

The COVID-19 pandemic posed an epic challenge to the U.S. healthcare industry. It has disrupted nearly all aspects of healthcare delivery. In response to the pandemic, multiple states temporarily suspended non-essential surgical procedures between March and May 2020. The suspensions prompted the healthcare industry to shed millions of jobs and limit the availability of resources necessary for essential procedures.

In this paper, we estimate the potential spillover effect of suspended non-essential surgery on patients' access to essential health services, using deceased-donor kidney transplantation as the clinical setting. Kidney transplantation is the preferred therapy for patients with end-stage renal disease. Even though the U.S. leads the world in kidney transplantation—with 4% of the world population, the U.S. accounts for almost a quarter of transplants performed worldwide—nearly 5,000 ESRD patients die every year while waiting for a transplant. To minimize disruptions to deceased-donor organ transplants, the Centers for Medicare & Medicaid Services clarified that state guidances for non-essential surgery do not apply to them, because they are essential surgery. In other words, regardless of whether a state has suspended non-essential surgery, deceased-donor organ transplantation procedures are essential surgery so should not be postponed. By contrast, living-donor organ transplantation does not have the same distinction, mainly because of the potential infection risk posed to living donors. Indeed, the American Society of Transplantation (AST) recommended suspension of living-donor transplantation during the initial months of the pandemic. We focus on deceased-donor kidney transplantation in this paper.

To be certain, three key factors make disruptions to deceased-donor organ transplants inevitable. First, during the pandemic, the reduction in the population mobility has naturally led to a shrunken pool of deceased individuals who are eligible for organ donation. Second, as they scramble to tackle surging COVID-19 cases, hospitals might find themselves constrained by dwindling healthcare resources that are necessary for performing organ transplant procedures. Third, as the number of COVID-19 infection cases has grown over time in various states, out of an abundance of caution, certain clinicians and patients may hesitate to proceed with transplant procedures. However,

these three factors are shared across all states, regardless of whether a guidance for non-essential surgery has been issued. Indeed, by controlling these factors, we can tease out the effect of state guidances for non-essential surgery—inapplicable to deceased-donor organ transplantation—on the transplant volume.

Estimating the effect of state guidances for non-essential surgery on essential surgery is a challenging task, in no small part because nationwide clinical datasets (e.g., claims and electronic records)—containing all the cases for a given type of essential surgery with uniform data-reporting standards—are rarely available. Fortunately, we obtained a nationwide dataset from the United Network for Organ Sharing (UNOS) for kidney transplantation covering the initial half of 2020. We examine the dataset through the lens of the staggered suspension and resumption of non-essential surgery. Our data confirm the basic intuition that the COVID-19 pandemic led to a sharp reduction in the number of organ transplant procedures across all states. However, in states that issued guidances for non-essential surgery, the reduction was particularly salient. We tease out the effect of state guidances using a difference-in-differences approach. We estimate that a state guidance for non-essential surgery caused a 32.3% drop in the volume of deceased-donor organ transplants. Through this unique switching “on” and “off” of state guidances amid a major public health crisis, our study illustrates the spillover effect of health policy on patients' access to essential health services.

Contributing to policy debates about the impact of suspending non-essential surgery, our paper analyzes a high-acuity surgery setting with a uniquely clean and systematic dataset, which enables us to use a difference-in-differences approach to tease out the effect of state guidances. We show that although various states' efforts aimed at preserving healthcare capacity are laudable, suspending non-essential procedures can lead to a spillover effect that will end up hurting patients' access to essential procedures. Our findings are significant for potential future public health crises (including future waves of the COVID-19 pandemic) that may necessitate another round of surgical shutdown and subsequent reopening. Informed by our findings, instead of postponing all non-essential procedures, policymakers should explore more granular approaches to

safeguard the healthcare workforce and resources critical to supporting essential care. They should also monitor the changes in hospitals' service offering and provide financial and regulatory support proactively to reduce negative spillovers of their well-intentioned policies.