

What can health systems learn from COVID-19?

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1. Introduction

Coronavirus disease 2019 (COVID-19) is a severe respiratory disease from SARS-CoV-2. The first official cases were noticed in December 2019 in Wuhan, China, and spread fast causing a world pandemic. All countries in the world have been somehow hit either directly or indirectly by the effects of the disease and faced significant loss in terms of human lives, gross domestic product (GDP) and jobs.

At the end of the third quarter of 2020, COVID-19 has affected more than 28 million people around the world of which 70% in Western economies. Europe totaled 4.796 million cases with Spain (566,326), United Kingdom (365,1789), France (353,986), Italy (286,297) and Germany (259,428) in the top five positions¹. The total registered deaths for coronavirus worldwide and in Europe were 917,417 and 225,494 with a Case/Death Fatality (CDF) ratio of 3.2% and 4.7% respectively. Among the top five positions, the highest CDF ratio at the country level has been observed in Italy (12.4%) and UK (11.4%) while the lowest in Germany (3.8%). The most hit country worldwide is United States, counting 6.4 million total cases, 192,612 deaths and a CDF ratio of 3%¹.

Governments have been operating in a context of high uncertainty and have been struggling with difficult trade-offs given the health, economic and social challenges COVID-19 raised. Beyond the health and human tragedy of the coronavirus, it is now widely recognized that the pandemic triggered the most serious economic crisis in a century.

Healthcare systems organization and governance are fundamental assets in public health emergencies, but much can be done to improve their effectiveness and efficiency. We believe that COVID-19 did not create new problems but violently brought to the surface many of the challenges healthcare systems have been facing for a long time.

2. Health is Wealth

The ancient Roman adage “health is the greatest wealth” has never been so pertinent. Countries worldwide had

enforced tight restrictions on movement to decelerate the fast spread of COVID-19 pandemic, bringing the economic activity to a near-standstill. The resulting economic damage is already conspicuous and consists in the largest economic shock the world has experienced in decades.

The UN Labor Agency had estimated that Coronavirus has costed 400 million jobs worldwide² in the second quarter of 2020, and a 5.2 percent contraction in global GDP in 2020 - the deepest global recession in decades³. In the EU, GDP and employment losses were respectively estimated in 11.7% and 2.6% by Eurostat; these were by far the sharpest declines since time series started in 1995⁴. UK's GDP contracted by 20.4% compared to first quarter, the highest among the top 5 countries previously considered. Spain followed with a 18.5 percent contraction, France with 13.8%, Italy with 12.8% and Germany with 9.7% GDP loss⁵.

Covid-19 has exacerbated inequalities. People on low incomes are paying the highest price. During the lockdown, top-earning workers were on average 50% more likely to work from home than low earners. At the same time, low-income workers were twice as likely to have to stop working completely, compared to their higher-income peers⁶. Women have been hit harder than men, with many working in the most affected sectors (e.g. tourism) and disproportionately holding precarious jobs. Public support has been unprecedented in scale and scope. In Europe, the European Commission passed a recovery plan, “Next Generation EU”, amounting to 750 billion euros to offer some relief to EU Member States hit by the virus⁷. In US, already in March 2020, the Coronavirus Aid, Relief, and Economic Security (CARES) Act was passed by Congress with over \$2 trillion to protect the American people from the public health and economic impacts of COVID-19⁸. The Marshall Plan pales in comparison to COVID-19 recovery plans.

As a matter of fact, development, growth and wealth are clearly affected by health. No matter how obvious it may be to the general public, putting population health and healthcare systems at the core of government actions cannot be taken for granted.

Many European healthcare systems are of Beveridge (e.g. UK, Italy) or Bismark-type (e.g. Germany), mostly

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Box 1. Clinical and economic impacts of delayed follow-up on heart failure patients

We studied the case of patients with heart failure (HF) and estimated the clinical and economic implications of delays in their management due to Covid-19 through data published in the literature. A systematic review was conducted in May 2020 through Pubmed database that identified 2,362 papers reporting mortality data of patients with and without cardiological follow-up. Of these, 4 studies focused on mortality rates at 1 year. These studies considered different durations of patients' follow-up depending on the period spent after the first hospitalization for HF (from 30 days to 1 year). We performed separate meta-analyses (random-effect models) to combine data for patients with and without timely cardiological follow-up. Mortality at 1 year was 19.3% (CI95% 17.1-21.6%, $I^2=85%$) and 27.5% (CI95% 21.8-33.6%, $I^2=97%$) for the two groups, respectively. The healthcare spending of HF patients in their last year of life, including DRG tariffs and cost of drugs, was quantified in 10,238€ per patient³². Taking into account only the difference in mortality, the additional cost for the management of a patient with HF with non-timely follow-up can be estimated at 840€ (range 20-1,689€) over a time horizon of 1 year.

publicly funded and, although to different degrees, both are based to a certain extent, on values of equity, solidarity and universalism⁹. In 2015, Europe was at the top of the world for its Healthcare Access and Quality Index. In particular Western Europe reached a score of 86.80, that increases at 91.05 for Northern Europe¹. Compared to other countries worldwide the difference is significant. United States finally overtook the threshold of 80 points in 2010 and reached 81.30 in 2015 but it classified at the bottom of Bloomberg Ranking for Healthcare Efficiency in 2018¹⁰.

Quality and performance of healthcare systems need however to be maintained. Cost containment pressures and austerity measures adopted in recent years have had a significant impact on the amount of resources available for healthcare. These trends were particularly evident in Italy, UK and US, the three countries that ranked among the first in number of deaths from COVID-19 in the world. At present, Italy spends less on healthcare than most other western European nations: at €3,428 per capita, remains well below Germany's €5,986 per capita¹¹.

The United Kingdom (UK) has likewise implemented austerity measures over the last 10 years, employing contractionary measures that, though the National Health Service (NHS) budget was not reduced, kept increases in funding below previous levels. Public health expenditure has also been declining in the US. Funding for core emergency preparedness, through the Public Health Emergency Preparedness (PHEP) Cooperative Agreement Program of the Centers for Disease Control (CDC), largely declined from \$940 million in 2002 to \$667 million in 2017, compromising state and local health departments' preparedness for emergencies.

The current epidemic has demonstrated that debilitated healthcare systems can be brought to the brink of collapse with unrecoverable consequences for the entire society.

3. What have we learned?

The COVID-19 pandemic has spotted the areas of improvements of the healthcare systems. The mortality rate of COVID-19 patients is much higher in those patients with comorbidities such as cardiovascular diseases and obesity¹². Inciardi *et al.* found—for instance—that COVID-19 patients

with concomitant heart disease have a higher mortality rate compared to non-heart patients with COVID-19 pneumonia (36% vs. 15%)¹³. Furthermore, COVID-19 has severely delayed treatments to non-COVID-19 patients who have experienced worse health outcomes than they had been following the planned therapies,¹²⁻¹⁵ with also economic implications (Box 1).

The first lesson is to invest more in prevention. In most European countries preventive care expenditure averaged 2.7% of current healthcare expenditure in 2017, and, although UK and Italy were placed at the top respectively with 5.2 and 4.2 percent¹⁶, investments in prevention are still too low. Effective prevention of chronic conditions would result in more, and healthier populations at lower risk of severe prognosis in case similar, future epidemics showed again. It has been said that prevention is typically being allocated a less than sufficient part of the healthcare expenditure mainly because its benefits on the population are often too distant in the future and less appealing for people (i.e. voters) who, instead, tend to reward the incumbent party for delivering disaster relief spending, but not for investing in disaster preparedness spending¹⁷. As a matter of fact, in every country the amount of resources spent on health and healthcare is a result of complex interactions between a range of institutional, social and economic factors, as well as political and cultural values. However, a greater use of evidence in policymaking could counterbalance the political orientation towards voters' expectations. COVID-19 pandemic had a strong impact over young generations, who internalized the many worries regarding prevention and health. Health is then expected to be another important theme, like environment, to encounter young people's expectations and leverage their votes.

The second lesson concerns empowering primary and community care.

When COVID-19 spread, there was no time to re-design care services, so those regions that already routinely used territorial services converted them to manage infected patients. Areas like Scandinavia, the Catalan region of Spain and the Veneto region of Italy had more robust models of primary care and were able to keep patients at home by organizing different forms of remote monitoring, thus

alleviating the pressure on hospitals and, at the same time, providing effective care to home-based patients. Furthermore, COVID-19 experience shown the importance of effective public health services. Over time, public health services have become disconnected from the gamut of services provided at the single patient level, reducing the level of coordination. The case of the first patient intercepted in Codogno (a town just south of Milan in Lombardy) is emblematic: the patient was identified in the E.R. of the local hospital when his clinical profile gave pause to the staff, who overrode protocol and tested him for the virus. Instruments centered on the single patient risk being overlooked, like a drop in the ocean, while community interventions (which failed not only in Italy, but elsewhere) are tailored to address the potential target, initiating sentinel instruments for groups most at risk and, most importantly, moving outside the hospital incubator. To move toward community intervention requires reconnecting the public health and hygiene mandate with that aimed at guaranteeing individual patient services through large scale managerial action.

The third lesson regards the psychological effects of the pandemic on the healthcare personnel.

The pandemic due to COVID-19 showed an overwhelming psychological impact on medical professionals involved in the care of COVID-19 patients¹⁸, with the highest prevalence rate of post-traumatic stress disorder (71.5-73%) compared to other outbreaks¹⁹. Clinicians in hospitals found themselves in the situation of having to manage a multitude of scared patients who were looking for treatment, reassurance and a point of reference given the limitations imposed to the community care, thus creating stressful circumstances. In this situation most hospitals were not prepared to manage such an intense and sudden request of hospital beds dedicated to the treatment of severe respiratory failure and converted other wards to the treatment of infected patients. In Northern Italy, cardiological ICUs were converted to the treatment of severe respiratory failure caused by viral interstitial pneumonia and this has led to outstanding changes in the clinical routine²⁰. Moreover, the management of patients' end of life was particularly complex and painful, since doctors had to face dozens of deaths per day, making it impossible to psychologically prepare the family and to communicate the death appropriately²¹.

The assessment of psychological effects on the healthcare personnel and the promotion of coping strategies, resilience and the organization of support services could mitigate the negative effects of epidemic/pandemic outbreaks on this group of professionals.

The fourth lesson concerns investing in digital health.

No matter how diverse containment and mitigation strategies have been across countries, a common development fostered by the pandemic in almost all European countries has been renewed reliance on digital health, with more or less efficient strategies implemented at various levels and directed at different stakeholders^{22,23}. Rapid implementation of social distancing measures and

rescheduling of elective procedures has led healthcare providers to resort to digital health applications to (at least partially) grant access to virtual consultations and remote visits and monitoring²⁴. As a result, in just three months, there has been an unparalleled surge in digital health adoption, with a general scale-up of telemedicine²⁵, and an up to ten-fold increase in the number of online consultations reported in the United States²⁶. However, the general unpreparedness of healthcare systems to digital health has resulted in too many COVID-19 and chronic (non COVID-19) patients who have been left unmonitored and not cured for the entire period of lockdown and even longer, till waiting lists will be absorbed by the hospitals and healthcare centres²⁷.

Digitalization can however also widen inequalities between patients if not effectively governed since it requires digital and internet access, that involve not only suitable devices, but also basic IT skills. While the economic incentives can be set by specific governmental programs, there are many barriers to internet access, such as age and education²⁸. The European Commission Digital Economy and Society Index (DESI) 2020²⁹ on Use of Internet Services across Europe showed a huge digital divide. So contextually to the promotion of digital health, we need to reduce the digital divide by setting a complete program of investments aimed to improve the average digital literacy of patients to effectively exploit the potentials of digital health, such as health applications.

The fifth lesson concerns the study designs to generate clinical evidence. Traditional randomized clinical trials often do not respond effectively and efficiently to specific cases and are too slow to provide robust but quick results to decision-makers. Adaptive trials can fit better in these cases³⁰.

An adaptive design, also called flexible design, allows modifications to the trial and/or statistical procedures after its initiation without undermining its validity and integrity³¹. The purpose is to make clinical trials more flexible, efficient and fast. In the context of testing different treatment strategies for COVID-19 (e.g. remdesivir, hydroxychloroquine or chloroquine, lopinavir and interferon), this means that 1) a trial may be stopped at an early stage in case of treatment success or failure, 2) a treatment may be replaced with another, 3) doses and treatments durations may be changed during the trial, 4) patients' allocation may vary among different trial arms and 5) patients most likely to benefit from the treatment may be selected for the investigation. In a situation that is extremely challenging, where drugs are tested against an unknown condition such as COVID-19, also clinical research should endorse more innovative designs in order to generate the best evidence to support clinical decisions.

Conclusions

COVID-19 has caused the worst economic crisis ever of the planet. But it also exposed the fundamental relationship between the human component, production and technology. As more and more people were quarantined, activity slowly ground to a halt, sector after sector. Without

people, or better to say, without *healthy* people, society and the economy cannot work.

Healthcare systems are meant to guarantee health protection and health improvements but too often are under-financed, under-staffed, stressed and are placed at the bottom of the political agenda. The Next-Generation recovery fund released by the EU is very generous and represents a great occasion we hope Member States will not waste.

COVID-19 also showed that in a global world, where people can travel from one side to another side of the planet in less than 36 hours, health emergencies must be tackled through global, harmonized and coordinated efforts. The role of the European Union in these cases is of paramount importance and would need to be further strengthened in order to improve the equity of access to effective technologies to all EU citizens (e.g. procurement of future COVID-19 vaccines); to quickly help orient Member States' actions by evaluating data and evidence whenever can be representative and applicable to different contexts (e.g. use of masks, contact tracing systems); and to propose coordinated policies vis-à-vis other jurisdictions and international organizations.

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