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LEARNING FROM PAST PANDEMICS

Sharing Experiences and Lessons: Medical Issues in Confronting the HIV Epidemic and COVID-19

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Our society and medicine confronted a frightening global epidemic almost 40 years ago with the recognition and spread of HIV infection and the disease it caused, AIDS. That epidemic was large and, for affected individuals and communities, devastating and expensive. We now are in the very early phases of seeing yet another epidemic with the newly described coronavirus, SARS-CoV-2, and the disease it causes, COVID-19. The scale of the current epidemic is massive and truly global. Although the mortality rate of HIV is much worse—essentially all infected persons die without treatment—COVID-19 has already killed more than 100,000 in the United States alone because all are at risk and so many have been infected. It seems fair to consider the relationship between these 2 epidemics, in particular how HIV affected the medical care system, what we might yet see from the coronavirus pandemic, and the lessons from AIDS that might help us face our current disaster.

The 2 epidemics have much in common, although we must admit that this is being written very early in the current pandemic and we will, without question, learn much more about the virus, the host reaction to infection, and the clinical manifestations, which already appear complex and can involve much more than just the lower respiratory tract—the target that to date has caused the highest rate of severe and fatal disease. Both viruses, HIV and SARS-CoV-2, entered humans from their natural hosts. HIV came to us from chimpanzees and SARS-CoV-2 from bats. Such zoonotic infections are, of course, hardly new, yet we seem to be surprised with each new one we encounter.

Epidemic infections spread by the most rapid transportation available. Both HIV and the new coronavirus had access to jet travel, although the fewer global connections between central Africa and the rest of the world in the 1970s and 1980s slowed the global distribution of HIV whereas the extensive commercial linkages from Wuhan, China, facilitated nearly instantaneous and simultaneous spread of SARS-CoV-2 to all continents excluding Antarctica. Epidemics at a more personal level are also spread by social and biologic factors. HIV is predominantly a sexually transmitted infection with an initial concentration among men who have sex with other men. Even with direct sexual exposure, HIV is seldom transmitted. In contrast, the coronavirus is a highly contagious respiratory virus. In the United States, high HIV risk was concentrated in subpopulations, whereas every person is susceptible to COVID-19. Yet, at least in our early experience, COVID-19 affects regions differently, with “hot spots” in densely populated cities such as Wuhan and New York and areas of Italy and Spain while relatively sparing rural areas with low population density. This variability, of course, has implications for advance planning for each epidemic’s impact on health care systems.

Strategies to reduce an epidemic’s impact on the population and health care system require detailed knowledge of the causative agent’s biology and the natural history of the resulting disease. Our knowledge of HIV is quite complete, but we are still learning about the coronavirus and COVID-19. HIV infection is typically silent for months to years before complications caused by progressing immune

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damage appear. During this silent phase, HIV can be transmitted, but the long time frame and often multiple sexual partners makes it extremely difficult to identify those exposed to an index case. SARS-CoV-2, in contrast, can cause illness very quickly, within days to several weeks of exposure; thus, contact tracing possible, although we still are not certain how many cases of infection are asymptomatic or the risk and duration of further transmission from these individuals.

Responding to both epidemics demands accurate diagnostic testing. Although it took years to identify HIV as the cause of AIDS, antibody tests were soon made available. The unique horror of HIV was soon appreciated; antibodies had no effect on the infection, and all those with positive tests were actively infected, were capable of transmission, and had progression of disease. The situation with COVID-19 is still not clear. Positive antigen testing is thought to confirm active infection and transmission risk. The development of antibodies to SARS-CoV-2 is less clear. Antibodies may imply the ability to neutralize and clear the virus, but the degree to which this is true may vary. Antibodies may suggest immunity to secondary infection; however, this is not yet clear but an area of very active research.

In the HIV epidemic, those at highest risk, including injection drug users and men who have sex with other men, were often stigmatized with harmful consequences. In the coronavirus pandemic in the United States, Chinese Americans have faced discrimination from those who blame China for “starting” the epidemic. Furthermore, COVID-19 disproportionately affects those who are unable to protect themselves from exposure as a result of crowded work or living conditions and those who have pre-existing health conditions including obesity, diabetes, and heart and respiratory disease, leading to worse COVID-19 outcomes. Stigma surrounding these social and economic conditions are primary drivers of the horrible impact of the pandemic on medical care systems that disproportionately serve these populations and must be considered in planning to improve care access and care success.

The medical care system changed as a result of AIDS and will certainly be altered as we respond to COVID-19. In the HIV epidemic, we realized that gaining fundamental knowledge of the virus and the resulting immune deficit was central in designing more effective therapies. As a country, we realized the benefit of that investment and in the close linkage of knowledge generated and its application at the bedside. AIDS research did not invent the concept of translational research, but it amplified its perceived value. Research on COVID-19 is proceeding at an amazing speed. Research funds are being provided, and we have already learned much about the disease process and ways to improve care. Similarly, the lessons learned in the HIV epidemic about the significance of understanding the social setting of the disease must apply to COVID-19. Better understanding who is at highest risk and the reasons

for disparities will improve our prevention approaches, and behavioral science can help us better understand how to engage those at risk on strategies of social distancing and masking that are to date our only effective means of reducing risk, although they may be seen as intrusive and limiting in many social settings.

HIV has led to fundamental alterations in care delivery. HIV care was, from the start, complex and demanded better coordination between hospital and community-based care delivery. Patients with AIDS became seriously ill, often needing multiple hospitalizations, but they also needed prolonged intervals of outpatient medical support in the community. Many patients with AIDS had insufficient means of paying for the services they so clearly required to prolong life. For these reasons, systems of care were developed that included dedicated inpatient facilities and comprehensive outpatient programs. Because all patients with AIDS died in the early epidemic, hospice care—still a novelty in the 1980s—grew in sophistication and effectiveness and became an essential care component. To remove the ability to pay for AIDS care as a barrier, the federal government created an entitlement device, the Ryan White Program, analogous to one paying for renal dialysis; this continues with strong bipartisan support.

The response to AIDS benefitted enormously from coordination among the medical care system, public health authorities, political leaders, and affected communities. A key lesson from the AIDS epidemic is that clear, informed, and compassionate communication with the general public can ensure a more coordinated and effective response while controlling public fear and stigma. All these lessons have echoes as we consider our response to COVID-19.

As a profession and as a society, we face enormous challenges in dealing with the coronavirus pandemic. We do not have the luxury of our 4 decades of experience and research in the HIV response. We are truly at the very start in responding to COVID-19. New clinical observations are made seemingly daily and communicated immediately. The AIDS epidemic preceded the Internet and immediate posting of new data in “pre-prints.” There was no Zoom. With COVID-19 we are now beginning to learn of clotting disorders, serious inflammatory effects in children, neurologic sequelae, and so much more. We hear of those recovering after prolonged intubation but also that mortality rates in ventilated patients may be extremely high. On a social level, we recognize that the early and rigorous sheltering-in-place measures invoked in many parts of the world had huge economic consequences and are difficult (perhaps impossible) to maintain. The economic consequences for our medical centers are also staggering. As we failed to develop better testing and epidemic surveillance and modeling early in the pandemic, many hospitals were closed to needed but “elective” care. Cancer care was delayed, and hospitals have lost substantial revenue. At the same time, patients have been understandably afraid to return to hospitals, which they perceive as places where

they might come in contact with COVID-19. Medical centers struggle to redesign facilities to recover an efficient yet safe means of caring for a high volume of patients. We are far from an effective antiviral drug for SARS-CoV-2, and although vaccine candidates are being feverishly developed, none are available. Furthermore, the cost and logistical demands of deploying a vaccine on a global scale are almost unimaginable, along with the challenge of the many people who, for a wide variety of reasons, are afraid of vaccines and unlikely to accept them, at least any time soon.

We can do a better job in responding to COVID-19, but we must do so with a strong sense of urgency and solidarity. We must have better information in real time of the

prevalence of the coronavirus in the broad population and in those subgroups at increased risk. We need to anticipate more accurately what will be needed in terms of acute hospital and intensive care facilities in a way that allows us to care for those patients without disrupting care for all of our other patients—perhaps by designing new COVID-19-specific facilities. We need to rethink the sources of funding for medical care, perhaps a federal program as we have for AIDS so those who are sick will not worsen their outcomes by delaying diagnosis. And we must learn how to communicate more effectively to gain the population's trust as we all, together, face the most serious challenge to our health system we could ever have imagined.