

SAR has received hundreds of pleas for assistance over the past several days, Quinn says.

Things could turn very bleak very fast for scholars left behind—even those not in the Taliban's crosshairs. Mayar anticipates that a cash-strapped Taliban regime is unlikely to pay salaries to university faculty and staff, as happened during its previous rule. "There's also a high potential that academic facilities will be looted," says Alex Dehgan, who as country director for the Wildlife Conservation Society from 2006 to 2008 helped establish Afghanistan's first national park, Band-e-Amir.

Academic life is inimical to the Taliban's ideology, Mashal says. "Hardly anybody in the Taliban leadership is educated," he says. Rank-and-file fighters are mostly "brain-washed kids coming out of the madrassahs. They're trained to only think about two things: heaven and hell." In a sign that the Taliban intends to assert control over universities, it installed its own rector at Paktia University in Gardez. "Their idea is to handicap these institutions. Push them back to the first century," Mashal says.

Many U.S. institutions are trying to protect former collaborators by purging their websites and social media accounts of any mention of past cooperation. And they are coordinating with Biden administration officials and Congress on how to steer scholars to safe harbors.

Michigan State University's Grain Research and Innovation Project, for example, has trained researchers in Kabul in recent years and placed 33 students—including 12 women—in graduate programs at Kabul University and two Indian universities. Now, the program is trying to rescue the researchers it nurtured. "We want to find a good home for them where they can practice their science, where they can raise their families, where they can be safe and secure," says project director Kurt Richter. From his haven in Germany, Mashal has arranged a visa for an Afghan student to come to his university for doctoral studies.

With his own fellowship ending in November, Mashal has applied to SAR for his next lifeline. He has no intention of returning to Afghanistan while the Taliban is in power: "I don't want to die." But he agonizes over the perils his friends and remaining family members face back home. As Kabul was about to fall, he developed "extreme anxiety" and now has trouble sleeping. "I try to console my colleagues. I try to console my family. And I try to console myself," he says. "But it's so painful to see the devastation. The loss of everything we risked our lives for." ■

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COVID-19

Unethical? Unnecessary? The booster debate intensifies

As United States reveals its plan to offer an extra dose of COVID-19 vaccine, equity and scientific questions abound

By **Gretchen Vogel**

As the extraordinarily infectious Delta variant of SARS-CoV-2 continues to spread around the world, vaccines' powers are showing their limits. Although they are still extremely effective at preventing severe COVID-19, the tantalizing hope that the shots could block almost all infections—and squelch transmission—has evaporated. That has upended return to office and school plans, threatened economic recoveries, and spurred fresh political rows over mask and vaccination mandates.

Now, amid hints that vaccine-induced immunity is waning, policymakers and scientists are debating whether widespread booster shots could help—or whether getting shots into the arms of the unvaccinated should remain the top priority. And many people wonder whether one booster will suffice or periodic COVID-19 vaccination will become the new normal, as it is for influenza.

On the latter question, some scientists say experience with other vaccines suggests a single well-timed booster may provide long-lasting immunity. But others contend the booster rush is premature given scant data on their effectiveness and best timing. "We don't understand who is going to need a booster, how long after their last dose, or which vaccine combination works best," says physician-epidemiologist Bruce Aylward, a senior adviser at the World Health Organization (WHO). "You need to understand all that before you decide how boosters should be used."

That hasn't stopped booster rollouts in countries like Israel, which is seeing a Delta-fueled surge of COVID-19 cases, hospitalizations, and deaths, despite one of the earliest and fastest vaccine campaigns in the world. More than 60% of the Israeli population has received two doses of Pfizer's messenger RNA (mRNA) vaccine, but on 30 July, Israel began to offer a third dose of the vaccine to anyone 60 and older—the first country to do so. On

20 August, it said everyone 40 and older should get one.

WHO and other organizations have warned strongly against such broad booster rollouts, mainly because many high-risk people worldwide have not even received a first vaccine dose. Giving boosters now "is unfair to say the least, potentially ... even criminal," says Tulio de Oliveira, a computational biologist at the University of KwaZulu-Natal, Durban, who has used sequencing to track the pandemic's spread in Africa.

The United States and several other countries have started to give boosters to people with weakened immune responses or at high risk of developing serious COVID-19. Some regions are also recommending

boosters for health care workers, as even mild breakthrough cases can hobble the health system if staff have to isolate. Giving a third dose to those smaller groups is less controversial; the expected benefits are somewhat clearer, and the numbers of COVID-19 vaccine doses required only have a marginal

impact on global supplies, Aylward says.

But other wealthy countries may well follow Israel's lead and make boosters available to nearly everyone. On 18 August, just days before the U.S. Food and Drug Administration gave full approval to Pfizer's COVID-19 vaccine, the Biden administration said it would provide boosters more broadly in September, although that would first require approval by FDA and by a U.S. panel that recommends which specific populations should receive immunizations.

Many vaccine experts argue there isn't enough evidence that boosters are needed or will truly help control the pandemic, especially because multiple studies show existing vaccine regimens are holding strong against severe disease. A large study of patient health records in New York state, published on 18 August in the *Morbidity and Mortality Weekly Report*, found that vaccine efficacy against all SARS-CoV-2 infections dropped from 91.7% to 79.8% between May

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Bruce Aylward,
World Health Organization



Israel has started to administer COVID-19 booster shots to people ages 40 and older.

and July, as Delta took over in the region. But protection against hospitalization for COVID-19 stayed close to 95%. Data from the Israeli Ministry of Health suggests protection against severe disease is still nearly 92% for people 50 and younger and 85% for those older than 50.

That suggests boosters are the wrong way to use the world's still limited vaccine supply, says Aylward, who helps coordinate the COVID-19 Vaccines Global Access Facility, which distributes doses to low- and middle-income countries. If everyone in high-income countries received boosters, that would use up 1 billion doses, Aylward estimates. "You're dealing with a finite, zero-sum resource," he says. "You are reducing supply for those who need it more."

Even preparing for possible boosters disrupts the supply and distribution system, he says, as countries stock up on extra doses. "The U.K. has 66 million people and recently bought another 110 million doses—and they already have 80% of the [eligible] population vaccinated," de Oliveira says, "while at the moment Africa is at less than 3%."

Others don't deny that boosting in rich countries might disadvantage the rest of the world, but say that, scientifically speaking, a third dose is likely to help shore up the immune system. "[Vaccine] efficacy drops with Delta. That is indisputable," especially for mild disease, says Leif Erik Sander, an infectious disease expert at the Charité University Hospital in Berlin.

Other vaccines require three shots to confer long-lasting protection, including those for hepatitis B and tick-borne encephalitis. And some scientists have suggested the current COVID-19 vaccine dose spacing—just

3 to 4 weeks between mRNA doses, for example—was chosen not to provide long-lasting immunity, but to speed clinical testing. A boost months later may be ideal, they say, and doesn't necessarily mean yearly updates will be needed. Although SARS-CoV-2 is evolving in dangerous ways, it does not seem to undergo the same type of genetic shuffling flu viruses do in other animals.

"A third dose is a good idea," says Akiko Iwasaki, an immunologist at Yale University. Although at-risk groups should receive them first, she adds, "if there are enough doses, I think the general public will benefit," both because they are likely to help reduce SARS-CoV-2's spread and because even mild COVID-19 can lead to long-term complications.

In Israel, there are signs that the third shots are reducing infections in older people. "The very preliminary data look like it is having an effect," says Barak Raveh, who studies dynamic systems at the Hebrew University of Jerusalem. His analysis of the Health Ministry's data suggests protection against SARS-CoV-2 infection for vaccinated people has climbed in recent weeks, likely driven by boosters; 80% of people in their 70s have already received a third dose.

There's no telling how long that fortified immune shield will last. Multiple trials are underway to more precisely measure the effects of boosters—including mixing and matching different types of COVID-19 vaccines—but they will likely take several more months. As with so much in the pandemic, policymakers will have to make far-reaching decisions long before clear answers are in. ■

With reporting by Meredith Wadman.

SCIENTIFIC INTEGRITY

Honesty study was based on fabricated data

Made-up data set raises questions about behavioral scientist Dan Ariely

By Cathleen O'Grady

Dan Ariely is a behavioral science superstar. His research on honesty, cheating, and irrationality is "extremely clever and extremely intuitive," says behavioral scientist Eugen Dimant of the University of Pennsylvania—and it has had a huge impact on both the field and government policies. Ariely, who founded the Center for Advanced Hindsight at Duke University, has also written three *New York Times* bestsellers and is a TED Talks regular.

But some researchers are calling Ariely's large body of work into question after a 17 August blog post revealed that fabricated data underlie part of a high-profile 2012 paper about dishonesty that he co-wrote. None of the five study authors disputes that fabrication occurred, but Ariely's colleagues have washed their hands of responsibility for it. Ariely acknowledges that only he had handled the earliest known version of the data file, which contained the fabrications.

Ariely emphatically denies making up the data, however, and says he quickly brought the matter to the attention of Duke's Office of Scientific Integrity. (The university declined to say whether it is investigating Ariely.) The data were collected by an insurance company, Ariely says, but he no longer has records of interactions with it that could reveal where things went awry. "I wish I had a good story," Ariely told *Science*. "And I just don't."

Finding possible fraud in the work of such an influential scientist is jarring, Dimant says, especially for "the new generation of researchers who follow in his footsteps." Behavioral scientists Leif Nelson and Joseph Simmons, who exposed the apparent fraud via their blog Data Colada together with their colleague Uri Simonsohn, say a thorough, transparent investigation is needed. But given other universities' past reluctance to investigate their own researchers, they are skeptical that Duke will conduct one.

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