

tion spread across China, their exports came to a halt. Now, as the infection spreads globally and transmission in China slows, China is shipping masks to other countries as part of goodwill packages. The United States has not been a major recipient.⁵

The shortages have led to pleas from individual U.S. health care providers trying to secure adequate supplies of PPE. The situation has become so dire that some providers are using social media (with tags like #GetMePPE) and have even set up websites to obtain PPE directly. The Centers for Disease Control and Prevention (CDC) recommends that during crisis situations, N95 respirator masks be used only during aerosol-generating procedures, but that means risking exposure of health care workers using less protective surgical masks around patients with confirmed or suspected Covid-19 infection. Additional guidelines from the CDC include reusing masks and respirators intended for one-time use and, if stocks are fully depleted, using scarves or bandanas. The evidence to support these recommendations is thin.

What can we do to close the gap between the need and the availability of ventilators and PPE? We need a multipronged strategy. First, the Defense Production Act (DPA) allows the President to direct private companies to produce equipment needed for a national emergency. The President should use this power to begin to close the gap. But simply demanding more ventilators won't be enough — there are only a few companies that have the expertise to make these devices. The federal government should not only direct these companies to maximize production, but should also order their

suppliers and others to maximize the availability of raw materials. Finally, the federal government needs to bring other industries into this effort. Automakers, for instance, have said they might have the capacity to make ventilators. It would be helpful to engage them to see whether and how quickly they can contribute to boosting ventilator supply.

For PPE, the solutions are somewhat different. While the DPA is important for directing private-sector companies to make more PPE, there are additional options as well. U.S. factories, for instance, already produce millions of N95 respirators each month, but most of these are produced under standards not approved by the Food and Drug Administration (FDA). The government recently lifted the FDA standards, stating that N95s approved by the National Institute for Occupational Safety and Health could be used by health care workers. Nevertheless, few state health departments or hospital systems have been able to procure this PPE.

State governments could encourage companies in their communities that might be able to shift production to making this equipment to do so. The elements of PPE are complicated but don't require the intensive capital that ventilator manufacture demands, so smaller regional companies can play a key role in filling the gap. State partnerships with these companies will take ingenuity, meaningful resources, and a relaxation of less essential regulatory requirements.

Another role for government and the health care system must be to reduce hoarding of PPE and to tap into already existing

stockpiles. Masks and gloves are used in many nonmedical settings — construction companies, laboratories, artists, and even the sets of some television shows have stores of these items. Though there has already been a grassroots effort to donate this PPE to health care workers, a coordinated effort by local governments to collect these supplies would be helpful.

Beyond increasing the supply, a crucial role for the government is to coordinate efforts to ensure that the areas hardest hit at any given time are receiving needed equipment. Individual state governments and health care systems are currently competing for resources, and those resources are not necessarily being distributed on the basis of need. Surges of Covid-19 cases are unlikely to happen in all parts of the country at once, so there is an opportunity to coordinate the filling of gaps. As New York City, for instance, sees a surge of Covid-19 cases, other communities with few cases could share their supplies; New York could then pass equipment on when its surge subsides. Although such sharing can happen informally, some degree of federal coordination would be helpful from government agencies such as the CDC or the Centers for Medicare and Medicaid Services. Partnering with technology companies to track the availability of and projected needs for equipment in real time, ensuring that there is a close match between supply and demand, would also be helpful. Ultimately, this type of coordination could also help in identifying other anticipated supply-chain issues, such as threats to access to pharmaceuticals. A coordinated, nationwide

response is not something that individual states have the resources or legal authority to accomplish; thus, the federal government, in partnership with technology companies, could play a critical role.

As the United States braces for a growing wave of patients with Covid-19 in our hospitals and ICUs, we must ensure that we have the key equipment needed to care for patients and to keep our health care workforce safe. Achieving this goal will require a concerted approach from all sectors, from local and national government to the private sector and health care providers themselves. Failure to act in a coordinated manner would keep many patients from getting the care they need and would lead to the situation

we see in Italy, in which frontline clinicians are making difficult decisions about who will and who won't receive care. Furthermore, without adequate PPE, health care workers will get sick, endangering the functioning of the entire health care system. The human and economic costs of that scenario should not be underestimated.

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