



A soldier walks among cubicles being prepared at the Jacob K. Javits Convention Center in Manhattan on April 3. (photo: Andrew Kelly/Reuters)

## ***A Mysterious Blood-Clotting Complication Is Killing Coronavirus Patients***

By Ariana Eunjung Cha, The Washington Post 22 April 20

***Once thought a relatively straightforward respiratory virus, covid-19 is proving to be much more frightening***

Craig Coopersmith was up early that morning as usual and typed his daily inquiry into his phone. “Good morning, Team Covid,” he wrote, asking for updates from the ICU team leaders working across 10 hospitals in the Emory University health system in Atlanta.

One doctor replied that one of his patients had a strange blood problem. Despite receiving anticoagulants, the patient was still developing clots. A second said she’d seen something similar. And a third. Soon, every person on the text chat had reported the same thing.

“That’s when we knew we had a huge problem,” said Coopersmith, a critical-care surgeon. As he checked with his counterparts at other medical centers, he became increasingly alarmed: “It was in as many as 20, 30 or 40 percent of their patients.”

One month ago, as the country went into lockdown to prepare for the first wave of coronavirus cases, many

doctors felt confident they knew what they were dealing with. Based on early reports, covid-19 appeared to be a standard variety respiratory virus, albeit a contagious and lethal one with no vaccine and no treatment. But [they’ve since become increasingly convinced](#) covid-19 attacks not only the lungs, but also the kidneys, heart, intestines, liver and brain.

Many doctors also are reporting bizarre, unsettling cases that don’t seem to follow the textbooks they’ve trained on. They describe patients with startlingly low oxygen levels — so low that they would normally be unconscious or near death — talking and swiping on their phones. Asymptomatic pregnant women suddenly in cardiac arrest. Patients who by all conventional measures seem to have mild disease deteriorating within minutes and dying at home.

With no clear patterns in terms of age or chronic conditions, some scientists hypothesize that at least some of these abnormalities may be explained by severe changes in patients’ blood.

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The concern is so acute some doctor groups have raised the controversial possibility of giving preventive blood thinners to everyone with covid-19 — even those well enough to endure their illness at home.

Blood clots, in which the red liquid turns gel-like, appear to be the opposite of what occurs in Ebola, Dengue, Lassa and other hemorrhagic fevers that lead to uncontrolled bleeding. But they actually are part of the same phenomenon — and can have similarly devastating consequences.

[Autopsies](#) have shown some people's lungs fill with hundreds of microclots. Errant blood clots of a larger size can break off and travel to the brain or heart, causing a stroke or heart attack. On Saturday, Broadway actor Nick Cordero, 41, had his right leg amputated after being infected with the novel [coronavirus](#) and suffering from clots that blocked blood from getting to his toes.

Lewis Kaplan, a University of Pennsylvania physician and head of the American Society of Critical Care Medicine, said every year doctors treat people with clotting complications, from those with cancer to victims of severe trauma, "and they don't clot like this."

"The problem we are having is that while we understand that there is a clot, we don't yet understand *why* there is a clot," Kaplan said. "We don't know. And therefore, we are scared."

### **'It crept up on us'**

The first sign something was going haywire was in legs, which were turning blue and swelling. Even patients on blood thinners in the ICU were developing clots — which is not unusual in one or two patients in one unit but is for so many at the same time. Next came the clogging of the dialysis machines, which filter impurities in blood when kidneys are failing and jammed several times a day.

"There was a universal understanding that this was different," Coopersmith said.

Then came the autopsies. When they opened up some deceased patients' lungs, they expected to find evidence of pneumonia and damage to the tiny air sacs that exchange oxygen and carbon dioxide between the lungs and the bloodstream. Instead, they found tiny clots all over.

Zoom meetings were convened in some of the largest medical centers nationwide. Tufts. Yale-New Haven. The University of Pennsylvania. Brigham and Women's. Columbia-Presbyterian. Theories were shared. Treatments debated.

Although there was no consensus on the biology of why this was happening and what could be done about it, many came to believe the clots might be responsible for a significant share of U.S. deaths from covid-19 — possibly explaining why so many people are dying at home.

In hindsight, there were hints blood problems had been an issue in [China](#) and Italy as well, but it was more of a footnote in studies and on information-sharing calls that focused on the disease's effects on lungs.

"It crept up on us. We weren't hearing a tremendous amount about this internationally," said Greg Piazza, a cardiovascular specialist at Brigham and Women's who has begun a study of bleeding complications of covid-19.

Helen W. Boucher, an infectious-disease specialist at Tufts Medical Center, said there's no reason to think anything is different about the virus in the United States. More likely, she said, the problem was more obvious to American doctors because of the unique demographics of U.S. patients, including large percentages with heart disease and obesity that make them more vulnerable to the ravages of blood clots. She also noted small but important differences in the monitoring and treatment of patients in ICUs in this country that would make clots easier to detect.

"Part of this is by virtue of the fact that we have such incredible intensive care facilities," she said.

### **A leading cause of death**

The body's circulatory or cardiovascular system often is described as a network of one-way streets that connect the heart to other organs. Blood is the transport system, responsible for moving nutrients to the cells and waste away from them. A [common cold](#) or a cut on the finger can lead to changes that help repair the damage, but when the body undergoes a more significant trauma, the blood can overreact, leading to an imbalance that can cause excessive clots or bleeding — and sometimes both.

Scientists call this “hemostatic derangement.” In math, a derangement is a permutation in which no element is in its original position.

Harlan Krumholz, a cardiac specialist at the Yale-New Haven Hospital Center, said no one knows whether blood complications are a result of a direct assault on blood vessels or a hyperactive inflammatory response to the virus by the patient’s immune system.

“One of the theories is that once the body is so engaged in a fight against an invader, the body starts consuming the clotting factors, which can result in either blood clots or bleeding. In Ebola, the balance was more toward bleeding. In covid-19, it’s more blood clots,” he said.

A Dutch study published April 10 in the journal [Thrombosis Research](#) provided more evidence the issue is widespread, finding 38 percent of 184 covid-19 patients in an intensive care unit had blood that clotted abnormally. The researchers called it “a conservative estimation” because many of the patients were still hospitalized and at risk of further complications.

[Early data from China](#) on a sample of 183 patients showed more than 70 percent of patients who died of covid-19 had small clots develop throughout their bloodstream.

Although acute respiratory distress syndrome still appears to be the leading cause of death in covid-19 patients, blood complications are not far behind, said Behnood Bikdeli, a fourth-year fellow at Columbia University Irving Medical Center, who helped anchor a paper about the blood clots in the [Journal of The American College of Cardiology](#).

“My guess is it’s one of the top three causes of demise and deterioration in covid-19 patients,” he said.

That recognition is prompting many hospitals to change the way they think about the disease and manage it. When the novel coronavirus first hit, the Centers for Disease Control and Prevention and others put people with asthma at the top of their lists

of those who might be the most vulnerable. But European researchers writing in the journal *Lancet* noted it was “striking” how underrepresented asthma patients had been. Earlier this month, when New York state released data about the top chronic health problems of those who died of covid-19, asthma was not among them. Instead, they were almost all cardiovascular conditions.

Some medical centers have begun giving all hospitalized covid-19 patients small doses of blood thinners as preventive measures, and many are adjusting doses upward for the most seriously ill. The challenge is the more you give, the greater the danger of upsetting the balance in the other direction and having the patient bleed out.

Another big mystery the doctors hope the blood issue will shed light on is why some maternity patients are collapsing during or after giving birth.

A paper published in the [American Journal of Obstetrics & Gynecology MFM](#) in late March detailed how two women with no prior symptoms of covid-19 ended up in intensive care. The first was a 38-year-old patient of New York-Presbyterian/Columbia University Irving Medical Center in Manhattan who spiked a fever of 101.3 while undergoing a C-section delivery and began bleeding profusely. The second woman, 33, also underwent a C-section but the next day developed a cough that progressed to respiratory distress. Her heart beat irregularly and her blood pressure jumped to as high as 200/90.

Several physician-researchers said the relationship between covid-19, clotting and pregnant women is “an area of interest.” Women in childbirth can experience clotting and bleeding complications because of the involvement of the blood-rich placenta, but it’s possible covid-19 may be triggering additional cases by making some women’s bodies “lose balance.”

“There’s lots of speculation,” Krumholz said. “That’s one of the frustrating things about this virus. We’re in a lot of darkness still.”