Medicine is an imperfect science, but you can still trust its process

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As an intensive care physician in Southern California who endured the onslaught of COVID-19 in 2020, it has been deeply disheartening to experience chillingly familiar scenes all over again. The ICUs in the

University of California San Diego Health hospital network where I work are again overflowing—especially with patients who need ventilators. Families peer through tinted hospital windows for glimpses of loved ones. And hospital administrators scramble to keep up with necessary staffing and beds to accommodate the influx of patients.

What is so vexing is that COVID-19 is still the culprit, despite the availability of highly effective vaccines that slashed U.S. COVID-19 daily case numbers and hospitalizations within months. The vaccines also allowed economies to begin to recover and provided a way for people to experience some sense of normalcy again.

In early spring, the efficacy of the vaccine engendered hope that herd immunity—in which infectious viral spread is prevented through a high proportion of the population's being immune to the disease—could be within reach in months. Instead, pandemic panic is again suffocating us, largely because a large part of the public still shuns vaccination—with only 62% of the eligible U.S. population fully vaccinated as of early September 2021.

I wanted an answer to the obvious question: Why?

Straight from the source

So I turned to my patients for answers. At the bedside in their hospital rooms, I first asked about how they were feeling and performed detailed exams before addressing the elephant in the room. "Did you receive the COVID-19 vaccine?" And if not, I gently asked, "Did you have a specific reason you could share with me, so I can understand better?"

Somewhat surprisingly, patients candidly told me their reasons for avoiding the vaccine.

A common response I heard was that it was simply inconvenient. "I was too lazy and I didn't get around to it," some admitted, looking away sheepishly as they did so. Curiously, they did not consider the myriad "inconveniences" of becoming infected, such as medical complications—including death—and associated costs for treatment, lost work, dependence on others for basic necessities such as child care, the risk of infecting family members, the potential for developing long-haul COVID-19 and more.

Others expressed a fervid distrust of vaccine-testing methods, stating that people had been "guinea pigs in past vaccine experiments that later caused autism." Yet more than 25 studies in the past 20-odd years have disproved any causal link between vaccines and autism.

Some felt that the forceful public messaging to get vaccinated belied true motivations of the authorities, adding: "I mean, why are they pushing this so hard? Something must be wrong with it." Yet few question the strong public health stance on healthy eating practices and exercise, or wearing seat belts while driving.

Still others feared the possibility of life-threatening side effects: "Thousands had heart attacks from the vaccine—it's all on the CDC website," they told me. So I took a close look at the CDC website to understand their claims better.

Reports of heart inflammation occurred in 699 cases out of 177 million vaccinated people, or 0.0004%, with causal links to the vaccines still being investigated. Development of blood clots causally associated with the Johnson & Johnson vaccine are also extremely rare, occurring in 28 cases out of 8.73 million doses given as of May 7, 2021—a rate of 0.0003%. This extremely low risk of blood clots is still significantly lower than the risk of blood clots from an actual COVID-19 infection.

Medicine as art and imperfect science

In some cases, political affiliation can partially explain vaccine antipathy. But my patients' responses highlighted two other themes to me.

First, people often forget that medicine is an art based on applied science, not a deductive science based on irrefutable forces in nature like gravity. Patients and families often ask me in the ICU to predict what will happen to loved ones unequivocally, only to be disappointed when I avoid speaking in certainties.

Once viewed as omniscient authorities, doctors now openly acknowledge that limitations of medical data require scrutiny and careful application to particular circumstances. COVID-19 has reinforced our appreciation that there are no perfect cures or 100% guarantees of success. Rather, medicine is governed by what is probable. What are the chances I still may have cancer if the test result returns negative? Am I more or less likely to survive pneumonia by taking this specific antibiotic?

Doctors must then engage in thoughtful analysis of the strengths and weaknesses of scientific methods and data to optimize and tailor our recommendations for individual patients—without the luxury of perfect or even complete datasets to rely on. The vaccine has clearly been shown—its rare side effects notwithstanding—to provide an overwhelmingly high likelihood of benefit over potential risks to almost all individuals. This includes people who have been previously infected with COVID-19. Yet the unvaccinated continue to fixate on rare side effects to justify skipping the shot.

Vaccines are medicines too

Many of my patients also seem to view vaccines and other public health-based recommendations like offers to buy a used car—with skepticism and independence, threatening to walk away at any moment. Doing one's part to stop the spread of disease is a culturally nuanced civic virtue, like safe driving, which transcends absolute autonomy. In the U.S., most drivers willingly do not drive while intoxicated, cross lanes without warning or block other cars that are trying to merge. These are norms that make driving in the U.S. relatively efficient, safe and even pleasant compared with some other countries.

The path to herd immunity, like highway safety, requires majority participation without immediate guarantees of complete personal freedom. Vaccines succeed not because they are 100% risk-free to the individual but because collective efforts focus on achieving the common good.

Oddly, at the same time that my patients rejected the vaccine, they showed strong interest in receiving other types of medicine "shots" like monoclonal antibodies—which mimic natural antibodies—or anti-inflammatory medications. While some of these treatments have demonstrated benefits in certain situations—others have not. And some present the risk of very serious harm.

I reminded my patients that the COVID-19 vaccine stimulates a person's own immune system to make antibodies that can neutralize the virus and that surpass the capabilities of commercially created antibody formulations. So the vaccines help prevent infection and development of serious illness from COVID-19 in the first place. People who experience the rare breakthrough infections following vaccination generally have a shorter and milder course of COVID-19 infection and are far less likely to end up hospitalized than those who are unvaccinated. Vaccines also confer longer-term protection, whereas the other medications are used reactively—when a serious infection has already begun—and those

medications have shorter-term results.

How past vaccination efforts succeeded

In the past, many vaccines that successfully vanquished societal outbreaks of polio, measles and mumps are now routinely administered in childhood with minimal objection, despite the fact that there is no such thing as zero risk.

As I continue to have conversations with patients who suffer greatly from COVID-19 illness as a direct consequence of having avoided the vaccine, my own pain—for being an ineffective healer and witness to such loss—is inexorable. Overcoming this fourth wave of COVID-19 still feels out of reach until our vaccination efforts can somehow better emphasize the effectiveness of vaccines, even when scientifically imperfect, and prioritize civic health care responsibilities over pure autonomy. If not, I fear that our battle against COVID-19 will rage on.

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