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Letter to Editor

Simple Coronavirus Containment Measures -

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The coronavirus pandemic went out of control, and I, as a Virologist, accept my part of guilt. Not only we did not forecast this emerging disease, we were also unable to provide effective guidelines for infection containment. We had 4 months to discover how the virus was propagating, and we are still missing the main clues.

As soon as this pandemic is controlled, we need to establish an international pandemic prevention institution. All the new viruses will need to be isolated, grown, analyzed, and assessed for virulence, transmission conditions, sensibility to antiviral agents and pandemic potential. Hopefully, we will not make the same error twice.

I now see many gaps between the official knowledge and the public health actions, and I will suggest a few scientifically sustained actions that could help our fight against the virus. For instance, we know that air trapped in buses or trains can keep deadly virus for hours, but still the transportation runs with closed windows almost everywhere. Moreover, I suggested to make a hole in the back window of vehicles, because even with open windows, the back of the vehicle is a dangerous virus container. Air circulation could improve the vehicle safety regarding virus transmission. Every proposal in my list can be further analyzed by economists and statisticians, to show harder data and help convince the public health authorities.

We have data supporting the effectiveness of air purifiers in virus removal, but we still do not see them in public places. In some cases, it is impossible to avoid people concentration or frequent circulation, and HEPA air filters could make the place safer. This could apply to offices, workshops or public transportation (including elevators). The companies that manufacture respirators for intensive care units are rushing to increase production, but this is not the case of simpler air purifiers.

Mouth covers are reluctantly becoming part of our clothing and appearance, but some people are reluctant to use them. And thus they miss an important barrier against viruses. Transparent mouth masks are equally effective than opaque fabric mouth covers. They will soon gain acceptance, because they improve communication. Also, common mouth masks can be easily worn by criminals to hide their faces. It seems logical, but for some reason the change is taking a long time. Even if the transparent covers cost a bit more, and the campaign to promote them also costs, the increased adoption of this protective device will mean a positive reward.

Another experiment that I suggest is the effectiveness of the hood cap head cover compared to the simple mouth cover. The mouth cover leaves plenty of space for air leakage, while the full head cover does not. The air trajectory for mouth covers is maybe 2 inches, while the head cover has maybe 10 inches. The anti-infection capabilities of both devices needs to be measured. Maybe the world is doing things wrong, and a simple experiment can guide us to the right prevention

method. I still have not seen transparent hood cap head covers, but I am sure it is feasible to make them.

Virology is currently focused in the molecular mechanisms, but I still see room for animal experiments. We see patients with very different responses to coronavirus infections. Some have asymptomatic infection, most have mild symptoms and a few make an excessive and dangerous immune reaction.

The case fatality rates are different among countries. In some countries we can attribute a high fatality rate to poor medical systems, but in other countries like France or Italy there is a very good health system and also a high mortality rate. In these cases we need to blame the virus strain virulence. Either that, or there is some deadly virus/host combination. Animal experiments are the best option to establish the virulence of viral strains. In some cases the virulence can be related to genetic mechanisms or viral proteins, but this is not as simple as to inject a few rodents.

The high number of asymptomatic virus carriers seems to be an important factor in viral propagation. It is necessary to run animal experiments to characterize new viruses with risk of causing and emerging disease. After we know the animal (hamster and others) response, we can find the genetic correlate and hopefully design tests to define human host susceptibility. Genetics can define the mechanisms involved in animal and human responses.

I have seen many different results regarding coronavirus stability in different conditions, like surfaces, temperatures, humidity and air current. But these data are not that clear. In the same conditions, some studies report very different virus survival rates. Also, we do not know if some viral strains are more resistant than others. We urgently need more experiments. The world is spending massive amounts of money in cleaning and sanitizing, using chemical products and labor, and I am sure that many places are cleaning more than necessary. If we had precise data and how long the virus survives while keeping infective power, we could save millions in unnecessary cleaning.

The viral detection methods are currently one of the main expenses of the prevention campaigns. The main accepted test is the PCR (polymerase chain reaction), but there is also the loop-measured isothermal amplification (LAMP), a breathalyzer test and others. We need a comparison of these tests, in order to decide in which cases the cheap tests can replace the costly tests. Besides cost, the alternative tests can be faster and simpler.

This is my view on the still growing number of coronavirus infections and deaths. Here I suggested a few experiments that would cost between USD 5,000 and 50,000. A small figure, compared to the forecast of \$82 trillion in damages related to the coronavirus pandemic over the next five years. Without mentioning the half a million deaths, so far.