



TOPICS IN THE NEWS:

Operation Warp Speed: Fast Track to a COVID-19 Vaccine

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INTRODUCTION

The news is teeming with stories of rapid progress towards a COVID-19 vaccine, with prominent medical professionals speaking with guarded optimism about the prospect of availability by the beginning of 2021, if not the end of this year. How could a process that historically has been a years-long undertaking be on such a fast-track? Enter [Operation Warp Speed](#) (OWS), a joint project between the federal government and industry with a stated goal “to produce and deliver 300 million doses of safe and effective vaccines with the initial doses available by January 2021, as part of a broader strategy to accelerate the development, manufacturing, and distribution of COVID-19 vaccines, therapeutics, and diagnostics”.

[Announced by President Trump and the Department of Health and Human Services on May 15](#), OWS aims to safely expedite the process by selecting the most promising candidates and providing coordinated government support. By supplying the financial backing, research, development, and manufacturing stages, which typically occur sequentially, can run simultaneously in a way that would normally pose more monetary risk than pharmaceutical companies would undertake. OWS specifies these efficiencies in each of those stages:

Development:

- Start with the strongest pool of candidates. Government agencies evaluated more than 160 vaccines that were already in the works, and winnowed that group down to 14, and eventually to 5 core candidates that offered the most promise.
- Standardize protocols for the demonstration of safety and efficacy. Protocols for the safety and efficacy of trials will be overseen by the federal government, which will allow the trials to proceed more quickly than in traditional public-private partnerships, in which pharmaceutical companies decide on their own protocols.

Manufacturing:

- Relieve industry of financial risk. With the federal government assuming the costs of manufacturing, industry partners can devote their investment to their development processes.

- Advance manufacturing capacities as the vaccines are in development, rather than upon approval.
- Develop a universal manufacturing capacity which can be applied to whichever vaccine(s) is successful, to the extent possible.

Distribution:

- Plan distribution strategies and develop required infrastructure that will be ready to go upon vaccine approval.
- Frontload the domestic manufacture of specialized supplies needed for distribution, such as glass vials, prefillable syringes, and other containers.
- Borrow from existing allocation methodologies in place for flu seasons, and fine-tune based on what has already been learned from the first wave of COVID 19, regarding frontline workers and vulnerable populations.

VACCINE CANDIDATES

The basic premise of a vaccine is to introduce a virus into a host so that its immune system can learn to recognize it and respond accordingly. Very simply put, the vaccine cycle “takes a village” of cell types. 1. T-helper cells are activated to detect the present of a virus. 2. B-cells are alerted to create antibodies that block the virus from being able to replicate itself. 3. T-Killer cells destroy the infected cells. A vaccine might only activate one of these stages, different vaccine technologies impact different stages. There are four vaccine-platform technologies that are believed to have the greatest likelihood of success against COVID-19, categorized broadly as nucleic acid (DNA or RNA) vaccines; viral-vectored vaccines; subunit vaccines; and weakened or inactivated virus vaccines. Vaccines had to be based upon one of these platforms to be considered by OWS. While each platform works differently, they all work on a shared principal, targeting the spike protein in the coronavirus, which is the structure that gives the virus its readily recognized spikey appearance.

To increase the odds of success, OWS aspired to assemble a diverse pool of candidates, representing each of the 4 platforms. This diversification would help overcome failures or shortcomings in any one technique and might also reveal targeted vaccines for specific population groups. The vaccines that ultimately moved forward with OWS are represented in the table below, which was published in the [July 6, 2020, issue of JAMA](#):

Table. Operation Warp Speed Vaccine Candidates

Candidate	Technology	Single dose	Stage
Moderna (mRNA-1273)	Messenger RNA	No	Phase 2a clinical trial
BioNTech/Fosun Pharma/Pfizer (BNT162a1, BNT162b1, BNT162b2, BNT162c2)	Messenger RNA	Potentially	Phase 1-2 clinical trials
Merck, Sharpe & Dohme and the International AIDS Vaccine Initiative	Recombinant vesicular stomatitis virus vector	Unknown	Preclinical
Johnson & Johnson/Janssen Pharmaceuticals	Replication-defective human adenovirus 26 vector	Yes	Phase 1-2a clinical trials
AstraZeneca and the University of Oxford (ChAdOx1 nCoV-19)	Replication defective simian adenovirus vector	Yes	Phase 1-2 clinical trials

THE CLINICAL TRIALS PROCESS

By the time the U.S. found itself in the midst of the COVID-19 pandemic in mid-March, pharmaceutical labs had been working on a vaccine since January 2020. Even with that 3-month head start, to have an approved vaccine in place by the following January would be unprecedented. To date, the fastest turnaround time for a vaccine, from development to approval, is the 4 years it took for the [mumps vaccine](#), 1963 - 1967.

Conversely, it took 34 years, 1954-1988, for the chicken pox vaccine, and even more grim is the fact that after 36 years of research and development, there is still no vaccine for HIV. In addition to the time-saving measures OWS brings to the process, labs also have the advantage of advancements in science and technology, which make the process inherently faster to begin with. But in addition to the science that must happen to create the vaccines, vaccine development includes clinical trials, which is a three-phase process, and one which leaders of OWS assure will not fall prey to shortcuts. A [handout on the FDA website](#) offers this summary of those phases:

- Phase 1 clinical trials focus on safety and include 20–100 healthy volunteers. In Phase 1, scientists begin to learn how the size of the dose may be related to side effects.
- Phase 2 clinical trials involve several hundred volunteers. This phase includes studies that may provide additional information on common short-term side effects and how the size of the dose relates to immune response.
- In Phase 3 studies, hundreds or thousands of volunteers participate. Vaccinated people are compared with people who have received a placebo or another vaccine so researchers can learn more about the test vaccine's safety and effectiveness and identify common side effects.

Since the JAMA table of OWS Vaccine Candidates was published, the Moderna, BioNTech, and AstraZeneca candidates have entered Phase 3. Moderna and BioNTech began in late July and are about midway to their goal of 30,000 participants. There are other vaccines from pharmaceutical labs in China that have entered Phase 3, as well, but they are not under consideration by OWS, and in mid-August Russia announced that it had a vaccine that was already cleared for use in certain circumstances, despite having just entered Phase 3.

The FDA guidelines do allow for an [Emergency Use Authorization](#) (EUA), a mechanism which allows for “the use of unapproved medical products, or unapproved uses of approved medical products, to diagnose, treat, or prevent serious or life-threatening diseases when certain criteria are met, including that there are no adequate, approved, and available alternatives.” To date, there have been EUAs issued for [COVID-19 therapeutics](#), but Dr. Anthony Fauci, director of the National Institute for Allergy and Infectious Diseases, cautions against rushing the vaccine clinical trial process by this means. “One of the potential dangers if you prematurely let a vaccine out is that it would make it difficult, if not impossible, for the other vaccines to enroll people in their trial,” [Fauci said](#).

Any plan as audacious as Operation Warp Speed is destined to have its naysayers, and in a situation with as many twists and turns as the COVID-19 pandemic has taken, it is hard to believe there is any confident view

of the future. Perhaps OWS is best represented by another quote from Dr. Fauci in an [interview with NIH Director Dr. Francis Collins](#):

“...But that is a financial risk. That is not a risk for safety, nor is it a risk for scientific integrity. And I think that’s what the general public needs to understand. The risk we’re taking is to gain months so that we will be able to have it ready. And, if we lose that, we’re only losing money.”

SOURCES AND FURTHER READING

- [Department of Defense Operation Warp Speed Website](#)
- [Operation Warp Speed Factsheet](#) (Department of Health and Human Services)
- [“Developing a SARS-CoV-2 Vaccine at Warp Speed,” JAMA, 2020;324\(5\):437-438.](#)
- [“Developing Safe and Effective Covid Vaccines — Operation Warp Speed’s Strategy and Approach”, New England Journal of Medicine, August 26, 2020.](#)
- [“Fauci Optimistic About COVID-19 Vaccines, Though Immunity Unknowns Complicate Development,” Scientific American, July 31, 2020.](#)
- [“Coronavirus Vaccine Tracker,” New York Times](#) (updated regularly)
In addition to tracking worldwide COVID-19 vaccine progress, this site provides background information on vaccine testing and vaccine-platforms.
- [“These are the Coronavirus Vaccines to Watch,” Washington Post](#), (updated regularly)
In addition to tracking worldwide COVID-19 vaccine progress, this site provides background information on how vaccines work.
- [“Experts Highlight COVID-19 Vaccine Developments and Remaining Challenges”, American Journal of Managed Care, August 4, 2020.](#)
- [“How a New Vaccine Was Developed in Record Time in the 1960s” History website, June 22, 2020.](#)
- ["Dr. Anthony Fauci on COVID-19 Vaccines", NIH News in Health, August 2020](#)
This advocacy group has gathered information on ACES-related legislation and other state actions across the U.S.

PODCASTS

- Learning Curve - HHS podcasts, including touchpoints on OWS:
[HHS Secretary Alex Azar on the Race to a Vaccine, May 11, 2020](#)
[Dr. Peter Marks: Operation Warp Speed, July 2, 2020](#)
[Dr. Moncef Slaoui: Operation Warp Speed, July 31, 2020](#)
- [Conversations with Dr Bauchner, \(JAMA\): Coronavirus Vaccine Update, August 25, 2020](#)

NOTE

If you need assistance accessing any of these resources, please email librarian@michigan.gov.