

In China, Ultrasound Is Helping Doctors Fight COVID-19



Before he begins a 12-hour shift working with patients suffering from COVID-19, the illness caused by the novel coronavirus, Professor Xiaoting Wang puts on three layers of gloves and gowns, a mask and an air-purifying respirator that looks like something out of a movie.

The equipment makes it hard for him to bend down, hard for him to walk around. Every move is “like a weight-bearing climb up 10 floors,” says Wang, deputy director of critical care medicine at Peking Union Medical College Hospital in Beijing.

The process is exhausting as is working with patients in a highly contagious environment. But one thing that’s made it a bit easier is ultrasound. Instead of sending patients to get CT scans, Wang and his colleagues have been using lightweight ultrasound machines to see inside their lungs. Thanks to these kinds of innovations and the clinicians behind them, China is now sharing lessons learned for handling the COVID-19 pandemic that is affecting thousands more people around the world every day. “It’s our responsibility to save lives in this kind of pandemic,” says Wang. “We have to do this.”

Wang is part of a group of doctors in China who are sharing their experience using lung ultrasound as an alternative to CT scans for patients in ICU. Typically, when a doctor is caring for patients with critical lung infections, they will send the patient for a CT scan. In normal times, that makes sense. CT machines are excellent at spotting problems like thickened pleura, the membrane that envelopes the lungs.

But CT scans take longer to conduct and hospitals usually have only a limited number of scanners. Add to that the problem of decontaminating between scans. With a disease as contagious as COVID-19, every nook and cranny of a machine has to be thoroughly disinfected before the next patient can be scanned making the giant machines inefficient for handling a pandemic.

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Wang and his colleagues have instead been relying on ultrasound machines. Ultrasound machines are small and portable. They can be covered in plastic to protect them from germs or easily wiped down between patients. And doctors can see results from ultrasound scans instantly.

On March 12, a group of Chinese doctors, including Wang, [reported their experiences](#) of using lung ultrasound to the Journal of Intensive Care Medicine in a letter to the editor. They had performed lung ultrasound exams on 20 patients with COVID-19.

They saw consistencies across both CT and ultrasound scans including thickening of the pleura and consolidation in the lungs.

“Lung ultrasonography gives the results that are similar to chest CT and superior to standard chest radiography,” they wrote in the report. “With the added advantage of ease of use at point of care, repeatability and absence of radiation exposure.”

One of the key detectors in lung ultrasound is called B lines. In a healthy lung, B lines are not prevalent. Instead, ultrasound shows rows of equidistant, horizontal lines — known as A lines. These lines are a reflection of the smooth lining of the normal lung (pleura). But in a patient with COVID-19 pneumonia, the pleura becomes irregular and bumpy with dark patches (consolidations) underneath. Rays of bright B lines appear below the consolidations helping to highlight these abnormal areas. An experienced doctor can easily see the difference between a healthy lung and an injured lung using an automated feature on ultrasound machines, such as GE's [Venue](#) which has an automated B lines feature that counts the number of B lines and signals if there is a sign of disease.

Wang and his colleagues used ultrasound to test patients several times a day to track the progression of the disease which causes increasing injury to the lung. So even in patients who were almost asymptomatic there were still signs of the beginning of lung problems.

"It's easy to compare the images," says Dr. Yangong Chao, director of critical care medicine at First Affiliated Hospital of Tsinghua University in Beijing. "Most patients have very favorable prognosis but about 10% become much worse. We want to follow those patients so we know who has a poorer prognosis."

Now that the epidemic has slowed in China, Wang and Chao are sharing their findings with doctors around the world to help them better track patients and more quickly figure out who needs the most care. Wang is working in Tibet where so far there has only been one confirmed case, but Wang is hoping he can help the country attack the problem before it gets out of control.

"I think this will draw more attention to the science and clinical application of lung ultrasound," Wang says. "I think lung ultrasound is stronger in a critical care practice. That's my opinion."

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