

Collateral damage during the attention for COVID-19 pandemic

El daño colateral de la atención de la pandemia de COVID-19

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Abstract

Throughout history, pandemics have had a major impact on humanity. The measures used to combat them cause collateral damage. During the COVID-19 pandemic, the actions taken to reduce the exposure, the number of infections, and the case fatality rate focuses on reducing mortality; however, the collapse of the health system can cause an even greater number of deaths. At the same time, both medical personnel and patients are affected by the economic slowdown and the “effect of negativity”. In this review article, the different tools available for pandemic control, their development in a historical context, and how they may impact risk stratification for vulnerable patients (elderly, patients with chronic degenerative, and oncological diseases) were analyzed.

Keywords: COVID-19. Collateral damage. Health-care system impact.

Resumen

A lo largo de la historia, las pandemias han tenido un gran impacto para la humanidad. Las medidas utilizadas para combatirlas causan daño colateral. En la pandemia por COVID-19, las acciones generadas para disminuir la exposición, el número de contagios y la tasa de letalidad conllevan un enfoque en la reducción de la mortalidad, sin embargo el colapso del sistema de salud puede provocar un número aún mayor de muertos. A su vez, tanto el personal médico como los pacientes se ven afectados por la desaceleración económica y el “efecto de la negatividad”. En este artículo de revisión se analizaron las diferentes herramientas para el control de la pandemia, su desarrollo en un contexto histórico y como impactan en la estratificación del riesgo para pacientes vulnerables (ancianos, pacientes con enfermedades crónico degenerativas y oncológicos).

Palabras clave: COVID-19. Daño colateral. Impacto en el sistema de salud.

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“Whoever fights monsters should see to it that in the process he does not become a monster. And if you gaze long enough into an abyss, the abyss will gaze back into you.”

F. Nietzsche (*Beyond Good and Evil*)

Both 1918 flu and AIDS pandemics were devastating for humanity. At present, beyond health issues, we are living a critical stage. Crises are cyclical, rare, and temporary and can be explained by their causes. If they become permanent, they will turn into the cause that can explain the rest.

In 2020, a new virus abruptly broke social, economic, political, and ideological order, as well as the feeling of security within our society. It would seem that globalization rushed for “all that is solid to melt into air”; that solidity that was granted to us by security¹.

The term “pandemic” means that the all people are included. The paradox is that social isolation is part of solidarity.

The attack on New York’s Twin Towers is a classic example of a “black swan”. An event of that nature is surprising (to the observer), has a huge impact (usually negative), and is unpredictable. Although data are available, they are not accounted for to mitigate risks. These extreme events can be predicted to a certain extent. The COVID-19 pandemic caused by SARS-CoV-2 is not a black swan, but rather a white swan, since it had a huge impact and was predictable and likely to occur².

However, when an event has a large size or effect magnitude (“a king”), it shares a single origin (“a dragon”), which is related to others within the same system. This theory is known as the “dragon king”.

In non-linear and complex systems, mechanisms depend on positive feedback, its inflexion points, bifurcations, and phase transitions, which together tend to amplify the occurrence of the event to extreme levels. Understanding the system and monitoring its dynamics will allow to predict its occurrence³.

If we make claims about the unknown based on the properties we assume as the known, we will fall into the classical problem of induction: (1) the lower the probability for an event to occur, the larger the sample size must be for making inferences and (2) the lower the probability, the larger the error of estimate².

Errors on probability estimation are important when a large impact is considered. Science tries to put confusion in order by removing uncertainty. It has been proposed that, if we have a normal (or Gaussian) probability distribution, then we will have sufficient

data for making inferences. But what if distribution is not symmetric?²

Although we are surprised by the magnitude of effect, a global ecological catastrophe or the COVID-19 pandemic could be regarded as a “dragon king” (double bifurcation), where precursors could be detected given that they showed signs. Other examples are nuclear accidents, financial crash of markets, oil prices collapse, natural disasters, etc.².

One characteristic of this phenomenon is its positive feedback. In human dynamics, herd behavior (“herding and mob” mentality) occurs. That is, panic during a stampede (crowds, stock markets, etc.) will cause more panic, which will make for the cattle to run more and more, and so forth^{2,4}.

“A posteriori” decision-making is dependent on available data. In risk management, statistical misuse and reliance on probability based on current methods can have serious consequences. The lower the probability, the more consequential the impact of error.

Despite the huge impact of extreme events, we fail to anticipate them, either by ignorance or cognitive biases, poor model selection, misuse of (Gaussian) distributions, which will underestimate the effect. The “dragon king” theory, by definition, employs outliers and poses a challenge for predicting risk.

Given the need to return to our daily activities and the risk of COVID-19 infection (non-negotiable), we must negotiate between risk compensation and efficiency. If the “dragon king” prediction is successful for adapting ourselves to the new circumstances, we will be able to defend the system (gain), by designing resilience and monitoring of risks based on the frequency and severity of the disease for decision-making.

Implemented measures and their consequences

Infectious diseases, throughout our history, have been the greatest cause of mortality. The goal of implementing harsh and immediate measures during a pandemic is to avoid a late infection peak. Failure to adopt them will result in millions of infected individuals, many of them hospitalized, who will require intensive care or die due to the health system collapse. Measures can be implemented at a reasonable cost for society⁵.

Governments chose one of the following options to deal with the pandemic, based on their economic and political conditions, and considering the economic repercussions^{5,6}:

- **Doing nothing.** The risk of this strategy is to have a larger number of infected individuals, collapse of the health system, a higher case fatality rate and mortality involving about 10 million people. One of the assumptions of this strategy is that herd immunity would be obtained.
- **Mitigation strategy.** It is not about containing the pandemic, but about slightly flattening the curve. It is based on social distancing while a vaccine is discovered and hoping the virus will not mutate too much.
- **Suppression strategy.** It is the application of harsh measures for rapid control of the epidemic. Among them, social distancing, gradual and controlled, and subsequent resumption of social and economic life. This strategy seeks to buy time and reduce the number of cases for the health system not to be impacted.

The latter strategy is described as “the hammer,” acting quickly and aggressively, and “the dance”, referring to the period between “the hammer” and the appearance of a vaccine or treatment, since harsh measures cannot be permanent and will have to be adjusted, with social distancing being tightened or not. Most did the right thing: “the hammer” was the right decision, since it gave time to reduce the spread of the epidemic and figure out what to do during “the dance” to avoid a second outbreak⁶.

Infectious diseases mathematical modeling can improve the prediction: what conditions are necessary for the outbreak? Which population will become infected? Is vaccination protective? Cladistics, under the theory of evolution, is the best approach, since it considers genetic variants and their interaction with the environment for understanding behavior. With this, we can predict the effects of a second or future waves, classify organisms and predict that which has not yet been observed⁷.

Collateral damage

Strategies against the COVID-19 epidemic aim to reduce exposure, the number of infections, the case fatality rate, and health system collapse. In this scenario, mortality figures are focused on direct deaths from coronavirus. However, if the health system collapses, many will die from other diseases.

In addition to the slowdown in economic activity, which can have serious consequences, an increase in anxiety and depression has been observed as a consequence of the “negativity effect”; that is, our

brain is under continuous media barrage and generates an atmosphere of catastrophism. This situation can trigger undocumented, uncontrolled, or undiagnosed psychiatric problems, as well as more aggressiveness, suicide attempts, substance or drug use, and isolation.

An editorial warned about a tsunami of collateral damage from COVID-19⁸. The article emphasized that it is essential for damage to be minimized in vulnerable patients and in those at higher risk of death associated with chronic non-communicable diseases. But what will happen if the entire health-care system collapses because of coronavirus patients? Surely, others will also die from other diseases.

One of the biggest global problems is the prevalence of obesity (body mass index > 30 kg/m²), which in the American population is 33% and in Mexico 32% in people older than 20 years, and that, in addition, has been associated with metabolic syndrome^{9,10}.

In low- and middle-income countries, chronic non-communicable diseases (cancer, cardiovascular disease, stroke, and diabetes) outnumber infectious diseases as causes of death. This epidemiological and demographic transition has been driven by economic development (human development index), attributable to the environment or “Westernization”. This is a consequence of demographic changes (population aging and growth), exposure to risk factors such as smoking and alcohol consumption, and decrease of infections as a cause of child mortality¹¹.

The decision to defer or reschedule, for example, colonoscopies during the COVID-19 pandemic in subjects with a positive fecal occult blood immunochemistry test, is based on: (1) patient selection (urgent/elective) based on morbidity and mortality from the underlying disease and COVID-19 infection, and (2) risk reduction (patients and health-care personnel) through the use of personal protective equipment. Screening programs and scheduled colonoscopies of subjects with a positive fecal occult blood immunochemistry test (outside national programs) were considered of low priority (postponable)¹².

What will be the effect size of postponing colonoscopies due to the pandemic? What will be the impact on the burden of care? Will it negatively influence colonoscopy findings? Endoscopic activities resumption will be complex and will represent a real challenge, since it is difficult to establish a probable date for returning to normality. Rescheduling and postponing colonoscopy will surely have a negative impact on the findings and burden of care if programs are not resumed soon. However,

endoscopic activities resumption will be complex, and it is difficult for a date for it to be established. In addition, it should be borne in mind that this population (older than 50 years of age), which attends these procedures in a larger percentage, has a higher risk of comorbidity.

On the other hand, there are other factors that can increase mortality associated with neoplastic disease and infection, such as the increase in the population pyramid and chronic non-communicable diseases. In Uruguay, for example, where there is a high prevalence of colorectal cancer, the reported prevalence of overweight ($> 25 \text{ kg/m}^2$) and obesity (30 kg/m^2) is 64.5 [59.8-69.2] and 28.9 [23.7-34.4], respectively, with a risk increase¹³. In addition, the risk of mortality from cardiovascular disease between 50 and 79 years of age is 41%¹⁴.

The pandemic poses two fundamental problems with regard to cancer patient safety: (1) hospital visits increase exposure to infection, and (2) treatments can predispose to more harmful COVID-19 effects. Should they risk being exposed to SARS-CoV-2 in order to receive cancer treatment? Available evidence is limited, but it suggests that COVID-19 symptoms are probably more severe in cancer patients than in those without cancer.

To ensure safety and reduce transmission risks, health systems recommend, in most cases, to postpone or defer treatments. However, with more new COVID-19 cases, it is urgent for management to be prioritized. There is evidence that postponement may adversely affect outcomes. For example, there is a 16% increase in the risk of death for each month of delayed radiotherapy for patients with head-and-neck cancer (risk ratio [RR]: 1.16; 95% confidence interval [CI]: 1.02-1.32)¹⁵. On the other hand, postponing chemotherapy in colorectal cancer (hazard ratio: 1.14; 95% CI: 1.10-1.17 for 4 weeks) and breast cancer (RR: 1.08; CI 95%: 1.01-1.15 for 4 weeks) is associated with lower survival^{16,17}.

Postponing cancer treatments could entail risks, although they should be considered according to the magnitude of potential benefits, the impact of waiting times on outcomes, and patient and system competing priorities. Throughout the pandemic, it will be important to support emotional well-being of the patient (psycho-social support). Decisions will be based on the precautionary principle, evidence-based priority of triage, and fluidity to recognize how local contexts change¹⁵.

For health systems that anticipate COVID-19 cases, but with no confirmed cases, continuity in most treatments, while considering postponing those with no anticipated adverse effects on oncological response

(basal cell carcinomas or low-risk prostate cancers), is reasonable. Deferring follow-up appointments for months seems reasonable for most patients under these circumstances. Some hospital visits could be replaced with "virtual" evaluations (video conferencing or phone). This approach seeks to balance outcomes (patient) and system capacity when quarantines, isolations, and anticipated hospitalizations affect the capacity to provide cancer care. These measures guarantee patient safety by reducing the risks of transmission to a vulnerable population¹⁵.

Lack of access to medical care or closure of facilities, economic difficulties, lost or delayed appointments, treatments and procedures, home confinement by express orders, and fear of becoming infected, are causes of collateral damage in the progression (exacerbation) of chronic non-communicable diseases and preventable mortality. If we do not anticipate the consequences of this new curve, we will inevitably fail by neglecting, ignoring, omitting or deferring health-related programs (health education dissemination, prevention, timely detection, diagnosis, and treatment) that address chronic non-communicable diseases, which will have a negative impact on mortality and on the burden of care for the system.

In the United States of America, the probability of SARS-CoV-2 infection is 75-80%, with an estimated mortality of 5% (approximately 10 million people) considering the spread of the virus. Every year, there are 4 million people admitted to intensive care units and 500,000 (around 13%) of them die. Mortality could be close to 80% without access to intensive care units as a collateral damage. It is essential for a collapse of the health system to be prevented by establishing virtual consultation⁸.

Risk stratification in chronic diseases

Patients with chronic non-communicable diseases represent a highly heterogeneous group with different risk levels. We must specially evaluate those who have not received care (diagnosis) or who have interrupted treatment, since this considerably increases the risk of hospitalization and death from COVID-19 or from comorbidity. Once the risk has been identified, socioeconomic factors (income, savings, employment/unemployment, economic difficulties) and clinical factors (profile or severity, disease control, treatment adherence, laboratory, or imaging requirements) have to be considered.

Advanced analytics and artificial intelligence enable risk stratification taking socioeconomic and clinical factors into

account. These measures can be helpful for keeping vulnerable patients healthy, safe, and out of hospital¹⁸.

We must ensure remote scheduled consultation (specialized electronic patient consultation) and home visits to ensure adherence and treatment regimens, in addition to implementing medication supply with remote monitoring.

Access to essential end-of-life palliative care will be limited during the pandemic. Isolation and suffering will increase in palliative care patients and in those who are grieving. Care providers, including private facilities, will require additional human and financial resources. Online training is available to provide some types of care. Smartphones and telemedicine can facilitate home activities supported by health professionals and volunteers without physical contact¹⁸.

A study carried out in California reported a lower incidence (events per 100,000 person-weeks) of acute hospitalization for myocardial infarction after the first cases of COVID-19 when comparing two periods (January 1 to March 3 vs. March 4 to April 14); these findings were similar to those reported in Italy¹⁹.

There are procedures that cannot be deferred because the risk of mortality is increased, such as aortic valve replacement in patients with heart failure, in whom the mortality rate is 23% (at 6 months) if the intervention is delayed.

Although surgical treatment of COVID-19-unrelated disease is necessary, non-urgent procedures have been reduced due to the need to redistribute health-care resources to meet the massive medical needs projected by COVID-19. The decision to perform necessary and urgent procedures requires the inclusion of factors that should be evaluated (resource limitations, risk of SARS-CoV-2 transmission for providers and patients, etc.).

The authors described a scoring system that systematically integrates factors to facilitate decision-making and procedures classification, and weighs individual risk against the ethical need to optimize public health concerns. The practical utility is that the strategy allowed to identify the risk, detect the impact of delay of the procedure on successful treatment of the disease, or of technical and safety risks when deferring it²⁰.

These unmet needs represent a serious risk for those who are the most clinically vulnerable in our society. The care of the COVID-19 pandemic should seek as little collateral damage as possible. We conclude with a phrase about the experience of modernity: "all that is solid melts into air, all that is holy is profaned, and man is at last compelled to face with

sober senses his real conditions of life, and his relations with his kind".

Conflicts of interest

The authors declare that there are no conflicts of interest.

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