Everything You Need to Know About the Covid-19 Vaccine

Update: 12/18/20

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A Note

What we know about the COVID-19 vaccine is ever-evolving. I will be updating this document as new information is fully verified, therefore, the information here is subject to change. (We are currently reviewing the full 92-page document from the FDA on the 17not all of that information will be presented at this time.)

Who is manufacturing this vaccine?

Although there are many organizations in the race to develop a COVID-19 vaccine, the top three contenders are **Moderna** (US-based company), **Pfizer** (US-based company), and **AztraZeneca** (UK-based company). Therefore, this information will be centered on these three primary vaccines.

Who is sponsoring the COVID-19 vaccines and trials?

Moderna: ModernaTX Inc**.** in partnership with Biomedical Advanced Research and Development Authority and the National Institute of Allergy and Infectious Diseases (NIAID)

- **Source 1**
- **Source 2**

Pfizer: BioNTech SE

- **Source 1**
- **Source 2**

AstraZeneca: UK Research and Innovation, National Institutes for Health Research (NIHR), Coalition for Epidemic Preparedness Innovations, Bill & Melinda Gates Foundation, Lemann Foundation, Rede D'Or, Brava and Telles Foundation, NIHR Oxford Biomedical Research Centre, Thames Valley, and South Midland's NIHR Clinical Research Network, and AstraZeneca.

- **Source 1**

How many trials have they done (AKA what phase are we on)?

Most drugs must go through three trial phases to prove efficacy and to gather enough data from participants to be show safety. Which can be thought of as three progressing trials. Each of the three vaccines listed above is in the third phase or has finished the third phase of trials. Although the phases of these trials are much shorter than is customary for a drug, which usually must go through at least 3 years of testing before phase three trials can be complete. However, technically, all have reached the third phase, or trial, of their respective vaccine.

Have the vaccines been approved or authorized?

Pfizer: Has received authorization in the UK. It was also the first vaccine to be approved for emergency use authorization by the FDA in the US.

AstraZeneca: Has submitted a petition for approval in the UK, however, is not yet approved. We are not sure when approval may be granted.

Moderna: Moderna has recently finished its trials, and received FDA emergency approval Friday, December 18 2020.

What is the perceived effectiveness of each vaccine?

Pfizer

Pfizer announced that its vaccine is 95% effective. This is how Pfizer came to this conclusion, as stated on their website:

> "The first primary objective analysis is based on 170 cases of COVID-19, as specified in the study protocol, of which 162 cases of COVID-19 were observed in the placebo group versus 8 cases in the BNT162b2 group." The participants were looked at 7 days after receiving the second dose of the Pfizer vaccine.

A note about this data: due to the short length of time, this data is based on 170 participants out of the 44,000 recruited for the study. Using this analysis the placebo seems to be equally as effective as the vaccine. Out of 21,000 people in the placebo group, 162 got the infection, which is a 99.9923% efficacy rate vs. the vaccine group-- 8

people out of 21,000 getting the infection, a 99.99962% efficacy rate.

Another thing worth noting here is the large gap from the time of monitoring or recording cases of COVID-19 (7 days after the second dose of the vaccine is given). This means that monitoring or recording of COVID-19 cases in this data set occurred approximately 29 days into the trial, possible excluding cases of COVID-19 that may have appeared in between the first and the second shot, as well as cases that may have occurred in the 6 days after the second dose. **This means it may take time for the vaccine to become effective and that one dose alone may not be enough.** This is why Pfizer can only claim efficacy after a certain amount of time, i.e. 7 days after the second dose.

The last thing to point out here about efficacy is the small timeframe. The phase three trials went on for a little less than 3 months, therefore, we have no idea how many people will contract the infection in the vaccine group or the placebo group weeks, days, and months from now.

Therefore the conclusion of effectiveness based on this data should be taken as **preliminary**.

Moderna

Moderna has announced a 94.5% efficacy rate, based on the following data:

> "The primary endpoint of the Phase 3 COVE study is based on the analysis of COVID-19 cases confirmed and adjudicated starting two weeks following the second dose of vaccine. This first interim analysis was based on 95 cases, of which 90 cases of COVID-19 were observed in the placebo group versus 5 cases observed in the mRNA-1273 group, resulting in a point estimate of vaccine efficacy of 94.5% (p <0.0001)."

The same precautions as I listed above for the Pfizer vaccine should be taken when looking at this data. We are only looking at 95 participants out of approximately 30,000. This would also mean that the placebo is about as effective as the vaccine. (99.994% efficacy vs. 99.9997% efficacy in the vaccine group.

There is quite a long bit of time taken before recording COVID cases, in this case, almost 42 days into the trial. This may exclude many cases. This also means it may take a good deal of time for the vaccine to become effective.

Lastly, of course, the short period of monitoring. The phase 3 trial finished gathering participants on October 22, so, we have been monitoring this trial for a little more than a month and a half. We have no idea how many more cases will show up in the vaccine or placebo group in the coming weeks and months post-administration.

AstraZeneca

AstraZeneca reported about a 70% efficacy rate:

> "As announced on 23 November 2020, the primary efficacy endpoint of the programme statistical plan, based on the pooling of two dosing regimens, showed that the vaccine is 70.4% (95.8% CI: 54.8% to 80.6%) effective at preventing symptomatic COVID-19 occurring more than 14 days after receiving two doses of the vaccine...A further analysis of the efficacy regimens showed that when the vaccine was given as two full doses, vaccine efficacy was 62.1% (n=8,895; CI 41.0% to 75.7%), and 90.0% (n=2,741; CI 67.4% to 97.0%) in participants who received a half dose followed by a full dose."

They are a little less transparent about how large of a group this data is based on. They do not give us the exact numbers of the vaccine or the placebo group. They do site separate groups of 8,895 and 2,741, these seem to be the full group from which these numbers are drawn.

Here again, we see a large gap in the recording of infections.

Effectiveness and the possibility of horizontal transmission:

While there are perceived effectiveness against SARS-CoV-2 symptoms, according to the CEO of Pfizer and a chief scientist of Moderna, there is no data on Pfizer and Moderna vaccine's ability to stop transmission from the vaccinated to others. (More sources: Moderna, Moderna 2, Pfizer,)

In other words, those who receive the vaccine may be protected from getting the symptoms of the infection or catching the infection, however, after vaccination, there is a possibility those who are vaccinated could spread the infection to others through shedding. This is called horizontal transmission.

Pfizer Update: In the 53-page report that Pfizer submitted on December 8, **they confirmed the statements made above:**

> "Data are limited to assess the effect of the vaccine against transmission of SARS-CoV-2 from individuals who are infected despite vaccination...it is possible that if efficacy against asymptomatic infection were lower than efficacy against symptomatic infection, asymptomatic cases in combination with reduced mask-wearing and social distancing could result in significant continued transmission. Additional evaluations...will be needed to assess the effect of the vaccine in preventing virus shedding and transmission, in particular in individuals with asymptomatic infection."

AstraZeneca may be able to stop transmission by 27%, according to their study in the Lancet. However, more data is needed and the ability to stop transmission is still unsure.

This is why the Mayo Clinic and others have warned that even after vaccination, social distancing and masks will still be required on a regular basis.

How are the vaccines administered?

All three vaccines are administered by intramuscular injection.

How much will it cost? Insurance covered?

In the US the vaccine will cost very little out-of-pocket for the average consumer if any.

Pfizer has made this statement: "We will price our vaccine in a way to help governments ensure there is little to no out-of-pocket cost for the vaccine for their populations. It is also important to note that our COVID-19 vaccine development and manufacturing

costs are entirely self-funded, with billions of dollars already invested in an effort to help find a solution to this pandemic." (https://www.pfizer.com/science/coronavirus/vaccine)

When will the vaccine be available?

Pfizer: Already available in the UK, it will likely become available in the US the week of December 14, 2020.

Moderna: Since it was recently approved, it will most likely be available at the end of December 2020.

AstraZeneca: We do not know when AstraZeneca will be approved, as it is still under review. Therefore, we have no data on how soon it will become available, but the earliest would be the end of December.

What are the ingredients in the vaccine?

We only have exact ingredients for the Pfizer vaccine thus far. We will hopefully have the ingredients from Moderna late next week. So, I will detail the Pfizer vaccine ingredients as well as ingredients we may expect in one or more of each of these vaccines.

PFIZER: Each vial is 1.8 ml containing:
0.9% **Sodium Chloride**, USP prior to use to form the vaccine.
(This is used to help keep the PH of your body from destroying the mRNA and other ingredients in the vaccine, sodium chloride is used in nearly all injections for this purpose.)

30 mcg of a **nucleoside-modified messenger RNA (modRNA) encoding the viral spike (S) glycoprotein of SARS-CoV-2.**
(Please read below about the mRNA and its purpose in the vaccine. Something of note here, is that there is some concern that the spike (S) glycoprotein looks very similar to proteins found in placenta. This could lead to possible issues with fertility and pregnancy. However, there is no data on this, nor has any data on pregnant women been published thus far. There is some evidence , that mRNA may affect DNA. However, there is not enough data to confirm affect nor do we have evidence that this will happen with the type of mRNA in the vaccine.)

Lipids

0.43 mg**(4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate)**,
0.05 mg **2[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide**,
0.09 mg **1,2-distearoyl-sn-glycero-3-phosphocholine, and 0.2 mg cholesterol)**,
*(These are being used as emulsifiers, stabilizers and chelators in the vaccine. They are acting as a fat layer to help the body properly disseminate the vaccine. These specific compounds are rather new to vaccines and were formulated specifically for this vaccine. Therefore t**here is little data on toxicity or other possible effects**. After consulting two chemists and one bio-physicist and looking at several toxicological reports, it seems that most of these ingredients are fairly benign. Some like Azanediyl are irritants, but I have not found anything that shows blatant toxicity. The **polyethylene glycol** is probably the most concerning ingredient here. Its constituents (ethlyene glycol) have been linked to many side effects. Polyethylene glycol is an irritant and allergenic, which may account for the allergic reactions we are seeing. Its job may be to allow the mRNA and other ingredients into the cells more easily, as it does with make-up. There has been concern expressed that it is acting as a hydrogel, however, I **cannot** confirm this.)*

Salt Buffers

0.01 mg **potassium chloride**,
0.01 mg **monobasic potassium phosphate**,
0.36 mg **sodium chloride**,
0.07 mg **dibasic sodium phosphate dihydrate**
6 mg **sucrose**
(These are acting as buffers within the vaccine, to again help with the PH balance. They are benign as far as we know.)

mRNA Technology

Both **Pfizer** and **Moderna** are using **mRNA technology in their vaccine**. According to Moderna,

> "mRNA medicines aren't small molecules, like traditional pharmaceuticals. And they aren't traditional biologics (recombinant proteins and monoclonal antibodies) – which were the genesis of the biotech industry. Instead, mRNA medicines are sets of instructions. And these instructions direct cells in the body to make proteins to prevent

> or fight disease."

The basic tenant of this technology, as stated above, is that the mRNA will get into the cytoplasm of our cells and give instructions to those cells to create antibodies. As we have never used this technology in vaccines before, **we have no data on side effects or possible toxicity with this technology**. It is very new and has not ever been used in humans, and because our human trials have been very short, we have no long-term data on the effects of the human body and giving instructions to our cell's DNA through vaccine deposited mRNA.

OTHER POSSIBLE INGREDIENTS IN MODERNA/ASTRASZENECA:

Luciferase

In **Moderna's** recent study in the NEJM, showing its phase one results, luciferase was used in the vaccine to help track effectiveness. However, **we do not know whether this compound will be used in all of its COVID-19 vaccines.** Luciferase has been used in vaccine studies before this and is not a new enzyme.

What is Luciferase?

Luciferase is an enzyme that is usually found in fireflies. This enzyme has the ability to produce light and therefore can be used to track what is happening inside certain proteins or cells. It has been used in many different areas of science for tracking, imaging, and reporting.

As the Encyclopedia of Neuroscience states,

> "a number of studies have employed Luc as a reporter gene in real-time noninvasive in vivo imaging. This in vivo imaging allows the visualization of the spatial and temporal behavior of Luc-expressing cells in living animals; for example, growth of tumor cells, trafficking of immune cells, and migration of transplanted cells."

Luciferase is known to cause skin and eye irritation, category 3 target organ toxicity, and respiratory irritation. However, toxicity is dependent on the amount and form exposure.

Squalene

As none of the ingredient profiles have been released, we do not know if Squalene will be used in any of the vaccines, however, there is evidence of the possibility of this ingredient being used.

Squalene is a natural precursor to cholesterol in the human body. Many other animals and plants also produce Squalene, including sharks from which some squalene used in vaccines is made. It has been used in vaccines in the past.

There is very little data on safety, as seen in this chemical profile, concerning Squalene. Squalene is assumed by most sources to be safe. Although, there have been concerns about anti-squalene antibodies, linking to gulf war syndrome like symptoms in vaccinated persons.

Aborted Fetal Tissue

Although aborted fetal tissue of **two different cell lines was used to create the vaccine**, there are apparently **no aborted fetal cells in AstraZeneca's vaccine**.

The HEK-293 line and the MRC-5 line have both been used to develop AstraZeneca's COVID-19 vaccine. MRC-5 was used to develop the spike protein being used in the AstraZeneca vaccine and HEK-293 was used in actual testing. However, AstraZeneca claims that there will be no tissue or debris in this vaccine.

We have no evidence about the Pfizer or Moderna vaccines and do not know whether cell lines will be used in either of those vaccines.

The US Congress did petition for restrictions to be lifted to allow more fetal cell lines to be developed and used to rapidly-produce a COVID-19 vaccine. However, we have no data to suggest that further cell lines were developed during this time.

Nanotechnology

I have included this because many have expressed concerns that the vaccine may carry some form of tracking technology. Thus far, there have been no evidence or statements that this is the case. There has been one case made, that if the 2[(polyethylene

glycol)-2000]-N,N-ditetradecylacetamide is acting as a hydrogel, then it would be possible to use it as a carrier for nanotechnology. However, while there are currently aspirations to use vaccines to inject nanotechnology and chips implanted in employees are already used in silicon valley, there is not as yet data to support the assertion that there is nanotechnology in any of the vaccines.

What are the possible adverse effects of the vaccine?

As the vaccine is still being monitored for adverse effects and it has been a very short amount of time in the trials, we do not have full data on the possible long term side effects. We do have some data on short term side effects and a working list of side effects that the FDA has put out, which I will attach here.

Here is what we know from the trials themselves

(the following are screenshots taken straight from the FDA report on the Pfizer vaccine, as no other vaccine has released its full data, however, we can assume that most side effects will be similar.)

*Notes about the following data:
1) As mentioned above, the follow-up period is very short, therefore not all side effects may have been observed. These are taken from those with a "median" of two months or one month of follow up. This means that not all patients had one or two months of follow up, some may have had a week or two, as is stated earlier in the FDA data.

2) In the charts you will see side effects deemed as "related" by investigators. In Pfizer's study design, it states that *investigators* are those *employed by Pfizer*. It also has an independent board looking at side effects, however, Pfizer has chosen not to include who is on these boards, how they were selected, or if they have any ties to Pfizer financially. The investigators here are likely Pfizer employees as stated in the study design.

Systemic events in the younger group compared with the older group, with frequencies increasing with number of doses (Dose 1 vs Dose 2), were:

- fatigue: younger group (47.4% vs 59.4%) compared to older group (34.1% vs 50.5%)
- headache: younger group (41.9% vs 51.7%) compared to older group (25.2% vs 39.0%)
- muscle pain: younger group (21.3% vs 37.3%) compared to older group (13.9% vs 28.7%)
- chills: younger group (14.0% vs 35.1%) compared to older group (6.3% vs 22.7%)
- joint pain: younger group (11.0% vs 21.9%) compared to older group (8.6% vs 18.9%)
- fever: younger group (3.7% vs 15.8%) compared to older group (1.4% vs 10.9%)
- vomiting: reported less frequently in the older group and was similar after either dose
- diarrhea: reported less frequently in the older group and was similar after each dose.

Cerebral Palsy and Severe Fever

was low (<0.5%), without meaningful imbalances between study arms. Among non-serious unsolicited adverse events, there was a numerical imbalance of four cases of Bell's palsy in the vaccine group compared with no cases in the placebo group, though the four cases in the vaccine group do not represent a frequency above that expected in the general population.

Severe fever (>38.9°C to 40.0°C) was reported in the BNT162b2 group after Dose 1 for 0.2% and after Dose 2 for 0.8%, and in the placebo group after Dose 1 for 0.1% and after Dose 2 for 0.1%. Grade 4 fever (>40.0°C) was reported for 2 participants in each of the BNT162b2 and placebo groups.

Tables of the Number of Severe Reactions

Table 6. Number (%) of Subjects Reporting at Least 1 Adverse Event From Dose 1 to 1 Month After Dose 2 – ~38000 Subjects for Phase 2/3 Analysis – Safety Population

	Vaccine Group (as Administered)	
Adverse Event	**BNT162b2 (30 µg) (N^a=18801) n^b (%)**	**Placebo (N^a=18785) n^b (%)**
Any event	5071 (27.0)	2356 (12.5)
Related[c]	3915 (20.8)	953 (5.1)
Severe	220 (1.2)	109 (0.6)
Life-threatening	18 (0.1)	20 (0.1)
Any serious adverse event	103 (0.5)	81 (0.4)
Related[c]	3 (0.0)	0
Severe	57 (0.3)	48 (0.3)
Life-threatening	18 (0.1)	19 (0.1)
Any adverse event leading to withdrawal	34 (0.2)	25 (0.1)
Related[c]	14 (0.1)	7 (0.0)
Severe	13 (0.1)	7 (0.0)
Life-threatening	2 (0.0)	4 (0.0)
Death	1 (0.0)	2 (0.0)

Table 7. Number (%) of Subjects Reporting at Least 1 Adverse Event From Dose 1 to Data Cutoff Date (14NOV2020) – Subjects With 2 Months Follow-Up Time After Dose 2 for Phase 2/3 Analysis – Safety Population

	Vaccine Group (as Administered)		
Adverse Event	**BNT162b2 (30 µg) (N^a=9531) n^b (%)**	**Placebo (N^a=9536) n^b (%)**	**Total (N^a=19067) n^b (%)**
Any event	2044 (21.4)	1197 (12.6)	3241 (17.0)
Related[c]	1297 (13.6)	343 (3.6)	1640 (8.6)
Severe	105 (1.1)	69 (0.7)	174 (0.9)
Life-threatening	10 (0.1)	11 (0.1)	21 (0.1)

Table 7. Number (%) of Subjects Reporting at Least 1 Adverse Event From Dose 1 to Data Cutoff Date (14NOV2020) – Subjects With 2 Months Follow-Up Time After Dose 2 for Phase 2/3 Analysis – Safety Population

	Vaccine Group (as Administered)		
	BNT162b2 (30 µg) (N[a]=9531)	Placebo (N[a]=9536)	Total (N[a]=19067)
Adverse Event	**n[b] (%)**	**n[b] (%)**	**n[b] (%)**
Any serious adverse event	57 (0.6)	53 (0.6)	110 (0.6)
Related[c]	2 (0.0)	0	2 (0.0)
Severe	32 (0.3)	33 (0.3)	65 (0.3)
Life-threatening	10 (0.1)	11 (0.1)	21 (0.1)
Any adverse event leading to withdrawal	1 (0.0)	0	1 (0.0)
Related[c]	0	0	0
Severe	0	0	0
Life-threatening	1 (0.0)	0	1 (0.0)
Death	1 (0.0)	0	1 (0.0)

a. N = number of subjects in the specified group. This value is the denominator for the percentage calculations.
b. n = Number of subjects reporting at least 1 occurrence of the specified event category. For "any event", n = the number of subjects reporting at least 1 occurrence of any event.
c. Assessed by the investigator as related to investigational product.
PFIZER CONFIDENTIAL SDTM Creation: 17NOV2020 (09:48) Source Data: adae Table Generation: 17NOV2020 (16:28) (Cutoff Date: 14NOV2020, Snapshot Date: 16NOV2020) Output File: ./nda2_unblinded/C4591001_IA_P3_2MPD2/adae_s091_all_2mpd2_p23_saf

Table 8. Number (%) of Subjects Reporting at Least 1 Adverse Event From Dose 1 to Data Cutoff Date (14NOV2020) – Phase 2/3 (All Subjects) – Safety Population

	Vaccine Group (as Administered)	
	BNT162b2 (30 µg) (N^a=21621)	Placebo (N^a=21631)
Adverse Event	n^b (%)	n^b (%)
Any event	5770 (26.7)	2638 (12.2)
Related[c]	4484 (20.7)	1095 (5.1)
Severe	240 (1.1)	139 (0.6)
Life-threatening	21 (0.1)	24 (0.1)
Any serious adverse event	126 (0.6)	111 (0.5)
Related[c]	4 (0.0)	0
Severe	71 (0.3)	68 (0.3)
Life-threatening	21 (0.1)	23 (0.1)
Any adverse event leading to withdrawal	37 (0.2)	30 (0.1)
Related[c]	16 (0.1)	9 (0.0)
Severe	13 (0.1)	9 (0.0)
Life-threatening	3 (0.0)	6 (0.0)
Death	2 (0.0)	4 (0.0)

Note: Data for subjects randomized on or after 10OCT2020 are included to comprehensively show all data reported but are subject to change with additional follow-up.
a. N = number of subjects in the specified group. This value is the denominator for the percentage calculations.
b. n = Number of subjects reporting at least 1 occurrence of the specified event category. For "any event", n = the number of subjects reporting at least 1 occurrence of any event.
c. Assessed by the investigator as related to investigational product.
PFIZER CONFIDENTIAL SDTM Creation: 17NOV2020 (09:48) Source Data: adae Table Generation: 17NOV2020 (16:29) (Cutoff Date: 14NOV2020, Snapshot Date: 16NOV2020) Output File: ./nda2_unblinded/C4591001_IA_P3_2MPD2/adae_s091_all_p23_saf

Deaths

There were two deaths reported in the vaccine group, both are assumed to be unrelated to the vaccine:

- One participant in the older BNT162b2 group experienced an SAE of arteriosclerosis and died 3 days after Dose 1.
- One participant in the older BNT162b2 group experienced an SAE of cardiac arrest 60 days after Dose 2 and died 3 days later.

Other possible side effects as listed by the FDA

FDA Safety Surveillance of COVID-19 Vaccines : DRAFT Working list of possible adverse event outcomes ***Subject to change***

- Guillain-Barré syndrome
- Acute disseminated encephalomyelitis
- Transverse myelitis
- Encephalitis/myelitis/encephalomyelitis/ meningoencephalitis/meningitis/ encepholapathy
- Convulsions/seizures
- Stroke
- Narcolepsy and cataplexy
- Anaphylaxis
- Acute myocardial infarction
- Myocarditis/pericarditis
- Autoimmune disease
- Deaths
- Pregnancy and birth outcomes
- Other acute demyelinating diseases
- Non-anaphylactic allergic reactions
- Thrombocytopenia
- Disseminated intravascular coagulation
- Venous thromboembolism
- Arthritis and arthralgia/joint pain
- Kawasaki disease
- Multisystem Inflammatory Syndrome in Children
- Vaccine enhanced disease

Other news on effects to be aware of

As we do not have all the clinical data from the other two vaccines, we do not know what the possible side effects may be. However, it is worth noting that the **AstraZeneca** vaccine had to be stopped twice for serious neurological outcomes of patients in the vaccine group.

One patient was diagnosed with multiple sclerosis and one with transverse myelitis. We do not have any data as to whether these conditions were caused by the vaccine, although, it is assumed by AstraZeneca that they were not. Transverse myelitis is listed as a side effect on other vaccine inserts and there has been an association made between multiple sclerosis and vaccines.

Use of the Vaccine in Vulnerable populations:

The following information comes from the Pfizer vaccine insert:

Pregnancy: There is not enough data to know the risks of vaccinating pregnant women with this vaccine. (Other vaccine use in pregnancy is still an off-label use.)
Lactation: There is not enough data to know the risk of vaccination and the effect of the vaccine components on milk production.

Pediatric use: The vaccine was only granted emergency status for those 17 years of age or older.
Immunocompromised: Although there were HIV positive and immunocompromised participants in the Pfizer study, the data on these participants was **not included in the FDA report/data** of the vaccine. We do not yet know the risks of vaccination for those who may be HIV positive or immunocompromised. Although, warning are given that the vaccine may not work as well in those who are immunocompromised.

Is the current legislation making this vaccine mandatory?

There is currently no legislation making the vaccine mandatory, however there is a bill in NYS that has been proposed to take such action. Utah has a similar bill. Public health officials have also made statements that affirm they will try to make the vaccine mandatory.

Private sector:
The airline Qantas, has stated that the vaccine will be mandatory for its passengers. Ticketmaster has also made implications that it may require vaccination or testing for those going to future events. Many companies are asking to be labeled as "essential" in order to get their workers the vaccine first. Employers may be able to force employees or those who want to use their services to provide proof of vaccination.

Any lingering questions about the COVID-19 vaccine? Email us at hello@researchbased.co