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Get Vaccinated, or Get COVID-19

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Forget herd immunity. You have a binary choice: get vaccinated, or get COVID-19. It's not more complex than that. If you are fully vaccinated, you are unlikely to get COVID-19 and have almost no chance of dying. If you don't get vaccinated, COVID-19 will find you. When it does, you will have about a 1% chance of dying and about a 25% chance of long-term sequelae. You will also lend your body to the virus as a bioreactor for producing yet more infectious variants. Thanks a lot.

Introduction

With the emergence of new variants of SARS-CoV-2, another wave of COVID-19 is crossing the globe (asamonitor.pub/3ki9qb3). Driven by the Delta variant, new cases are surging in two of the most vaccinated countries in the world, Israel and the U.K. (asamonitor.pub/3hGdrnR). See Figure 1. The Delta variant has been rising rapidly in the United States and now accounts for more than half of the new cases of COVID-19 (asamonitor.pub/3BfRTq7). See Figure 2.

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Improving Perioperative Brain Health: Turning Knowledge Into Action

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Most anesthesiologists are aware of the ASA Perioperative Brain Health initiative (PBHI) (asamonitor.pub/2UcqKDd) and its goals to increase awareness of perioperative delirium and perioperative neurocognitive disorders (PND) and to promote action to reduce the incidence of these conditions. The number of papers published on delirium and PND in scientific journals, as well as guidelines and systematic reviews, increases year on year. A recent important paper in *JAMA Surgery* drew attention to the economic impact of delirium and, consequently, made the business case for more investment and preventative action (*JAMA Surg* 2021;156:430-42). An accompanying

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Circle of Life or Hamster Wheel? The World of Obstetrical Anesthesia

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Hello readers, hopefully everyone enjoyed the summer and is looking forward to an academic year with a large degree of normalcy restored. Notably, most schools look to be reconvened 100% in-person, with minimal to no masking requirements and removal of plastic barriers. Can you imagine that, despite the anxiety, uncertainty, and disruptions related to the COVID pandemic, people still found the proper mindset to procreate? This is, of course, no surprise and is doubtless comforting to ***Dr. Sharon Reale****, our Expert this month. Sharon is in the business of obstetric anesthesiology, and she counts on a steady flow of new babies to safeguard her livelihood, pandemic or no pandemic…*

Welcome Sharon, can you describe your current position and responsibilities?

Thanks very much, Zach. I am an obstetric anesthesiologist at Brigham and Women's Hospital in Boston. Our labor and delivery unit performs approximately 7,000 deliveries a year, and we are a quaternary referral maternal care center. Currently, I am the director of resident education and the associate fellowship program director for the division of obstetric anesthesia. I become the fellowship program director in the fall. My research focuses on using large databases to study maternal morbidity and mortality.

Let's start with some nuts and bolts: what techniques do you favor for epidural/spinal anesthesia in terms of needles/equipment, dosing, and medications?

One of my favorite techniques for epidural analgesia is the dural puncture

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In the Know: Get Vaccinated, or Get COVID-19

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It has been estimated that R0 for the Delta variant, the initial reproduction number in a susceptible population, is approximately 7 (*Lancet* July 2021). Herd immunity occurs when a closed group of individuals has sufficient immunity that a new infection does not initiate an outbreak. The threshold can be calculated as 1-1/R0. For the Delta variant, the herd immunity threshold is 1-1/7, or 86%. No country is close to that level of immunity. However, it probably does not matter. Herd immunity requires a closed system to protect those without immunity. As long as new cases are continually introduced from outside the "herd," nobody inside the herd is safe without immunity. Put another way, unvaccinated individuals are not protected if even 86% of their neighbors are vaccinated. Our exceptional social mobility ensures that individuals from outside will continuously expose everyone in the community to COVID-19. If you are not vaccinated, you will eventually get COVID-19. It is only a matter of time. With the Delta variant, you may not have to wait very long.

Manaus, Brazil, and Iquitos, Peru

In March of 2020, Manaus, Brazil, the capital of the Amazonas state, reported its first case of COVID-19 (*Science* 2021;371:288-92). Serologic surveys suggested that attack rate for SARS-CoV-2 was 66% as of June 2020 and 76% as of October 2020. The toll was horrific. By October, there were approximately 1,200 confirmed COVID-19 deaths per million inhabitants and 1,800 acute respiratory syndrome deaths per million inhabitants. These figures were generally higher than the observed mortalities in other countries: U.K. – 620 per million, France – 490 per million, or the U.S. – 625 per million. Perhaps the worst was over for Manaus, Brazil.

As can be seen in Figure 3, the residents of Manaus likely thought that by August 2020, the worst was over (*Lancet* 2021;397:452-5). Physical distancing was eased and, after several months, entertainment venues opened. The Gamma ("P1") variant appeared in Manaus in December (*Science* 2021;372:815-21). In January 2021, all hell broke loose (*Lancet* 2021;397:452-5). "Herd immunity" proved meaningless. Cases and deaths surged to rates not previously seen. Figure 1 tells the same story as Figure 3 about the outcome when a population believes "the worst is over" just as a more infectious variant appears. As mentioned two months ago in this column, "it ain't over 'til it's over" (*ASA Monitor* 2021;85:1-7).

The Gamma variant also caused a resurgence in Iquitos, Peru. As reported by Álvarez-Antonia and colleagues, last summer serological data suggested that 65%-85% of the Iquitos population was immune, depending on age (*Lancet* 2021;9:E925-31). Despite high levels of immunity, the Gamma variant caused a second surge in January 2021. As shown in Figure 4, the surge resulted in an acceleration of case and death rates throughout Peru, which now has the highest mortality in the world (asamonitor.pub/3wHRlWc). One in 150 Peruvians have died from COVID-19.

Herd immunity failed to protect Manaus, Brazil, or Iquitos, Peru, from a highly infectious variant. Because restrictions had been relaxed, both experienced surges in cases and deaths as severe as during the original wave of the pandemic. These cities are cautionary tales for the rest of the world.

In a perspective article in *Science*, two University of Edinburgh researchers review the implications of the surges in Manaus and Iquitos on public health strategies for SARS-CoV-2 (*Science* 2021;371:230-1). Drs. Sridhar and Gurdasani conclude that "Achieving herd immunity through infection will be very costly in terms of mortality and morbidity, with little guarantee of success …. Even a mitigation strategy whereby the virus is allowed to spread through the population with the objective of keeping admissions just below health care capacity, as is done for influenza virus, is clearly misguided for SARS-CoV-2."

European spread of SARS-CoV-2

In a February 2021 *Nature* article, European and American researchers discussed the problems associated with managing the spread of SARS-CoV-2 during the "second wave" of COVID-19 in early 2021 (*Nature* June 2021). Regarding the minimization of disease burden spread, the authors comment, "We believe that travel policies may be a key consideration in this respect because similar conditions may arise as the ones we demonstrated to provide fertile ground for viral dissemination and resurgence in 2020." The authors cite a recent study predicting dire consequences following premature or sudden cessation of containment efforts (*Lancet* 2021;21:P793-802). In their conclusion, the authors note, "Well-coordinated European strategies will therefore be required to manage the spread of SARS-CoV-2 and reduce future waves of infection, with hopefully a more

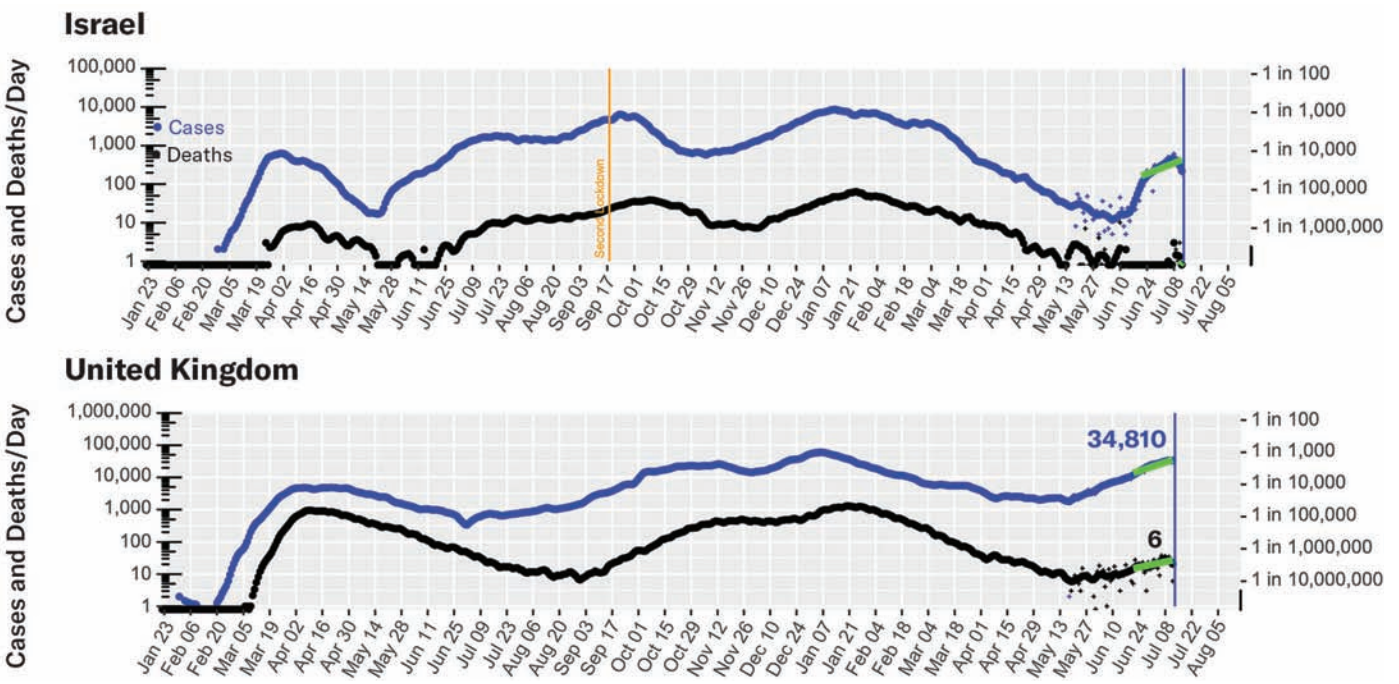

Figure 1: Despite aggressive and initially highly successful vaccination campaigns, daily case rates are accelerating in both Israel and the U.K., as shown below (July 13, 2021) (asamonitor.pub/3BfRTq7). The surge is primary from the Delta variant infecting unvaccinated individuals. Deaths are not rising in Israel (yet) because of the high priority given to vaccinating its elderly and vulnerable populations.

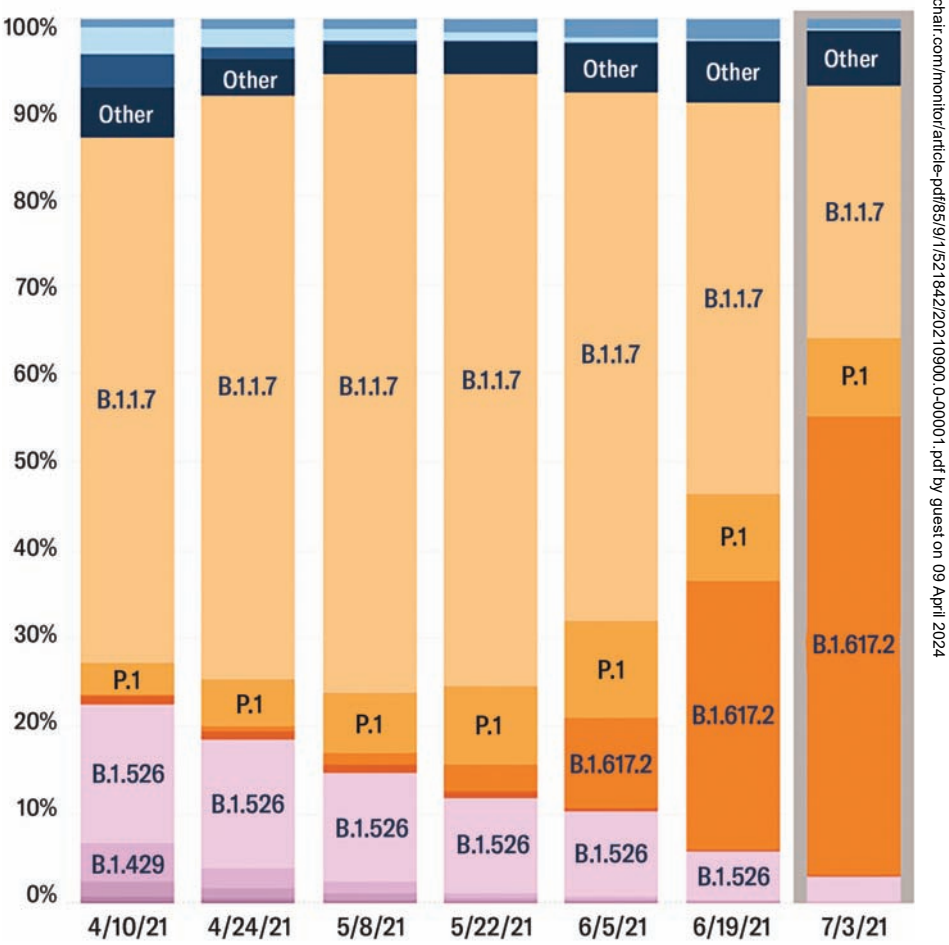

Figure 2: Projections from the CDC documenting the rapid rise in the Delta variant (called "B.1.617.2 below) from April through early July (*The Lancet* July 2021).

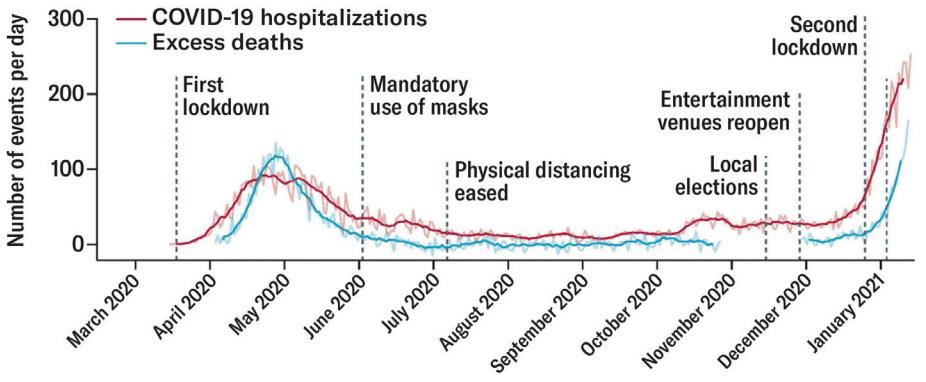

Figure 3: Based on approximately 75% attack rate and low levels of daily cases and deaths, it appeared the worst was over in Manaus, Brazil, last fall (*ASA Monitor* 2021;85:1,6-7). Restrictions were relaxed. In December, the appearance of the Gamma ("P1") variant resulted in cases and deaths surging to rates not previously experienced, eventually forcing another lockdown. Adapted from *ASA Monitor* 2021;85:1,6-7.

unified implementation than hitherto observed." Presciently, the authors voice concern that future spread in Europe may "also involve the spread of variants that evade immune responses triggered by vaccines and previous infections."

According to the most recent technical briefing published by Public Health England (PHE) on SARS-CoV-2, the Delta variant now accounts for nearly all cases of SARS-CoV-2 (asamonitor.pub/3iiKuh3). Between February 1, 2021, and June 21, 2021, the U.K. reported a total of 123,620 cases of confirmed Delta variant COVID-19, with 71,932 being unvaccinated and 14,359 having unknown vaccination status. This is similar to the experience reported in Belgium in late May 2021 (asamonitor.pub/3kqKhea). In the Nos Tayons assisted-living facility in Nivelles, Belgium, 119 of the 121 residents were fully vaccinated against SARS-CoV-2. Despite nearly 100% vaccination, 55 still developed COVID-19, of which 12 eventually died (asamonitor.pub/3kmwKEp). There were also 16 cases of COVID that were identified among the 107 staff (76% of whom were fully vaccinated).

The events that transpired at the Nos Tayons facility were consistent with the findings of a study that compared the immune responses of elderly patients and younger health care workers who received the BNT162b22 (Pfizer/BioNTech) vaccine (*Nature* June 2021). After the initial dose of vaccine, reduced neutralization potency against the Alpha, Beta, and Gamma variants relative to wild-type SARS-CoV-2 was noted in participants who were older than 80 years. After the second shot, however, neutralization was noted in all age groups.

Conclusion

The current consensus is that, provided both shots of the vaccine are given (unless the manufacturer only recommends a single shot), vaccines confer significant immunity against infection and exceptionally strong protection against death from the known variants (*Science* 2021;371:1103-4; *Nature* July 2021; *Cell* June 2021; *J Travel Med* July 2021; *Lancet* 2021;397:2461-2).

That's excellent news. Although the variants have reduced vaccine efficacy, vaccines remain generally effective at reducing the probability of infection and hugely effective at reducing the possibility of death.

We can count on the virus evolving. As the virus increasingly seeks to infect those with pre-existing immunity, it will adopt new mutations that evade existing immunity. We can prevent this by vaccinating the world as quickly as possible. As succinctly stated by Altmann et al., "A virus that cannot transmit and infect others has no chance to mutate" (*Science* 2021;371:1103-4).

Get vaccinated, or get COVID-19. To paraphrase Albus Dumbledore, "It is our choices that show what we truly are" (Harry Potter and the Chamber of Secrets. 1998). ■

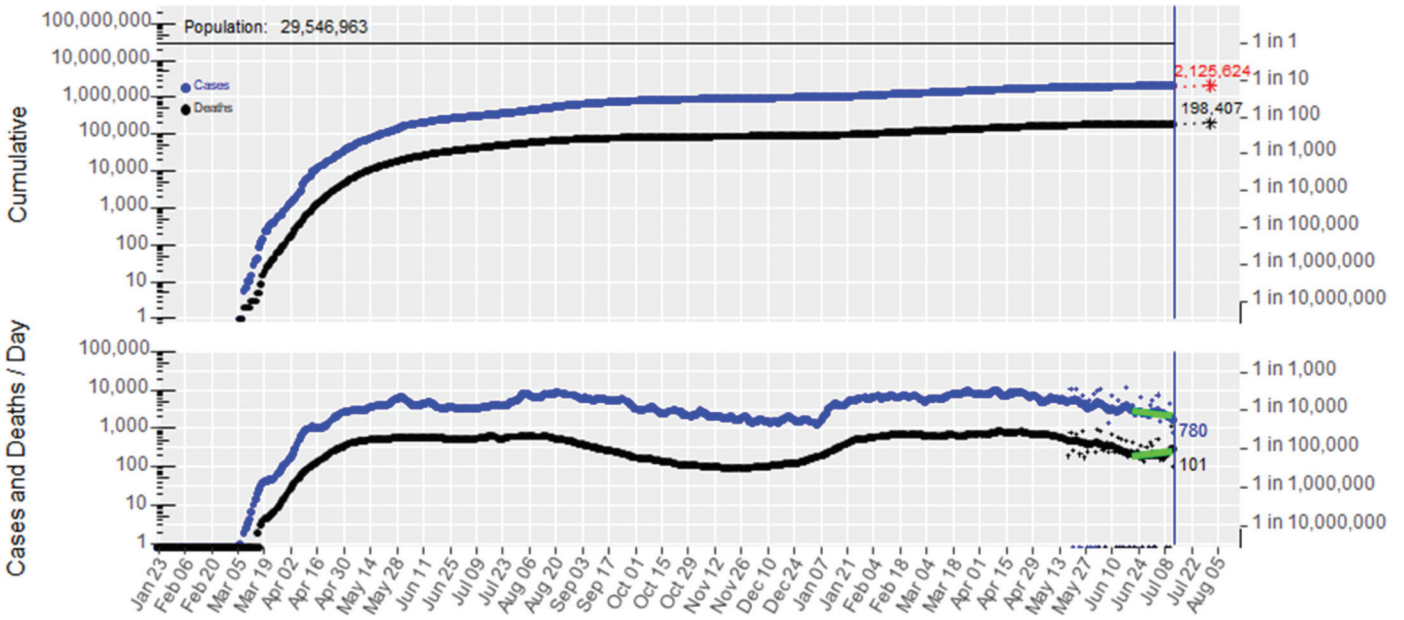

Figure 4: Time course for the COVID-19 cases and deaths in Peru. The surge observed in Iquitos was seen throughout the country (*Science* 2021;371:230-1). Peru has seen more than 194 thousand deaths, exceeding more than 0.6% of the population. The Gamma variant is partly responsible for Peru having the highest COVID-19 mortality in the world.

Your Patient's Brain

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editorial stated, "*postoperative delirium is the single most compelling case for our national surgical community to address, through initiating hospital-based quality improvement programs*" (*JAMA Surg* 2021;156:470-1). The authors of the editorial went on to make the central points, also stressed by the PBHI, that delirium is the commonest postoperative complication in older surgical patients and is associated with poorer outcomes, including increased complications, loss of independence, readmissions, and mortality.

Note that the *JAMA Surgery* editorial did not call for more research, although that, of course, is always essential, but instead for hospital-based quality improvement. In medicine, we know that despite guidelines and systematic reviews on best practice, there is a major gap between knowledge and action. The PBHI and the ASA Committee on Geriatric Anesthesia surveyed U.S. anesthesiologists and found that evidence-based actions for the prevention and detection of delirium were often not carried out; for example, formal postoperative screening for delirium in at-risk patients occurred routinely only about 20% of the time in academic medical centers and less than 10% of the time in all other types of practices (*Perioper Med (Lond)* 2020;9:6). While there is much more to be learned in the field of perioperative brain health, there are already established practical actions that can help reduce the incidence of delirium and PND, and yet those actions are not reliably carried out. Not all delirium is avoidable, but it is estimated that we can prevent 40% of cases. Moreover, early detection and mitigation are vital as studies show that the longer a patient remains delirious the greater the harm.

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How then do we turn our knowledge into action? The first requirement is clear, evidence-based practices. Information is available in recent papers such as the "Best Practices for Postoperative Brain Health" from the International Perioperative Neurotoxicity Working Group (*Anesth Analg* 2018;127:1406-13), the American

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