

What doctors want patients to know about COVID-19 herd immunity

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Earlier in the COVID-19 pandemic, the idea of herd immunity was thought to be the golden ticket out of this public health crisis. But with the [dangerous Delta variant](#) becoming the dominant strain of SARS-CoV-2 in the U.S., many Americans delaying or refusing COVID-19 vaccination, and people urged to mask up again in public indoor settings, the concept of herd immunity can seem as though it is out of reach.

Herd immunity occurs when a significant portion of a population becomes immune to an infectious disease, limiting further disease spread. For those who are not immune, they are indirectly protected because the ongoing disease spread is small. Learn more from this JAMA Patient Page, [“What is Herd Immunity?”](#)

Some epidemiologists have estimated that 70% of the worldwide population would need to be vaccinated against COVID-19 to establish herd immunity against the disease that’s already killed over 620,000 Americans. But, with the Delta variant driving up cases among the unvaccinated as well as causing [breakthrough COVID-19 infections](#), the threshold for herd immunity now seems to be higher.

Two AMA members took the time to discuss what patients need to know about herd immunity to clear up some of that misinformation. They are:

- [Peter Hotez, MD, PhD](#), dean of the National School of Tropical Medicine and professor of pediatrics and molecular and virology and microbiology at Baylor College of Medicine and Texas Children’s Hospital in Houston.
- Thompson W. Liddell, MD, an infectious disease specialist at Hattiesburg Clinic—a member of the [AMA Health System Program](#).

We're a long way from herd immunity

"I've stopped using the term," said Dr. Hotez, noting that some groups, especially those with political agendas, are using unrealistically low herd-immunity estimates to argue that "we don't have to worry about masks, vaccines or physical distancing."

Instead, Dr. Hotez has "started saying that these are the levels of vaccination we need to get to in order to start slowing or even halting virus transmission."

"Herd immunity really requires the whole herd and we're a long way from that," said Dr. Liddell, noting that [barely half of the total U.S. population](#) has been fully vaccinated against COVID-19. "We're seeing progress towards it and people are starting to look at this new wave and say it is time I go get vaccinated—it's pushing people as they see people get sick and they're hearing about the ICUs filling up again."

"All the concern that we have now—and I hope people do know that we are concerned—it's terrible to have this come back again in a new wave," he added, noting that "we're dealing with a worse version of the virus than we were before, so hopefully we're going to have some people change their minds on getting the vaccine ... and we can get a little control over this."

Herd immunity can be confusing

"Technically what herd immunity means is, depending on the level of transmissibility of an infectious agent, if enough people become infected and recover—and therefore are partially immune—or if they get vaccinated, it means that that will diminish, reduce or even halt virus transmission in the community," Dr. Hotez explained.

"Herd immunity is a confusing topic because it's different for different things," said Dr. Liddell. "But the general idea of herd immunity is that you have protection in a community."

"Even though a person may not have immunity for whatever reason—maybe they don't have a strong immune system, they're unable to get the vaccine or children are the obvious example right now—what we do is we surround them," he said. "We insulate them from the

virus by having everybody around them have immunity.”

“The best example is measles. Measles is one of the most transmissible agents,” said Dr. Hotez. “We know it has a reproductive number of between 12 and 18, and what that means is if you have over 90% of the population immune—either because of infection or vaccination—it can halt transmission. This has been more or less the situation for the last two decades in the U.S, until measles transmission resumed in 2019 due to local declines in immunization rates due to antivaccine targeting of parents.

“The way that 90–95% is often theoretically calculated is to use a simple equation: 1 minus 1 over the reproductive numbers, so 1 minus 1 over 12,” he added. (1 divided by 12 equals .083; subtracting that from 1 equals .916 or about 92%),” he added. “It’s kind of held up because once you get vaccination coverage below 90%, then you do start seeing breakthrough measles outbreaks.”

COVID-19 variants are disruptive

“People want to know what’s the threshold for herd immunity? What’s the percentage of people who have to be vaccinated?” said Dr. Liddell. “We can guess ... but we get very different answers because probably the most complicated piece of it is that COVID is changing.

“The Delta variant that we’re dealing with now is more transmissible, which is going to change the percentage that we need for herd immunity,” he added. “It’s now harder for us to achieve herd immunity with the Delta variant than it was with earlier COVID.”

“We’re fighting a moving target and the longer we let it move, the longer we let it change into something worse, the harder it is.” Dr. Liddell explained.

“The original lineage was thought to have a reproductive number of around two or three, so 1 minus 1 over 3 would be two-thirds, or 60% to 70% immunization or infection to create some kind of herd immunity,” said Dr. Hotez. “The problem, though, is the Delta variant [reproductive number] is much higher. Some say between five and eight. Others say between eight and nine, so we’re looking now at over 85% immunization rates for the

entire U.S. population ... which means that you'd have to pretty much vaccinate every adult and adolescent to make that happen."

"That's starting to happen in Vermont, and you are seeing a decline," he said. "You're not seeing the big upswing in transmission like you're seeing here in the south where vaccination rates are so profoundly low."

There's always going to be a risk

"If the majority of people are safe and have herd immunity, but there are populations where the virus is allowed to continue, the risk overall is lower because there's less virus happening," Dr. Liddell explained. "So, less virus happening means fewer replications, which means fewer mutations, fewer variants. But it is still happening."

"And with an infinite amount of time, even if it's happening less, it's still happening to that degree over time, so you're always going to have that risk," he added.

Widespread vaccination is key

"Vaccination is important in halting vaccine preventable diseases," said Dr. Hotez. "The most dramatic example was, from my perspective, *Haemophilus influenzae* type B—Hib meningitis.

"When I was a house officer in Boston in the eighties, I was admitting a very sick child with bacterial meningitis to my service every couple of weeks," he added. "And over a period of a couple of years, the disease more or less disappeared because of widespread vaccination."

That means that "vaccinating large cohorts works. It really can halt transmission," said Dr. Hotez. "By the time I was an attending physician I would practically teach about Hib meningitis for mostly historic interest."

"The goal of vaccinating is not really herd immunity. That ultimately is a good goal, but the goal of vaccinating right now with COVID is to protect the people around you and yourself,"

said Dr. Liddell. “If we really could vaccinate on a large scale, then yes we would have that barrier and we would be able to have herd immunity and we wouldn’t be as sick from this.”

“If it passes through everybody, then it is going to impact a larger amount of people, but if we can keep it controlled, the amount of people who get sick, the amount of people who die is much less,” he said, adding “whether or not we achieve herd immunity, every time someone gets the vaccine everyone’s safer.”

At least 85% need to be vaccinated

“What we need to do is we need to get 85% of the U.S. population vaccinated—we need all of the adolescents and all of the adults,” said Dr. Hotez, noting that “except for a few areas in the Northeast and maybe Pacific Northwest, it’s not happening.

“In fact, the opposite’s happening in the South and that’s why we’re seeing Delta rage through the South right now,” he added. “It’s going to be really problematic to get through a school year safely in many parts of the South unless we can fix these vaccination rates.”

Family immunity helps

“Especially for little kids, parents are the No. 1 person they’re interacting with,” said Dr. Hotez. That means “parents absolutely should get vaccinated.”

“I have four children. The best way I can keep them safe is as many people as possible around them being vaccinated, washing hands, wearing masks and isolating,” Dr. Liddell explained. “Obviously, if they stay by themselves all the time, that’s the safest they’re ever going to be, but that’s impractical and ridiculous.”

“It makes sense for people who can get vaccinated around them to be vaccinated,” Dr. Liddell said. “So, that’s how I’m going to keep my kids safe. They’ll be safe if I can create a safe environment for them, like we try to do with everything else.”

Discover [what doctors want parents to know about keeping unvaccinated kids safe](https://patients.ama-assn.org/public-health/infectious-diseases/what-doctors-want-patients-know-about-covid-19-herd-immunity).

The AMA has developed frequently-asked-questions documents on COVID-19 vaccination covering safety, allocation and distribution, administration and more. There are two FAQs, one designed to answer [patients' questions](#) (PDF), and another to address [physicians' COVID-19 vaccine questions](#) (PDF).