Survivors' burden

By **Kelly Servick**

Among those hospitalized with severe COVID-19, these are the lucky ones: people who recover, come off mechanical ventilators that have kept them breathing, and leave the hospital. As more and more of these patients return home, clinicians are turning their attention to potential lingering effects of both the virus and the emergency treatments that allow people to survive it.

"The issue we're all going to be faced with the most in the coming months is how we're going to help these people recover," says Lauren Ferrante, a pulmonary and critical care physician at the Yale School of Medicine.

COVID-19 damages not just the lungs, but the kidneys, blood vessels, heart, brain, and other organs (see main story, p. 356). Doctors don't yet know what lasting disabilities the virus will cause, but clues come from studies of severe pneumonia—an infection that inflames the air sacs in the lungs, as COVID-19 does. Such infections can progress to acute respiratory distress syndrome (ARDS), in which those sacs fill with fluid. Most patients eventually recover their lung function, but ARDS sometimes leads to scarring that can cause long-term breathing problems, Ferrante says.

After any severe case of pneumonia, a combination of underlying chronic diseases and prolonged inflammation seems to increase the risk of other illnesses, including heart attack, stroke, and kidney disease, says Sachin Yende, an epidemiologist and critical care physician at the University of Pittsburgh Medical Center. COVID-19 might prompt "a big increase in these sorts of events," he says.

Patients who spend time in an intensive care unit (ICU), regardless of the illness that put them there, are also prone to a set of physical, cognitive, and mental health problems after leaving. The coronavirus might put ICU survivors at particular risk for some of these problems, in part because its severe lung injury leads many patients to spend prolonged periods on a ventilator under deep sedation, says Dale Needham, a critical care physician at Johns Hopkins University's School of Medicine.

Those few patients who survive long periods of ventilation are prone to muscle atrophy and weakness. Keeping a critically ill patient moving—helping them raise their arms and legs, and eventually sit, stand, and walk—can reduce that weakness and get them off the ventilator faster. But in some hospitals, a shortage of protective equipment has kept physical therapists away from COVID-19 patients.

Another risk is delirium—a state of confused thinking that can lead to long-term cognitive impairments such as memory deficits. "What we're finding in COVID is that there's a ton of delirium," says E. Wesley Ely, a pulmonologist and critical care physician at Vanderbilt University. One cause is the virus itself, which may infect the brain. But the sedatives prescribed to suppress violent coughing and help patients tolerate the discomfort of a breathing tube can also increase delirium risk. And as hospitals run short of the most commonly used sedatives, they're turning to other drugs that can cause "intense and prolonged delirium," Ely says.

ICU patient care guidelines that Ely and colleagues have developed over many years recommend a daily interruption of narcotics and sedatives to test whether patients can wake up, breathe, and tolerate the ventilator without drugs. But the practice requires close monitoring that is difficult in overstretched ICUs, Ely says. "Everybody out there is trying to do their best. … But let's not throw out all the things we've learned in the last 20 years."

The threat of infection has also limited the bedside interactions that can calm patients and reduce the need for delirium-inducing drugs. "If you could design a system to be bad for how you care for older adults … the family would not be allowed to visit, and [health care workers would] go in with face masks and all gowned up, so they're completely frightening," says Sharon Inouye, a geriatrician at Harvard Medical School's Hebrew SeniorLife health care system.

Some critical care doctors are starting to question recommendations for ventilator use early in the course of disease. "If we're putting more people on ventilators than maybe we need to, that certainly is going to affect the population health after recovery," says C. Terri Hough, a pulmonary critical care physician at the University of Washington, Seattle.

As some hospitals move past the initial surge in cases, researchers are also trying to look ahead. Ely's team is testing a tablet-based rehabilitation program for people who have cognitive impairment after being hospitalized for a critical illness. Yende's team is piloting a care approach for discharged pneumonia and sepsis patients that includes remote monitoring and treatment and inhome visits to prevent readmission to the hospital.

Others are preparing for a surge in mental health problems among survivors, among them anxiety, depression, and post-traumatic stress disorder. Hough and her collaborators are testing a mobile app that promotes mindfulness and coping skills for people leaving the hospital. For survivors of all critical illnesses, she says, "this we're-all-in-this-together attitude around coronavirus may actually provide hope that wasn't there before." ■

Survivors of COVID-19 who spent time on a ventilator may be at risk of long-term disability and illness.

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