Combating COVID-19

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Some Early Successes to Combat COVID-19

As the COVID-19 pandemic continues to take shape, the best ways to combat the virus have been non-pharmacological. Social distancing, hand washing and staying at home have been the most effective means of 'flattening the curve' of the pandemic; whether by choice, guidance, or by law.

These practices have worked best where complimented with a ready supply of personal protective equipment (PPE), widely available and aggressive testing for the virus, and access to other supporting medical equipment – such as ventilators.

China has shown the world a level of success in combating the virus in large part based on strict enforcement of lockdown and quarantine rules. South Korea's approach is regularly cited as a model approach involving a balance of extensive testing with strict quarantining.

The United States as the New Epicenter for COVID-19

By the end of March 2020, the United States had become the new epicenter for the global outbreak of COVID-19. Closure of the U.S. border to travel from China, and then with Europe, is regularly cited by President Donald Trump as important actions he took that have helped to stem the tide of the outbreak in the U.S.

A range of mandated business and public sector closures, as well as "stay-at-home" orders issued by state governors across the country – combined with strong support and guidance from the White House – have added up to unprecedented moves.

But, during April 2020, the United States is expected to experience the peak of the outbreak. The White House coronavirus task force is predicting anywhere from 100,000 to 240,000 deaths in the U.S. alone by the time the outbreak runs its course – even having accounted for mitigation efforts.[1]

Therapeutics

The early successes to combat this pandemic in countries like China and South Korea, as well as other countries including Japan and Taiwan, are largely attributable to strong centralized action on the part of these countries, combined with impressive levels of organization and preparedness.

For the United States and much of the rest of the world, mitigation efforts are showing promise. But, there is a clear prospect of greater impact on a per capita basis. This has many – including the President of the United States – hoping for a proven and effective treatment for COVID-19.

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[1] Noack, Rick. 'White House task force projects 100,000 to 240,000 deaths in U.S., even with mitigation efforts'. The Washington Post. March 31, 2020. Available at: https://www.washingtonpost.com/world/2020/03/31/coronavirus-latest-news/. Accessed on April 1, 2020.

There are a number of trials ongoing around the globe in the race to find an effective treatment for COVID-19. To be sure, we are already making impressive progress in the development of a vaccine for the virus. But, for the peak of this outbreak, determining any level of effectiveness for near term treatments is key.

Among the potential drug treatments, much focus has been placed on 1) the "malaria drug", hydroxychloroquine, and 2) the anti-viral drug made for Ebola: Remdesivir.

Hydroxychloroquine

On March 29, The U.S. Food and Drug Administration (FDA) issued an emergency authorization to experimental coronavirus treatments using chloroquine and hydroxychloroquine.[2] Prior to this authorization, President Trump made mention of hydroxychloroquine, in combination with azithromycin as a possible 'game changer'.[3]

Despite the attention on this drug, there is no conclusive evidence to suggest that it is effective against COVID-19. According to Dr. Parastou Donyai, Professor and Director of Pharmacy Practice, University of Reading, "Chloroquine and hydroxychoroquine have been tested against the novel coronavirus both in the lab, and in patients. But none of the studies so far show convincing evidence that chloroquine or hydroxychloroquine work against COVID-19."[4]

If it is ultimately proven to be effective in some way against COVID-19, it will be important to take great care in the administration of the drug. The drug can be quite harmful to patients, and even deadly.

Dr. Katherine Seley-Radtke, Professor of Chemistry and Biochemistry and President-Elect of the International Society for Antiviral Research at the University of Maryland has written about what has triggered talk that this drug might work:

> *After the initial outbreak of MERS in 2012, scientists conducted random screens of thousands of approved drugs to identify one that might block MERS infection. Several drugs, including chloroquine, showed the ability to block coronaviruses from infecting cells in vitro. But these drugs were not extensively pursued because ultimately, they did not show enough activity to be considered further.*

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[2] Sandler, Rachel. 'FDA Approves Anti-Malarial Drugs Chloroquine And Hydroxychloroquine For Emergency Coronavirus Treatment'. Forbes. March 30, 2020. Available at: https://www.forbes.com/sites/rachelsandler/2020/03/30/fda-approves-anti-malarial-drugs-chloroquine-and-hydroxychloroquine-for-emergency-coronavirus-treatment/#3f6da7775e5d. Accessed on April 1, 2020.

[3] Grady, Denise. 'With Minimal Evidence, Trump Asks F.D.A. to Study Malaria Drugs for Coronavirus'. The New York Times. March 19, 2020. Available at: https://www.nytimes.com/2020/03/19/health/coronavirus-drugs-chloroquine.html. Accessed on April 1, 2020.

[4] Donyai, Parastou. 'Chloroquine and hydroxychloroquine: no proof these anti-malarial drugs prevent novel coronavirus in humans'. The Conversation. March 26, 2020. Available at: https://theconversation.com/chloroquine-and-hydroxychloroquine-no-proof-these-anti-malarial-drugs-prevent-novel-coronavirus-in-humans-134703. Accessed on April 1, 2020.

> *When the new coronavirus appeared, many drugs that had shown some initial promise against the related coronaviruses MERS and SARS were at the top of the list as worthy of further evaluation as possible treatments.*[5]

Remdesivir

This antiviral drug was developed by the company Gilead Sciences to combat Ebola. Back in February, the National Institutes of Health (NIH) announced the start of a clinical trial of remdesivir to treat COVID-19.[6]

We should know more about the usefulness of remdesivir against COVID-19 in the coming weeks. The drug is in multiple late-stage trials, with infectious disease experts indicating that we should not expect a home run.

Opinions were obtained from many experts for a recent article published in Chemical & Engineering News entitled: 'What can initial remdesivir data tell us about tackling COVID-19?'[7] The consensus seems to be that early results will be impacted by the nature of the patients involved with each of the studies.

One issue is that the first studies are focused on the most severe cases, people whose disease might have progressed past the point of help by an antiviral. H. Clifford Lane, clinical director at the National Institutes of Allergy and Infectious Diseases, who is overseeing its remdesivir study, notes that even if patients are treated early, the benefits could be minimal:

> *Consider, for example, the limitations of Tamiflu (oseltamivir), a common treatment for another virus, influenza. To have any effect, the drug must be taken within 48 hours of symptoms appearing. And even then, "the overall impact on clinical outcomes is not very dramatic," Lane says. "We don't have a lot of success in treating RNA viruses."*[8]

The possible need to take remdesivir at such an early stage is further complicated by the need to administer the drug intravenously. But, if deemed effective to some degree at early stages of the onset of symptoms, it is easy to see how its use could help to reduce the need for ventilators or time on supplemental oxygen – thereby alleviating some of the burden on the healthcare system, and supporting better outcomes.

Going forward

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[5] Seley-Radtke, Katherine. 'Could chloroquine treat coronavirus? 5 questions answered about a promising, problematic and unproven use for an antimalarial drug'. The Conversation. March 25, 2020. Available at: https://theconversation.com/could-chloroquine-treat-coronavirus-5-questions-answered-about-a-promising-problematic-and-unproven-use-for-an-antimalarial-drug-134511. Accessed on April 1, 2020.

[6] News Releases. 'NIH clinical trial of remdesivir to treat COVID-19 begins'. NIH. February, 25, 2020. Available at: https://www.nih.gov/news-events/news-releases/nih-clinical-trial-remdesivir-treat-covid-19-begins. Accessed on April 1, 2020.

[7] Jarvis, Lisa M. 'What can initial remdesivir data tell us about tackling COVID-19?'. Chemical & Engineering News. March 27, 2020. Available at: https://cen.acs.org/biological-chemistry/infectious-disease/initial-remdesivir-data-tell-us/98/i13. Accessed on April 1, 2020.

[8] *Ibid*.

These two drugs have gotten a lot of attention due to the fact that they are the most visible initial treatments in a pipeline of pharmacological efforts to combat COVID-19. Our understanding of these drugs and a likely host of other ones that will hit our radar in the coming months will certainly evolve.

At what is still an early stage in our fight against this virus, it is so important that we continue to use non-pharmacological methods to mitigate its spread. These methods have proven to be an effective defense. Progress is certainly being made toward safe and effective treatments and vaccines. The pace of their development is highly prioritized and unprecedented. In the face of this crises, all that we are doing should offer hope against COVID-19 and for our prospects in dealing with the next global health crisis.