



# COVID pandemic and Lung cancer: challenges lead to opportunities

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We have had to do things differently. This is the overwhelming legacy of the current COVID public health crisis. The COVID-19 pandemic has impacted not only the availability of healthcare resources addressing specific pre-existing priorities – problems like lung cancer, chronic obstructive pulmonary disease and asthma but has also limited the ability and willingness of both our patients and the public at large to seek our help and interact with the healthcare system in ways once considered normal. Recent evidence suggests dramatic declines in routine preventive care and recommended cancer screening which while trending up as we have adapted to the pandemic remains far below levels seen the years before [1]. There has been modeling suggesting declining cancer diagnosis and high probability of presentations in later stages of illness [2].

Reallocation is a word that comes to mind when describing our current personal and work lives and the milieu of healthcare in general.

Readily apparent are the changes that we have made to cope with the acute needs generated by a novel viral disease, but we can only speculate on the long-term consequences these changes will bring to the approach and practice of medicine. There are many opinions and much speculation regarding the impact of resource reallocation. In time, we will come to know the good, bad, and ugly aspects of this disorienting moment.

What aspects of medicine do we know have changed? First, public access: the ability and willingness of the public to tap into traditional healthcare. This clearly varies geographically and thus with the system of healthcare delivery for a population in a given region. Recent reports of declining US life expectancy also indicate that not all communities are equally affected. Excess deaths as reported by the Center for disease control (CDC) were double and triple that for black and Hispanic people compared to white people in 2020 [3]. Healthcare in the United States is for the most part tied to employment. Unemployment peaked at 14.8% in April 2020, before declining to a still elevated level of 6.7% [4] in December 2020. The pandemic relief legislation, known as the The Coronavirus Aid,

Relief, and Economic Security act, provides coverage to uninsured patients with COVID-19. However, care for other medical conditions, including cancer, is not covered. So higher unemployment rates make healthcare access for non-COVID conditions, including cancer, more problematic. This is not a direct effect of COVID-19, but rather an indirect effect of COVID-19 which is mediated through the economic consequences of the pandemic. Europe and China, with varying degrees of more socialized healthcare systems, may have different experiences. We fear that unwillingness to be screened, diagnosed, and treated will have important effects on patient outcomes the world over [5].

It is therefore important to measure both the direct and indirect effects of COVID-19. While news agencies have followed and frequently reported the total number of cases diagnosed and the number of COVID-19 deaths, these numbers are noninformative. The total number of cases will of course be higher in larger countries. Developed countries with readily available testing will have higher numbers of cases as well. Lack of access to testing may lead to significant undercounting as well so comparisons between and within countries without sufficiently rigorous analysis has led to invalid conclusions. If perfect testing was available universally, then the real numbers that matter are the case rate (number of new cases per 100 000 population) and the attributable mortality due to COVID. But these numbers are very difficult to obtain, even when testing is readily available, because they depend on accurate attribution of the cause of death. Definitions of a

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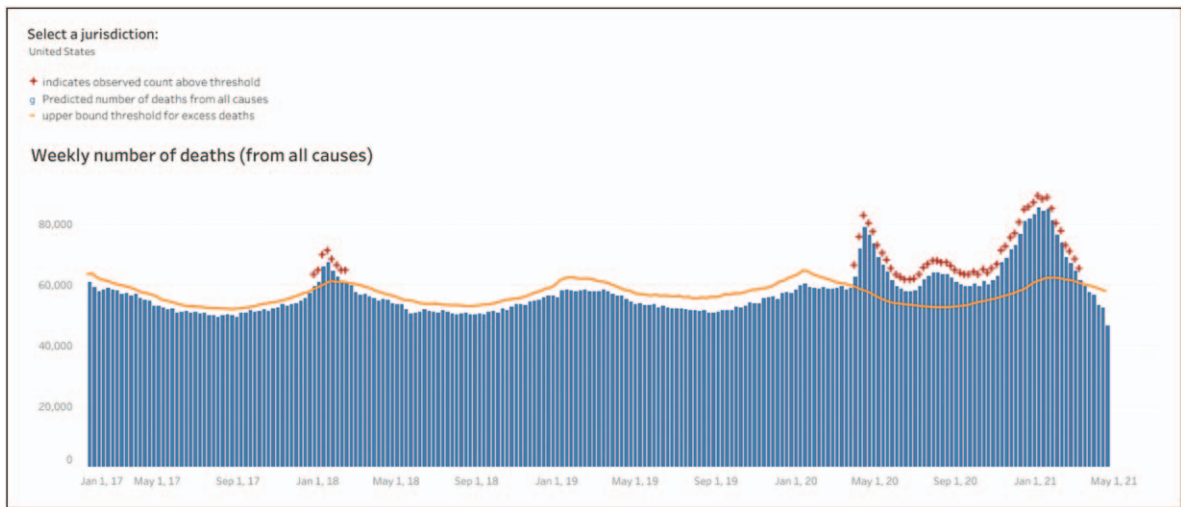


FIGURE 1. CDC excess mortality for the United States from 21 April 2021 [6].

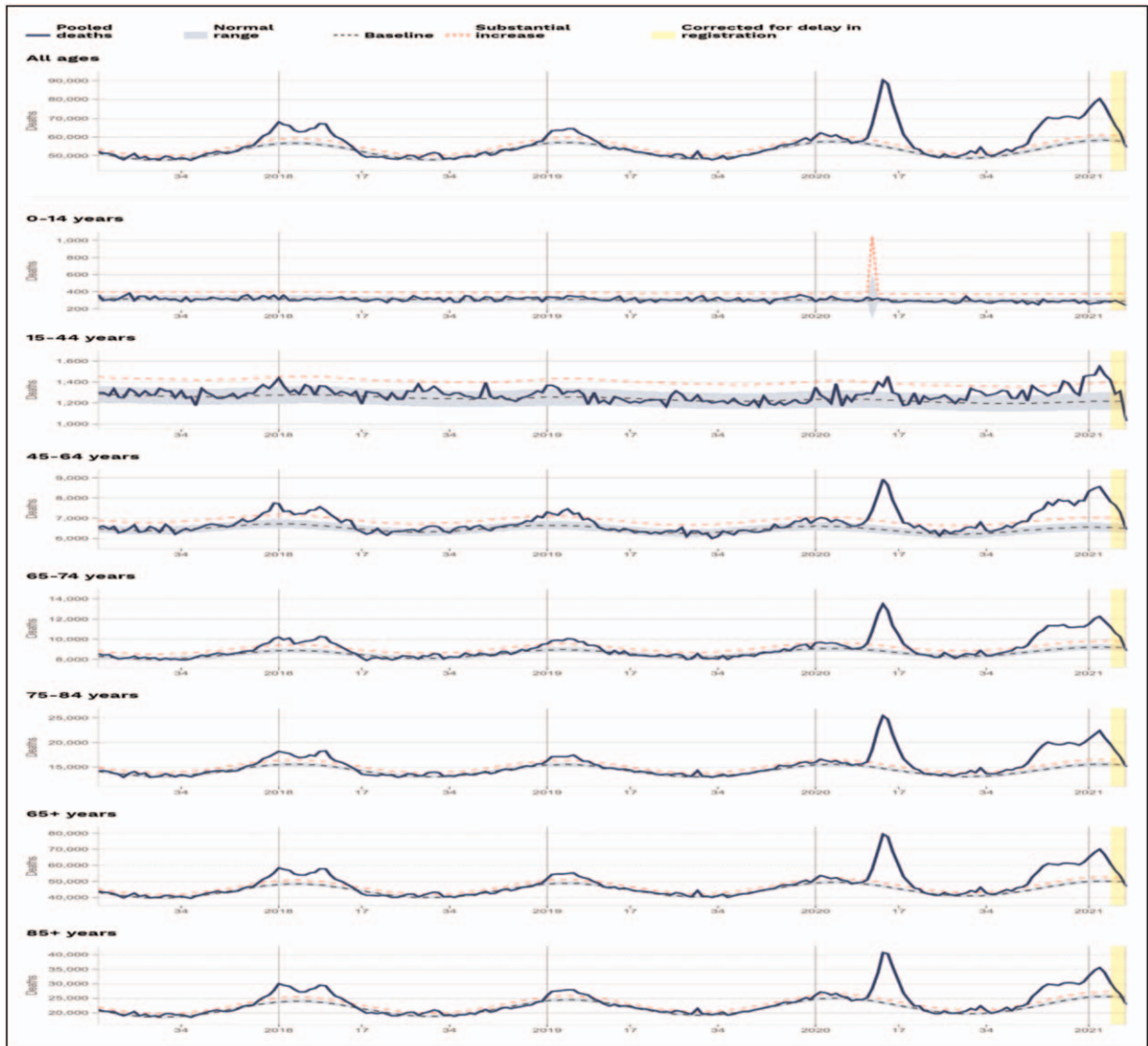


FIGURE 2. Euromomu excess mortality [7].

COVID death vary across states and countries. In addition, there are indirect effects of COVID that impact patients which need to be considered, and this is especially relevant to patients with cancer.

One method that is particularly useful to measure the impact of COVID is to measure excess deaths. Excess deaths provide a more complete picture of the aggregate impact of both direct and indirect effects of the pandemic as well being less subject to biases that can be introduced by underreporting and lack of access to testing. Excess deaths are typically defined as the difference between the observed numbers of deaths in specific time periods and the expected numbers of deaths in the same period. The expected number of deaths in the time period is estimated based on data from prior years when there was no pandemic. The difference in these numbers represents the aggregate of both the direct and indirect effects of the pandemic. Because the number of deaths does not depend on adjudication of cause, the measure is less vulnerable to differences in definition of what constitutes a COVID death. It can also be used in countries where there is little or no access to diagnostic testing. Finally, it captures indirect effects, like the impact of delays in non-COVID care as well as ‘beneficial effects’ like fewer motor vehicle accidents. The CDC provides a dashboard which tracks excess deaths in the United States [6] (Figure 1).

A similar methodology is available through the European Mortality Monitoring activity (EuroMomo) (Figure 2) [7]. EuroMomo covers 27 countries/regions, but in a few countries only a proportion of the country’s mortality is included. The population covered by EuroMoMo is approximately 304 million as of January 1, 2020. The primary limitation of this approach is that it cannot distinguish between direct effects of COVID and indirect effects and it cannot provide insight into the different types of indirect effects. So while this is a useful tool, it is just one of several tools necessary to evaluate the impact of the pandemic.

So how big are the indirect effects of COVID and in particular how large has the impact been on cancer care? As individuals and societies reallocate resources from potential future problems to basic survival in the present, significant declines in patient visits have been observed in both primary care and specialty clinics. It has been reported that nearly 45% of individuals have missed preventive care appointments during the peak of the pandemic. Routine cancer screening has significantly decreased as well, including the long-established screenings for malignancy of the breast, lung, and colon – the most lethal cancers in the US [8]. Patients are

reluctant to visit medical facilities, not only because of cost and inconvenience, but also because of the somewhat realistic fear of contracting COVID-19 within a healthcare setting. Providers, including pulmonologists and critical care specialists, have refocused their efforts to deal with the widespread effects of COVID-19, which we now know to be both acute and chronic. However, refocusing resources has an unintended consequence of providing less resources for preventive care as well as possibly delaying care, including cancer care. So focusing on COVID, while necessary, has hidden costs that need to be considered carefully in order to develop better policies for the future.

Recognizing the immediacy of the need to confront COVID-related acute illness, medical societies and institutions have provided guidance on how to approach lung cancer screening, the most common cause of cancer death, see Table 1. These approaches have significant common themes: delay and prolong when you can! [9]

**Table 1.** CHEST Expert panel recommendations on lung nodule management during COVID

Nodule type	Prepandemic	Pandemic
Lung cancer screening	55–74 years old current smokers or smokers who have quit in the past 15 years. Have at least a 30 pack-	Delay (variable depending on resources and patient comorbid conditions)
Lung RADS 1–2	Annual screening	Delay (variable depending on resources and patient comorbid conditions)
Solid nodule < 8 mm (malignancy probability < 2%)	6–12 months after nodule identified	Delay for additional 3–6 months
Lung RADS category 3 (1–2% probability of malignancy) Solid nodules > 6 mm but < 8 mm Part solid < 6 mm Ground glass > 30 mm	6 months after nodule identified	Delay for additional 3–6 months
Pure ground glass nodules	Screening variable depending on size and number of nodule	Delay for additional 3–6 months
Lungs RADS category 4A Solid nodule > 8 mm diameter (malignancy probability < 10%) Partial solid nodule with solid component 6–8 mm	3 months after nodule identified	Delay for additional 3–6 months

Table 1 (Continued)

Nodule type	Prepandemic	Pandemic
Solid nodule > 8 mm (probability of malignancy 10–25%) Part solid nodule > 8 mm	PET/CT, nonsurgical biopsy	Repeat CT 3–6 months after nodule found
Solid nodules > 8 mm (malignancy probability 25–65%)	PET/CT, nonsurgical biopsy	PET/CT, nonsurgical biopsy
Solid nodule > 8 mm (malignancy probability 65–85%)	PET/CT, nonsurgical biopsy	PET/CT, nonsurgical biopsy
Solid nodule > 8 mm (malignancy probability > 85%)	Surgical resection Stereotactic radiotherapy	Surgical resection Stereotactic radiotherapy

Lung RADS, lung imaging reporting and data system; PET, Positron emission tomography.

While guidance is certainly warranted, it should not be accepted blindly and there is no guarantee that following these guidelines does not have hidden adverse consequences. The longer term impact of these recommendations is unclear and warrant careful analysis. There is the distinct possibility that some of the excess deaths observed are due to excess lung cancer deaths, which are the consequence of delays in care with the result being more patients presenting with more advanced disease. Alternatively, lung cancer outcomes may remain similar. It is important to know what the hidden consequences of these policies are, because the knowledge gained may point the way to more cost-effective and efficient protocols in the future.

It has been said that the pandemic has accelerated changes in healthcare practice that were already underway. The shift from in-person visits to telemedicine has been widespread and will likely be long-lasting, as the value of remote care is studied and the benefits (and harms) of such care comes into focus. The pandemic provides a similar opportunity when it comes to lung cancer care. It is a natural experiment, which allows us to ask and possibly answer the question, what is the magnitude of the effect of a more ‘watchful waiting approach’ to lung cancer screening and treatment?

Few of us would have anticipated such a profound change in our personal and professional lives as has occurred in the last year during the COVID 19 pandemic. While a pandemic had been vaguely anticipated by epidemiologists, the reality of living through one has been more challenging, both

personally and professionally, than most of us could have ever imagined. The future of healthcare remains foggy, but slowly we will emerge from the grips of COVID-19. In 2021 and beyond, we must make up for lost time by renewing our commitment to the care that kept our patients healthy in the decades before this international crisis as well as keeping an open mind to the lessons learned from the accelerated innovations triggered in response. Part of that commitment to care is to carefully analyze the impact of pandemic policies on outcomes, especially in lung cancer patients. It is most likely that some policies were effective, some were harmful, and most had mixed effects, with inherent trade-offs being required. Quantifying these trade-offs and synthesizing them into a sort of lessons learned list is a necessary step so that more effective policies can be applied in the future. This will allow healthcare professionals to deal more effectively with future pandemics, so that both direct and indirect effects can be mitigated.

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### Conflicts of interest

There are no conflicts of interest.

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