Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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EDITOR'S PAGE

The Case for Mandatory COVID-19 Vaccination of Health Care Workers

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In combination with social distancing and wearing masks, we know that vaccination is the key to controlling the COVID-19 virus, so why are we having a discussion about a vaccine mandate for health care workers? The Delta variant of the COVID-19 virus is a deadly, highly infectious variant that is surging in its fourth wave across the United States and much of the world. Available hospital beds are again rapidly filling or full, and we do not have enough nursing staff to expand bed capacity to care for more patients. We cannot afford to lose our nursing and technical staff to a community superspreader event with our beds full and patients queuing for admission in our emergency departments. Much of the United States is once again in crisis mode.

By some reports, roughly one-half of all health care workers/hospital employees are not vaccinated, despite having 3 highly effective and safe vaccines available to us for the past 8 months (1). A small number of this unvaccinated group are the so-called anti-vaxxers, a group that uses far-fetched and sometimes irrational arguments to support their views, but are hardened in their convictions not to be vaccinated. A much larger number of the unvaccinated are the "hesitant" group, who offer a variety of reasons for being unwilling to take the emergency use authorization (EUA) vaccine.

Understanding the rationale behind these well-educated professionals' hesitancy to receive the vaccine for SARS-CoV-2 is complicated. These are smart health care workers who have been caring for these very sick COVID-19 patients for over a year. They have seen the isolation, the suffering, and the morbidity and mortality of this pandemic firsthand. They have the ability to read the clinical trial data and Centers for Disease Control and Prevention guidance, and to make a very informed risk-versus-benefit decision that, objectively, strongly favors vaccination. Why then the hesitancy?

The work of psychologists Amos Tversky and Daniel Kahneman might help us understand why people can know the right thing to do for the population (ie, vaccination in this case), but fail to do it personally. Tversky and Kahneman's development of Prospect Theory describes how individuals assess their potential for loss or gain in an asymmetric manner, dominated by an aversion to losing something they have (2). Loss aversion is based upon the observation that people react differently when faced with potential losses or potential gains relative to their specific situation. In experiments assessing an individual's willingness to bet on a coin toss, subjects typically had to be offered the opportunity to win double the money they risk in order take the bet, bringing to mind the proverb "a bird in the hand is worth 2 in the bush." Those hesitant about vaccination overemphasize their risk of experiencing a vaccine side effect (their short-term personal loss of feeling well), and undervalue the personal benefit of vaccine protection (belief that their risk or consequence of infection is less than it really is).

Clearly the argument for community, patient, and coworker safety has not resonated sufficiently with the vaccine-hesitant. Positive rewards such opportunities to win a lottery or to be rewarded with

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additional vacation time have not been effective, likely because these potential benefits do not change their personal calculation of loss aversion enough for them to act.

So what strategies are available to create a safe environment for our patients and our coworkers? One option is mandating COVID-19 vaccination, for those who can get it safely without a valid exception, as a condition of employment. We do this now for the influenza vaccine in most hospitals. The argument against this strategy is that the vaccine is not Food and Drug Administration (FDA) approved. This has not stopped several hospital systems from moving forward with this strategy (3). Others have stated they will mandate SARS-CoV-2 vaccination once the FDA approves it (3).

Given the mountains of data that have been accumulated on the current EUA vaccines' safety and efficacy, many ask why the FDA has taken so long to issue approval. One possible reason behind the FDA's delaying formal approval is that as long as the vaccines are under EUA, the Federal government can control distribution and offer the vaccine for free. Once the FDA approves the vaccines, the control over distribution and cost of the vaccine will revert to the manufacturers. Relying on private companies, who serve shareholders, not the public, may not be the best public health strategy to contain this virus.

A novel strategy being considered by some hospitals is aimed at reframing an individuals' loss aversion assessment by increasing the burden for the unvaccinated, while improving safety for patients and coworkers (3). Unvaccinated employees will be required to (uncomfortably) wear N-95 masks at all times at work and to undergo weekly (inconvenient/uncomfortable) COVID-19 testing during their off-hours. Vaccinated workers can wear surgical masks in clinical areas where an N-95 mask is not indicated. This significant level of burden may well nudge the vaccine-hesitant to receive the vaccine because it will amplify the perceived benefit to them personally.

Hospitals are facing very difficult decisions. Imposing additional safety/protection burdens on those who refuse vaccination, or mandating vaccinations, has the potential to alienate or push health care workers to leave their jobs in the current severe labor shortage. This dilemma may explain the current approach of encouraging, but not mandating, vaccinations for many. Indeed, what has become clear from what we have observed in the past year is that the COVID-19 pandemic has become much more complicated than solving a public health problem with safe and effective vaccines. With such a large percentage of our population unprotected against increasingly infectious strains of the virus, there is no end in sight without widespread vaccination. Allowing the virus to rage in the community while we wait for "natural" herd immunity comes with an unacceptable loss of life and suffering. Health care workers have a clear duty to not harm patients. The potential for asymptomatic infected caregivers and other hospital employees to infect vulnerable patients is real and is likely happening in our hospitals today. The obvious first step is to vaccinate all health care workers, and the sooner the better. So, on behalf of the editors, we strongly encourage our journal's readers who are not vaccinated to get vaccinated. Moreover, if you are in a health care system that does not require vaccinations, please take a moment to ask your colleagues and staff if they are vaccinated, and encourage those who are not to become vaccinated. We would do this for our patients, and we should do this for our colleagues and coworkers as well.

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