Trump's coronavirus treatments: Remdesivir, regeneron and more, explained

The president's treatment regime features a mix of drugs often used in more severe cases of COVID-19.

Jackson Ryan
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After spending three nights at Walter Reed Medical Center, President Donald Trump returned to the White House on Monday.
Win McNamee/Getty

President Donald Trump returned to the White House on Monday after announcing Thursday he'd tested positive for coronavirus and spending three nights at Walter Reed National Military Medical Center. As he battles COVID-19, Trump has been receiving a handful of different treatments for the disease, including an experimental antibody cocktail and the highly touted antiviral remdesivir.

As a 74-year-old overweight male, Trump has a heightened risk of experiencing severe complications from COVID-19, according to the CDC. Both age and obesity increase the risk of hospitalization by a factor of three. The White House has maintained a stoic optimism about his condition since diagnosis, and Trump himself has downplayed the seriousness of the novel coronavirus, tweeting Monday "don't be afraid of Covid."

However, his treatment regime seems to be geared toward addressing a more severe case of disease. So far, the president has received:

- Supplemental oxygen
- An antibody cocktail developed by Regeneron (REGN-COV2)
- Remdesivir, an antiviral manufactured by Gilead
- Dexamethasone, a commonly used corticosteroid

The treatments, outlined by White House physician Dr. Sean Conley over the last several days, could signal worries about Trump's prognosis. It also may just be overly precautionary, because of his multiple risk factors and, of course, his VIP status. In addition, COVID-19 is a complex, multifaceted disease affecting many organs. Though doctors and scientists have dramatically improved our understanding of how it affects the human body, there's no tried and true method to get from sickness to health. Questions remain about the effectiveness of these treatments, and clinical trials are ongoing across the world.

Here's what we know about the drugs Trump has been taking to treat his COVID-19 infection.

Supplemental oxygen

There are two broadly recognized "phases" of COVID-19. The first is during the initial stage of infection, when SARS-CoV-2, the coronavirus that causes COVID-19, replicates exponentially in cells of the lungs. The immune system, noticing the infection, flares up, which can cause the lungs to fill with fluid and prevent adequate oxygen flow. A normal blood oxygen level is at least 95%, but in some COVID-19 patients it drops significantly. The treatment guidelines from the National Institutes of Health suggest severe illness can be defined partly by a blood oxygen concentration below 94%.

Trump physician Conley had been evasive about whether Trump received supplemental oxygen but confirmed the president received an hour of the treatment on Friday. The president's oxygen level dropped below 95% again Saturday, but it's unclear whether he received oxygen another time.

"In the president's case, the time from initial diagnosis to the time showing showing serious symptoms, e.g. sudden drops in blood oxygenation and need to administer supplementary oxygen, is exceptionally short," said Jeremy Nicholson, pro vice chancellor of Health Sciences at Murdoch University in Perth, Australia.

Oxygen levels provide an indication of how a patient is faring early in the course of the disease and, along with scans of the lungs, can help determine any internal damage. Lower levels in the initial phase may indicate a poorer prognosis -- and the oxygen levels Trump has experienced likely informed the experimental therapeutics he has received since diagnosis. Current evidence suggests the Regeneron antibody cocktail and remdesivir may work better early on.

When the disease progresses to its second stage, these treatments don't appear to work as well. During the second phase, the virus has caused an extreme reaction from the immune system which can affect many different organ systems. Dexamethasone, for instance, is just one drug aimed at tamping down this response.

Regeneron's cocktail

Regeneron's antibody cocktail is known as REGN-COV2. On Friday, the White House released a memo stating Trump had been given an infusion of the experimental mix.

REGN-COV2 is a cocktail of neutralizing antibodies, Y-shaped proteins that stick to SARS-CoV-2, preventing it from using its viral machinery to hijack cells. The cocktail was developed in mice that had been genetically modified to have an immune response similar to humans and by identifying antibodies in people who have recovered from COVID-19. The cocktail uses two neutralizing antibodies that attach to the coronavirus spike protein. It takes some time for the immune system to generate these antibodies naturally, so providing a cocktail like this early in the course of disease could benefit patients.

The drug is yet to pass randomized clinical trials, and no data from human trials has been released in a peer-reviewed scientific journal. The cocktail development process was described in an article in the journal Science in August. Preclinical studies in primates and hamsters, posted as a preprint to biorXiv, showed it reduced levels of the virus, providing evidence for its potential.

Regeneron released an investor note on Sept. 29 describing a "descriptive analysis of a seamless Phase 1/2/3 trial" of REGN-COV2, stating it "reduced viral load and the time to alleviate symptoms in non-hospitalized patients." The results are based on the first 275 patients enrolled in Regeneron's trial, but the full published data hasn't been published.

"We plan rapidly to submit detailed results from this analysis for publication in order to share insights with the public health and medical communities," David Weinreich, Regeneron's head of global clinical development, said in the press release.

The cocktail is also being studied in three more Phase 3 trials, assessing its utility in various stages of disease.

Trump received a high-dose infusion of the drug after one of his physicians made a request to the FDA and Regeneron for "compassionate use." It isn't in widespread use for patients in the US and wouldn't be made available unless it received an emergency use authorization from the FDA.

"It will be a bit of an unknown how he will respond to this therapy," said Elizabeth Hartland, director of the Hudson Institute of Medical Research in Melbourne, Australia.

Remdisivir

Remdesivir, a drug developed by California's Gilead Sciences, has received the lion's share of the limelight as a COVID-19 therapeutic since March. It was first developed to treat hepatitis C and was also used to combat Ebola.

Remdesivir isn't specifically designed to destroy SARS-CoV-2. Instead, it works by knocking out a specific piece of machinery in the virus, known as "RNA polymerase," which many viruses use to replicate. It has been shown in the past to be effective in human cells and mouse models. During a White House briefing session on April 29, Dr. Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases in the US, touted it as something that could become standard of care. It has received emergency-use authorization from the FDA.

Trump is receiving five doses of remdesivir, according to his physicians.

Its modest benefits were reported in the New England Journal of Medicine in July. The drug reduced hospital stays from a median time of 15 days to 11, but it didn't show a significant benefit in reducing the odds of dying from COVID-19.

Dexamethasone

Dexamethasone is a cheap and widely available corticosteroid that has anti-inflammatory activity and can constrict blood vessels.

"These drugs dampen down the immune system response to COVID," said Greg Kyle, a professor of pharmacy at the Queensland University of Technology. Corticosteroids have been evaluated in patients with respiratory distress for decades, with many clinical trials examining their utility, but only a handful have examined their use in COVID-19 patients.

Dexamethasone rose to prominence as a treatment for COVID-19 after scientists at the University of Oxford in the UK conducted a 6,000-patient trial. The results, published in the New England Journal of Medicine in July, demonstrated dexamethasone could redue the number of deaths in patients on mechanical ventilation by one-third. In patients receiving supplemental oxygen, it reduced deaths by one-fifth. It didn't appear to help patients who weren't receiving respiratory support. Another study, in the Journal of the American Medical Association in September, looked at a group of 299 patients with moderate or severe respiratory distress and suggested it might keep patients off ventilators -- though this wasn't a randomized trial.

However, an observational study in the Journal of Hospital Medicine in July followed the positive NEJM paper, suggesting there may be issues with administering dexamethasone early in the course of disease.

Some doctors have pointed out the more serious side effects of dexamethasone treatment. "They work on a whole range of different body systems and they work at the level of the nucleus," said Kyle. That means it affects almost every cell in the body -- and so the side effects are rather varied. There are potential negative effects on the brain, influencing aggression, anxiety and mood. Another side effect is "euphoria," according to Nicholson, who says it "might partly explain the president's strong feeling that he is recovering rapidly."

Long-term health effects

Scientists and researchers are still coming to terms with the lasting effects of SARS-CoV-2 infection. While the course of a mild disease may only last for a couple of weeks, those who have experienced severe COVID-19 could have long-term health effects. An Italian team assessed a small group of hospitalized COVID-19 patients in April and May of this year, with almost 90% reporting the persistence of at least one symptom -- most commonly fatigue or labored breathing.

Though Trump is back on his feet and producing videos for Twitter in seemingly good health, his physician, Conley, warns he's "not out of the woods yet."

While Trump downplayed the severity of his illness and the threat of the coronavirus in briefings from the White House on Monday, science shows that surviving the illness isn't the end of the fight. The effects of COVID-19 may linger for some time. There is still so much we don't know about COVID-19 and the immune response and the factors that can dictate how well a patient responds to complications.

It has, so far, been difficult to get a clear understanding of just how severe Trump's prognosis is. This makes it hard for outside experts to draw conclusions on what the president is experiencing. Kyle likens it to fighting "with one arm behind your back."

"It becomes very difficult to make a judgment based on the information that's come out," he said. "You need to get the whole picture of the patient."

Progression toward more severe COVID-19 usually occurs about seven to 10 days after returning a positive test. It remains unclear the last time Trump was tested before he returned a positive test last week. "If the COVID-19 trajectory shown by the president is 'typical,' we will not know if he is really recovering for several days yet," Nicholson said.

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Amanda Capritto
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LetsGetChecked

For the most up-to-date news and information about the coronavirus pandemic, visit the **WHO website**.

In the first few months of 2020, getting a COVID-19 test was nearly impossible. Emergency rooms were backlogged, clinic waiting rooms were full and drive-through testing sites had lines out to the streets. COVID-19 tests were in such short supply that you had to be showing serious symptoms to even be considered for a test.

Now, as we're nearly to the last quarter of 2020, getting tested for the novel coronavirus is as easy as clicking through a few screens on your smartphone. Pretty much anyone can get tested for COVID-19, partly thanks to at-home testing kits manufactured by home health brands such as LetsGetChecked and Everlywell.

I was curious about at-home coronavirus test kits, so I decided to try one from LetsGetChecked.

For full disclosure, I haven't ever experienced COVID-19 symptoms and haven't knowingly been in contact with anyone who was infected with COVID-19. Because of this, I don't qualify to order the test online, so I requested a test kit from the company for the purposes of testing out the experience.

Read more: How long does it take to get coronavirus test results back?

How to get an at-home coronavirus test

The at-home coronavirus test kit from LetsGetChecked.

Amanda Capritto/CNET

As of September 2020, there are eight at-home COVID-19 tests available to consumers. Those include tests from LetsGetChecked, Everlywell, Pixel by Labcorp, Vault, Hims, Hers, Phosphorus and Picture by Fulgent Genetics.

A few brands, including LetsGetChecked, released at-home coronavirus tests as early as March 2020, but the FDA quickly put a stop to the production of these tests to ensure no "unauthorized fraudulent test kits" were on the market.

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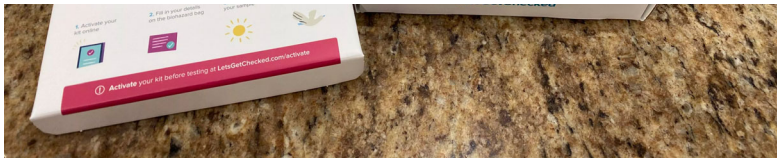
Later, the FDA administered Emergency Use Authorizations (EUAs) for at-home COVID-19 test kits that fit certain criteria -- namely that the FDA saw value in the product and believed it could detect SARS-CoV-2, the virus that causes COVID-19. You can see the entire list of EUAs for the novel coronavirus on the FDA website.

Now, several months into the pandemic, you can purchase an at-home coronavirus test with ease -- it's like buying anything else on the internet, except you have to take a prescreening test to ensure you're eligible for the test.

LetsGetChecked at-home coronavirus test



Unboxing the test kit.

Amanda Capritto/CNET

I took the at-home COVID-19 test from LetsGetChecked, a pretty prominent name in the at-home health test kit market. The LetsGetChecked at-home coronavirus test kit costs $119 and utilizes a lower nasal swab.

To order the test, you have to complete the online questionnaire. The quiz asks about any symptoms you may have, as well as your possible exposure to the novel coronavirus. You will not qualify for the test if you have severe symptoms, because the company says you should seek medical treatment for such symptoms.

You can't take the assessment twice, so be careful (and honest) when you go through it.

Read more: 8 at-home health kits to test for Celiac disease, fertility and more

Unboxing the test

The LetsGetChecked at-home COVID-19 test comes in a plain white box with the LetsGetChecked logo. Inside the box, you'll find several informational cards, an instructional pamphlet, your test materials and a prepaid return shipping label.

Make sure you read all of the instructions before opening the test materials. There are a few steps you need to take before taking the test, which include filling out an information card with your birthday, gender, date and time. Then you'll register the test online. If you don't register the test online, it won't be processed and you'll never get your results.

Taking the test

The test tube for collecting your sample.

Amanda Capritto/CNET

I was pretty nervous to take the test because I'd heard awful accounts of

COVID-19 tests (some exact words I've heard include "I swear, the swab was in my brain" -- ick). But, the LetsGetChecked coronavirus test is a lower nasal swab, meaning there's no "in your brain" feeling.

For a lower nasal swab, all you do is insert the provided swab into your nostril, swirl it around for 10 seconds and repeat in the other nostril. Some other at-home coronavirus tests take saliva samples instead of nasal swabs, and in my past experience with medical tests and clinical trials, I think the lower nasal swab is less intensive than the "spit in a tube" method.

The test was very easy to take and didn't give me any pain or discomfort, although swabbing did make me feel like I was going to sneeze about a hundred times. No uncontrollable sneezing occurred, thankfully.

LetsGetChecked provides phenomenally detailed instructions so I felt confident I was doing everything right throughout the process -- I think it'd be pretty hard to send back an invalid sample, because the step-by-step instructions don't leave much room for error. Your package comes with a pamphlet, but you also get the instructions online with videos when you register your test.

Sending the test back

LetsGetChecked provides a prepaid label and shipping instructions, so sending the test kit back is super easy. Just follow the instructions that came in the box and leave the package outside for UPS to pick up. Keep in mind you need to send the package back on the same day you take your test, or your sample might be compromised.

My results and final thoughts

The information card you have to fill out to send your sample back.
Amanda Capritto/CNET

Overall, this process was incredibly easy and user-friendly. I can't speak for other at-home coronavirus tests, such as those from EverlyWell, Pixel by Labcorp or Phosphorus, but I imagine the process being similar: You take a qualifying assessment, buy a test, get it delivered, take the test, and send it back with a prepaid shipping label.

I got my results within three days of my sample arriving at the test lab

(the website says to allow up to 72 hours from receipt). Despite feeling so confident during the sample-taking process, something evidently went wrong with my test. I excitedly opened the email with my results, only to be disappointed by the result: "clotted."

I wasn't sure what this meant, and the results page said little more than "This doesn't mean you have COVID-19," followed by some instructions for taking precautions just in case I did have the illness. I reached out to the company for clarification, and LetsGetChecked told me that, though getting a "clotted" result is rare, it does happen.

LetsGetChecked said that it could really be anything -- perhaps my test tube didn't seal right, or maybe the package sat out on my porch for too long before a UPS driver picked it up.

I decided to try again, in hopes I can get a valid sample the next time around. When I get my new results, I'll be back to update this story.

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3 COMMENTS

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