Feb-20	0	10816	11,183	1529	1831
10	06-Mar-20	0	10895	11,498	1551	1839
11	13-Mar-20	5	11019	11,205	1488	1769
12	20-Mar-20	103	10645	10,573	1514	1599

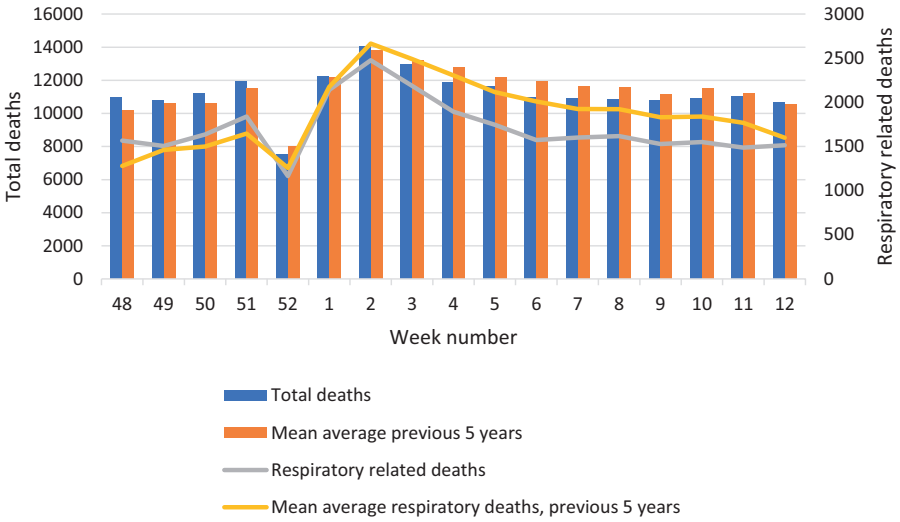

Figure 1. Total deaths and deaths from respiratory causes over the study period. For comparison, historical mortality over the previous 5 years is shown. Weeks 48 to 52 refer to the last 5 weeks of 2019 and weeks 1 to 12 refer to the first 12 weeks of 2020.

national level in the UK. The causes of and influences upon this pattern are likely multifold. First, a reduction of risky behaviour may have occurred following media reports and government advice. Whilst the government began to enforce social distancing in the middle of March, some individuals had already adopted these behaviours, especially higher risk groups and the elderly, reducing the spread of infectious diseases including, but not exclusive of, SARS-CoV-2. Second, the media and government have been emphasising the importance of washing hands, staying home when feeling unwell and coughing or sneezing into a tissue. This message was projected by the media prior to the first cases in the UK, as extensive reporting from Wuhan raised concerns regarding a potential pandemic. Again, uptake of this behaviour is likely to reduce the spread of various infectious diseases. Finally, iatrogenic mortality may have decreased as hospital admission numbers were reduced; there may also have been reduced spread of hospital-acquired infections, such as methicillin-resistant *Staphylococcus aureus*. Similarly, reductions in elective surgeries (to bolster intensive care and hospital bed capacity) may have resulted in fewer iatrogenic deaths. Some potential mechanisms resulting in reduced mortality are shown in Figure 2.

The increase in mortality during the week of 20 March is not accounted for by COVID-19 deaths. It is possible that these deaths resulted from reduced health service availability: many general practitioners closed their offices, accident and emergency departments were overwhelmed, and intensive therapy units were increasingly selective in patient intake. Additionally, elective surgeries, such as abdominal aortic aneurysm repairs, were cancelled, which could account for some portion of the increased mortality. Additionally, it is possible that total deaths were affected by SARS-CoV-2, but that affected cases with less stereotypical symptoms such as headache or altered taste were not being identified.

Each year infectious diseases make a significant contribution to avoidable deaths in

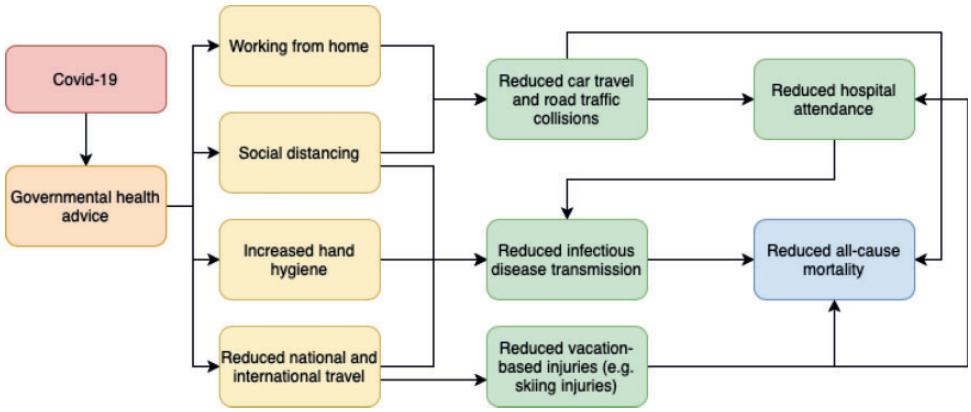

Figure 2. Potential mechanisms for reduced all-cause mortality during the COVID-19 pandemic.

England and Wales. While designed to reduce transmission of SARS-CoV-2, social distancing measures are likely to impact the spread of all infectious diseases. Preventing disease spread could cause a reduction in overall death rate.

Masks and policies surrounding them have become a controversial topic. Masks are now being considered for general use as part of national policy.[12] Members of the public have taken it upon themselves to wear masks and gloves when shopping or exercising outside. Studies have shown that despite a lack of training in face mask use, both professional and improvised face masks can reduce infectious disease transmission.[13] This highlights the fact that increased health awareness and pervasive health anxiety have resulted in many individuals paying more attention to their physical state and wellbeing. Concerns surrounding the virus could be promoting people to make more conscious health decisions in terms of eating, exercise, and smoking behaviours. Individuals may also be more likely to rest when they feel unwell or seek advice from 111, the UK's National Health Service emergency telephone number, regarding their symptoms.

If additional long-term, in-depth studies demonstrated that some of these factors contributed to an initial reduction in SARS-CoV-2 mortality, this would provide strong evidence regarding the efficacy of primary prevention strategies in reducing all-cause mortality. Healthcare professionals already recognize the importance of coughing and sneezing into tissues, hand washing and staying home when unwell to prevent the spread of disease. Should some of these factors be having a notable impact on mortality, then primary and public health workers would have good evidence to justify an increased focus on prevention.

It is important to note that whilst we have observed reduced mortality in the 'run-up' to the full SARS-CoV-2 pandemic, this may also have negative future consequences. It is possible that we may see a significant rebound in the number of deaths if mortality has simply been delayed rather than avoided. For example, primary prevention measures may have protected vulnerable individuals with co-morbidities from being exposed to infection, but they remain a vulnerable group who may become infected in the future. If a mortality rebound effect is observed, this may coincide with the peak demand for SARS-CoV-2 healthcare services. Overall, these data stress the need for careful ongoing observation and exploration of these mortality

trends. This assessment must take into account the SARS-CoV-2 peak, as well as the time periods prior to and following the pandemic.

Conclusion

This commentary describes a potentially important paradox in mortality rates during the early stages of the current SARS-CoV-2 pandemic. We have postulated some possible explanations for the observed data. We wish to make it clear that mortality figures reflect the early spread of SARS-CoV-2 in the UK, and do not provide any predictions on what is yet to come. The figures also do not indicate that measures put in place to contain the virus are excessive or inappropriate. The data suggest that careful observation of ongoing mortality rates and causes is needed. It is important to watch vigilantly for any rebounds in mortality that may coincide with the SARS-CoV-2 peak.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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