



Let Us Go Then ...

Vaccination, Anesthesia, and Teachable Moments

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SARS-CoV-2 did not “just go away.” By the time you read this, more than 200,000 Americans will have died from COVID-19. We are on track to have more than 300,000 Americans die by the end of 2020 (asamonitor.pub/3gclPaV), making COVID-19 the third-leading cause of death in the United States after heart disease and cancer.

I have been modeling the spread of SARS-CoV-2 worldwide since late March. (Readers interested in my daily updates can contact me at steven.shafer@stanford.edu). Over the past six months, a worldwide ensemble of scientists has tackled every aspect of the biology of the SARS-CoV-2 virus and the clinical management of COVID-19, the disease it causes. This unprecedented global scientific enterprise has produced an exceptionally detailed understanding about SARS-CoV-2 and COVID-19. It has also made unprecedented progress in developing a vaccine. Although much remains unknown (for example, we only have eight months of data!), the progress to date provides insight into what 2021 may look like:

1. Last year, there were four endemic seasonal coronaviruses in humans, HCoV-NL63, HCoV-229E, HCoV-OC43, and HCoV-HKU1 (*J Clin Virol* 2018;101:52-6). Now there are five. SARS-CoV-2 is not going away, now or ever.
2. The antibody response to the four endemic coronavirus infections typically lasts six to 12 months, with reinfections with the same coronavirus strain every six months to 36 months (asamonitor.pub/3kTX9Yc).
3. Antibodies to SARS-CoV-2 follow the same pattern, with rapid decreases in the first weeks and months after infection (asamonitor.pub/346uJnR).
4. Serology studies looking for the prevalence of antibodies in a population will underestimate the total number of individuals who have been infected, because the antibodies in many infected individuals will be undetectable months later.

We will never know the true number of individuals infected.

5. Unlike the antibody response, which is specific to the coronavirus strain, the CD4⁺ and CD8⁺ T cell responses are both durable and cross reactive among the endemic strains and SARS-CoV-2 (*Cell* 2020;181:1489-1501; *Nature* July 29, 2020; *Science* August 4, 2020).
6. T cell-mediated immunity to a recent coronavirus infection may decrease clinical severity, explaining some of the clinical variability of COVID-19 (*Nature* July 29, 2020).
7. Early vaccine studies demonstrate both humoral (antibody) responses and T cell activation (*Lancet* 2020;396:467-478; *N Engl J Med* July 14, 2020; *Nature* July 30, 2020). The humoral response may be evanescent, similar to the response to infection itself. However, T cell activation may provide durable protection. Even if the vaccine does not provide complete and durable immunity, it may significantly attenuate clinical severity for several months to a year or more.

Once vaccines become available, SARS-CoV-2 can be managed like influenza, including the need to regularly adapt the vaccine to account for novel mutations (*Pathogens* 2020;9:e565).

8. A reasonable expectation is that next year we will see the introduction of one or more vaccines that provide moderate immunity for six to 12 months and reduce the severity of disease for those who become infected. The vaccine may require yearly re-vaccination, just like the influenza vaccine. It might even require booster shots after the first vaccination. So what? It will bring the pandemic under control.

The above projection, if accurate, represents utterly astounding progress! Reducing this pestilence of seemingly biblical proportions to yet another manageable infectious disease demonstrates the power and ingenuity of modern science. Unfortunately, there is a weak link in my hopeful projection: us.

The anti-vaccination movement in the United States has never been stronger (*Science* 2020;368:699). A recent study has suggested only 50% of Americans would wish to be vaccinated when a vaccine becomes available (asamonitor.pub/2Ycwe01; *Science* June 30, 2020). That assumes the vaccine meets the usual requirements for safety. If the vaccination is rushed through the approval process and produces significant adverse effects in even a modest number of individuals, it may be overwhelmingly rejected. My frustrated response is to let natural selection work its magic. However, as a physician I am morally, ethically, and professionally bound to advance the health of my patients.

I have always admired the tireless efforts of Dr. David O. Warner to utilize the perioperative “teaching moment” to advocate for smoking cessation (*Anesthesiology* 2010;112:102-7). Patients arriving for surgery, an often life-changing event, are willing to listen to their anesthesiologist. Following Dr. Warner’s advice, if my patient is a smoker, then I use this as an opportunity to discuss smoking cessation.

“Did you have a cigarette today? When are you going to have another cigarette? How do you think that will affect your recovery? Since you have stopped for X days, do you think you could stop for a few more days? How about a week? How about throwing out your cigarettes when you get home? Your matches and ashtrays, too! How about calling me in a week to share your success with stopping smoking?”

These days, my patients are eager to talk about COVID-19. I talk about where we are in the battle against SARS-CoV-2. I talk about the latest papers in *Science*, *Nature*, *The Lancet*, and the *New England Journal of Medicine*. I talk about my models and forecasts. A few of my patients are now getting my daily updates.

As soon we are close to having a vaccine, I will start talking to my patients about getting vaccinated. In the preoperative setting, my patients are about to trust me with their life. I listen to them, and they listen to me. As the conversation turns to COVID-19, I intend to bring up vaccination. I hope they will listen to my explanations of how vaccination remains the greatest public health advance in history. Once it is available, I will explain why, and how, I got vaccinated. I will encourage them to do the same.

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We have a uniquely influential role in the health trajectory of our patients. The hours under our care are among the most vulnerable hours of their lives. We are their guides and protectors during these critical minutes. Most understand that when we speak to them before surgery.

Let’s use our preoperative visits to educate millions of patients on the critical role of vaccination in ending the great pandemic of 2020. By educating our patients, and leading by example, we can play a role translating the amazing scientific progress of 2020 into an equally amazing public health success in 2021. We can play a critical role restoring a “normalish” post-pandemic life in the years ahead. ■