Controlling Coronavirus Infection: ‘Plan B’ Based on Non-vaccine / Drug Interventions

Ram Kumar Dhaked¹,*

¹Biotechnology Division, Defence Research & Development Establishment, Ministry of Defence, Govt. of India, Jhansi Road, Gwalior - 474002, India

Abstract: COVID-19 pandemic affected over 227 countries with more than 147 million infections that claimed 3.122 lacs lives. The first case of the pandemic was reported from China in Dec, 2019 showing pneumonia like symptoms that turned out to be the novel strain of coronavirus (2019-nCoV). The WHO declared 2019-nCoV infection as the Public Health Emergency of International Concern and the disease named coronavirus disease (COVID-19). The infection curve of the pandemic has been flattened in many countries around the world, but the effective new antiviral drugs or vaccine has not yet developed. So far, we are saved by non-pharmaceutical interventions like handwashing, social distancing, quarantine, masks and health-care workers by personal protective equipments. Now the question arises that what we do if no effective drug or vaccine emerges? In the absence of effective drug/vaccines, pandemic has to be fought at community level not at hospitals. For such emergent situations, we need a ‘Plan B’ based non-vaccine/drug interventions.

1. INTRODUCTION

COVID-19 (Corona Virus Disease of 2019) pandemic affected over 227 countries with more than 80 million infections and claimed 1.78 million lives. The present COVID-19 pandemic began with an outbreak of pneumonia in the city of Wuhan in China involving a novel strain of coronavirus (2019-nCoV) detected in December 2019. WHO declared the 2019-nCoV infection as the Public Health Emergency of International Concern on 30th January 2020 and subsequently the disease was named as new coronavirus disease: COVID-19 on 11th February 2020 (https://www.who.int/emergencies/diseases/novel-coronavirus-2019/interactive-timeline). Pharmaceutical interventions like drugs and vaccines are the most effective methods of mitigation. Experiences from past pandemics suggest medical interventions are inadequate in early stages of a pandemic and for early mitigation and containment, non-pharmaceutical interventions (NPIs) are a viable alternative and the only available interventions for underdeveloped nations.

A heralding wave of fatalities due to COVID-19 is being witnessed that sweeping the globe. The precautionary measures like washing hands, physical distancing, isolation, wearing masks and use of personal protective equipment by health-care workers protected millions of lives (Fig. 1). For COVID-19 pandemic, millions of dollars have already been allocated to research groups for the development of vaccines and trials of repurposing potential drugs. Hundreds of clinical trials on drug cures and vaccines are underway. After fueling with most of its research funding in finding a vaccine and effective drugs against COVID-19 and even using several short-cuts in processes and fasten regulatory approvals, realistically, a vaccine for a common man will be injected not earlier than 6-12 months from the initiation of clinical trials that most of us are hoping for effective drug and vaccine in 2021. We also hope that with massive global efforts, the realization of an effective vaccine or drug for the treatment of COVID-19 will be successful. However, some experts think it will not be that easy or quick. The success of these vaccines will depend on distribution and complicated logistics, which is available in limited capacity and competence amid this pandemic. Some of the important points are, 1. capacity to produce sufficient amount of vaccine available to vaccinate global population, 2. to vaccinate large population would take weeks and 3. the anti-vaccine movement generating vaccine hesitation among populations [1]. The population is naive for 2019-nCoV; it may need prime-boost vaccination with two doses at 3-4 weeks of interval. The COVID-19 vaccines might come too late to protect from the current wave of this pandemic and it might be useful for additional waves if occur or for the post-pandemic scenario when it will circulate as a seasonal virus in the susceptible world population. It become very important to understand that eradication of a virus after the use of an effective vaccine has been achieved once only, ie, against smallpox which took millions of lives and nearly two centuries to vanquish smallpox virus after the discovery of a vaccine with unprecedented international efforts (Fig. 2).

Now the questions are; what will happen if no effective drug or vaccine emerges? What we should do in between and in the situation when the vaccine or the drug will not be a reality? War against this pandemic has to be fought at com-
Coronaviruses, 2021, Vol. 2, No. 0

Ram Kumar Dhaked

Community level. For these kinds of emergent situations, there is a need ‘Plan B’ based non-vaccine and non-drug interventions [2]. It need quality research to find out which procedure will work and how to implement this as effectively as possible. This effort is very important that must be supported by a research-based methodology on how to target and improve non-vaccine and non-drug interventions, the only things that are working so far. Across all health care researches, non-drug/vaccine interventions are the subject of very few clinical trials and no trial on how to improve their adherence. Also, they receive little attention than drug/vaccine development and testing. “We need a more rapid change of behavior than I can think of in recent human history to beat pandemic” says Robb Willer, a sociologist from Stanford University. He recruited more than 40 top behavioral scientists to advise their field’s research on mobilizing people for certain actions which will help to control the pandemic [3].

![Fig. (1). Image showing the protective triad followed during COVID-19 pandemic in the absence of vaccine and drug.](image)

Most of us think hand washing, social distancing and limited movement and use of masks are simpler advises that do not need research. There is a misconception about these and people say this is not a rocket science, however, in my view, it is not less than that. NPIs are also complex and require high-quality research to analyze the “active components” of the intervention (hands washing or sanitization), how much these are needed and the method to communicate this to people to start and keep doing it. Developing and implementing non-drug/vaccine interventions are very different and complex than a vaccine or drug development. For example, there is a ‘Masks4All’ campaign in several countries to encourage people to wear masks to restrict the spread of infection. Comprehensive research-based data is required to advise about the type, quality of masks and the material masks should be made of. Also, to whom it is advisable to wear i.e, all people, who are caring suspected/sick people or those who are ill, and in the last when and where to wear it. There are agreements and disagreements on some of these questions. Even hand-washing sounds too simple, but again there are questions; how often and the best way or after specific triggers or times? Few points can act as a burning topic for debate like, which is better to use; hand sanitizer or soap; and wearing masks, social distancing and washing hand are more effective than just one or few of them? These are some of the questions that require detailed research. In addition to these, studies are even required to determine the impact of short periods of tightening or relaxing of mitigation measures, as periods of relaxing measures are necessary to keep essential services working, creating a sense of normality while to be tightened to control further spread of the virus.

![Fig. (2). Image is showing how many years it took for the development of cure for contagious diseases in the past.](image)

Many of the small sample sizes or low-quality trials for physical interventions to break the spread of respiratory viral infections, including the use of masks, hand washing, physical distancing, eye protection, quarantining, and even for some combination of these are available; however there is no randomized controlled trial has been conducted. Other non-drug/vaccine research options are to study environmental factors like heating, air conditioning, ventilation, moisture and surfaces (for example, metals and non-metals). Presently, we may be doing things that might not be effective and no single measure is 100% effective. But due to lack of proper research, it is not known which one is effective or vice-versa. There is an urgent need for randomized controlled studies so that wasting of resources, efforts, and time on things that are probably not working can probably
be minimized. Also, when we need to persuade citizens for dramatic rapid behaviour change on a massive scale, at that time, conflicting advisories create confusion which, in turn, makes it much harder to achieve the set objectives. In contrast, fact-based unified common messages can give confidence in today’s global village with wider use of authenticated social platforms.

Let us consider if a successful vaccine for COVID-19 will be developed and pandemic also gets controlled and eradicated, it is to be pondered about the scenario what happens when the next pandemic will knock the door? As vaccines are virus-specific and so the most drugs, hence if next time a new viral pandemic hits the world, we will again face the same situation and the probability of pandemics cannot be ruled out. Therefore, it is needed to plan and study non-drug/vaccine interventions that can be applied to protect society against other viruses. We could have conducted detailed studies about the non-drug/vaccine research for respiratory viral infections during the Severe Acute Respiratory Syndrome (SARS) epidemic in 2003, the H1N1 influenza epidemic in 2009, and the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in 2012 [4]. The opportunities of planned rigorous studies on non-drug/ non-vaccine interventions got wasted; now we are desperately searching for vaccines and drugs or answers from physical and chemical interventions. Studies are also required on recovered patients for the treatment of their compromised health status like the lung, renal or mental illnesses, etc, if any.

To prevent the spread of COVID-19 type of viral pandemics, preparation of ‘Plan B’ is required for the future and will be useful in case a vaccine or drug does not arrive. Dramatic cultural and social behavioral changes and rapidly implementable non-pharmaceutical interventions are required to prevent and mitigate super spreading events during transmission that will protect healthcare services from disruption presently being observed. The ongoing pandemic is presenting us again a rare opportunity to rapidly conduct randomized trials to come up with many of the unknown non-drug non-vaccine interventions. Allocation of all our funding and resources to vaccine development and finding drugs may be devastating from both healthcare and economic perspective. This will be realized after this pandemic, and if ‘Plan B’ is in place, will help in this pandemic and also in future. We need a comprehensive strategy to be meticulously implemented. Our efforts are also needed for creating better nourished, physically fit and stress-less society with strong immunity as immune system is the number one protector.

**CONCLUSION**

In my opinion, randomized controlled trials are required for generating high quality data, however, large scale observational studies may be used to develop models to incorporate in mitigation policies. NPIs are relying on compliance probability that depend on the extent of illness and work status, like an unemployed individual has a higher compliance probability than an employed. Similarly, children are assumed to fully comply with isolation under supervision of adults. Data of such variables will help in estimating the effect of NPIs on the spread of pandemic. Recent estimates report large reductions (82%) in $R_t$ (time-varying reproduction number) in response to the combined non-pharmaceutical interventions in the absence of drug/vaccine, with an average of 0.66 across the 11 European countries compared to the pre-intervention values and $R_t$ below 1 is considered control of the epidemic [5].

**CONSENT FOR PUBLICATION**

Not applicable.

**FUNDING**

None.

**CONFLICT OF INTEREST**

The author have no conflicts of interest, financial or otherwise.

**ACKNOWLEDGEMENTS**

Declared none.

**REFERENCES**