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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EDITORIAL COMMENT

Unbiased COVID-19 Pandemic With Biased Global Recovery*

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This month marks nearly 2 years since the World Health Organization declared COVID-19 a global pandemic.[1] Despite the many advances in vaccines and therapeutics, the number of patients affected by the SARS-CoV-2 virus continues unabated. Several waves of the pandemic fueled by mutated variants have added to the ever-growing morbidity and mortality of the virus. Globally, >450 million cases have been recorded and >6 million deaths have occurred thus far. The United States has been the hardest hit country both with incidence and absolute mortality from COVID-19 and is on track to cross the very grim milestone of 1 million deaths.[2]

In the first few months of the pandemic, the INCAPS (International Atomic Energy Agency Noninvasive Cardiology Protocols Study) group conducted a worldwide survey to assess the impact of the COVID-19 pandemic on cardiac care.[3] The study attempted to evaluate the global volumes of invasive and noninvasive cardiac testing in March and April 2020 compared to prepandemic levels. Mirroring the overall slowdown in elective and emergency clinical services seen across the globe, the study clearly demonstrated a significant reduction in the volume of cardiovascular testing at the beginning of the pandemic. Furthermore, the effect was global with minimal variability in different regions of the world. Interestingly, there was heterogeneity in the impact on different types of tests with transesophageal echocardiography being the most affected test followed by stress testing.[3]

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In this issue of the *Journal of the American College of Cardiology*, Einstein et al[4] of the INCAPS-COVID study present a follow-up on their prior publication[3] describing the recovery of cardiovascular diagnostic testing in low-, low-middle-, upper-middle- and high-income countries compared to that in March 2020 by evaluating self-reported types of cardiac imaging and their volume from 107 countries and 669 inpatient and outpatient centers globally by a follow-up survey conducted in April 2021. Unlike the initial study,[3] Einstein et al[4] show that the recovery of cardiac imaging volumes differed across the globe, with significant rebound in higher-/upper-middle-income countries vs depressed levels in lower-middle-/low-income countries. In addition, stress testing was used 12% less frequently, whereas there was a 14% increase in cardiac computed tomography. Cardiac positron emission tomography (PET) and cardiac magnetic resonance experienced 22%-25% increases in volume. The study also demonstrated increased health care staff burnout and stress. Excess pandemic-related psychological stress on the part of providers was similar across income groups: 38% of physicians and 39% of nonphysician providers in low- and lower-middle-income countries and 37% of physicians and 41% of nonphysician providers in upper-middle- and high-income countries. This psychological stress was reported to affect patient care in 78% of sites, including a moderate impact in 23% of sites and a profound impact in 8% of sites.

Einstein et al[4] should be congratulated on putting together comprehensive data from large global representative sites. Countries contributing data had a combined population of 6.8 billion and accounted

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for 97.4% of globally reported cases of COVID-19 as of April 30, 2021. This survey also provides a snapshot into the changing trends in global health care delivery during the pandemic and the challenges faced by providers and health care systems.

However, there are limitations in the study data that are important to note. The pattern of using cardiac imaging depends very much on the status of the virus at the time of data collection and its infectivity.[5,6] This study[4] provides only cross-sectional data that give us an incomplete picture because there are variations in the virus surges across different parts of the globe at a given time with data skewed to reflect the surges occurring in April 2021. Of note, the survey did not capture data during the most recent 2 waves of the pandemic, particularly the later phase of Delta virus surge and subsequent surges driven by the Omicron variant. At the time of writing of this editorial, Hong Kong and mainland China are in the midst of their Omicron surge while many other countries have low infectivity rate and are removing restrictions.

During the pandemic, 62% of sites in 2020 indicated there was a preference for pharmacologic stress testing over exercise stress testing, and that remained the case in 36% of sites in 2021. Faster protocols were also used more often, particularly in transthoracic echo and nuclear pharmacologic protocols, as well as modalities that have less interaction with patients. Aerosol-generating procedures such as exercise stress testing were countered by an increase in computed tomography and cardiac magnetic resonance stress in high-income countries. This is partly in response to the guidance put out by professional societies.[7,8]

In addition, the study shows that there is significant variability in the global recovery. Several factors likely played in this variability. Without experience with dealing with such a pandemic, and despite local medical societies' opinion-based recommendations,[6-9] countries and medical centers largely invented their own guidelines by adopting measures that were locally feasible based on resources; pre-existing practice and expertise; socioeconomic status of its population; local availability and adoption of vaccines; availability of personal protective equipment; and strength, health, and resilience of its workforce.

An important consideration in this regard is vaccine inequity. In contrast to high-income countries that had preferential access to vaccines with a surplus for their citizens, lower-income countries had to rely on a limited vaccine donation to the most vulnerable sectors of the population. Whereas health systems in high-income countries benefitted from high vaccination rates (to a degree and particularly during most recent surges), those in low-income countries had to care for a disproportionately higher number of populations at risk, many of whom were not vaccinated.

The lack of recovery in cardiac imaging volumes in low-income countries highlights the challenges these countries had to go through to care for cardiac patients, which might have led to substandard care for patients with cardiac disease. The health care disparities that already existed will only get magnified once the COVID-19 pandemic burns out only to lead way to another challenging pandemic—that of delayed and undertreated cardiovascular diseases. Although recent efforts to address vaccine inequity (such as work by the World Health Organization to establish development hubs in developing countries) are encouraging, more work is still needed to reduce the existing disparities and their dreadful sequalae.

The study also highlights an oft overlooked aspect to the pandemic: its toll on the mental health of health care workers. Einstein et al[4] showed that many health care workers reported burnout and job dissatisfaction during the pandemic. This led to record number of health care workers quitting their jobs or retiring early—in progressively increasing volumes after this study was conducted and as the virus variants continued to emerge. In particular, during the recent rapid Omicron surge, burnout contributed to inadequate staffing of hospital beds. The study suggests that urgent interventions are needed to combat burnout and enhance the resilience of health care workers to allow for safe delivery of health care.

As the pandemic forced health care systems to adopt to a new norm, guidelines became an important tool to standardize practice. However, the lack of a global leadership led to a fragmentation of the process because several well-meaning medical societies and national public health organizations developed best-practice guidelines on their own with little collaboration.[6-9] Differing and at times contradictory guidelines on masks, vaccines, and gatherings led to significant differences in day-to-day practice extending to the institutional level. As of the end of April 2021, 20% of sites worldwide required COVID-19 testing prior to stress testing in all patients, and an additional 9% of sites required such testing only for nonvaccinated patients. Higher rates of testing requirements were observed for transesophageal echocardiography (49%) and diagnostic cardiac catheterization (57%). Such heterogeneity highlights opportunities to optimize care for patients during the pandemic, such as having timely best-care guideline recommendations from an international authority such as the World Health Organization.

This study forces us to ask an important question: Where do we go next? One thing successive waves of the current pandemic have proven is that we are not out of the woods yet. The current study highlights a few important messages health care systems should take note of and prepare for the emergence of the next surge, as well as future pandemics. This study highlighted the variability in access to health care and major differences in the delivery of health care in the different countries. It is time we come together to reduce these disparities because "we are as strong as our weakest link." The health care system should incorporate the important challenges that have been faced in the past 3 years to more efficiently respond in the setting of medical emergencies. As the prospect of an endemic COVID-19 is increasingly looking likely, we should increase the resiliency of other health care systems to combat these infections and allow for uninterrupted cardiac services while maintaining the safety of the health care staff. Finally, the pandemic has clearly highlighted the mental health toll of a pandemic on health care workers. A specific targeted program should be designed and implemented to create a supportive work environment that decreases or at least limits burnout and allows for safe delivery of health care while maintaining the well-being of health care workers. These programs are needed globally, but more so in low-income countries.

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