Hi, this is Dr. David Bluemke in Madison, Wisconsin. I’m the Editor of the journal Radiology. This is a special edition podcast. This is our update #5 on the 2019 Coronavirus infection: Information for Radiologists.

This update is about a new consensus document. It’s from the Fleischner society. In the past, guidelines from the Fleischner society have been very well reasoned, very helpful in daily practice. They tell us when to report pulmonary nodules—which need to be followed, which don’t. Very influential.

The title of this article, published online Tuesday, April 7 in Radiology: “The role of chest imaging in patient management during the COVID-19 pandemic: a multinational consensus statement from the Fleischner society.” The first author is well known to radiologists: Dr. Geoff Rubin at Duke University.

Background: On March 11, the American College of Radiology, the ACR, issued a statement about using CT for COVID-19. On their website, it looks generic and anonymous – just the recommendation of the “ACR.” The ACR statement had a few main points, very conservative approach:

#1) CT should not be used to screen for, or as a first-line test to diagnose, COVID-19.
#2) CT should be used sparingly and reserved for hospitalized, symptomatic patients with specific clinical indications for CT.
#3) Use portable chest x-ray if any x-ray at all is necessary.
#4) As a radiologist, you might accidentally see COVID19 on CT when doing a CT for other reasons. So learn what it looks like on CT.

That’s it. Very broad statements - try not to use any imaging for COVID. Use CT sparingly, or prefer portable x-ray.

At about that same time, tremendous number of reports, especially from China—extreme measures being taken to control the virus. RT-PCR tests in short supply. But RT-PCR was not working – only detecting about 7 of 10 cases of COVID. 7 of 10. The Chinese government started a war on COVID in Wuhan. And the war included lots of CT scans. Pretty good success – CT found viral lung infection when the COVID test was negative. Everyone knows the story. In this emergency situation, China even temporarily used CT as a gold standard for COVID-19. Basic public health—any viral pneumonia on CT, isolate the patients.

The Chinese docs started working on this problem: positive CT but negative RT-PCR. So, a day later they got a second RT-PCR test.

If the second test was negative and they were still suspicious of COVID – they did a 3rd test the next day. And in many cases, the RT-PCR test eventually became positive, and they knew what disease they were treating.

So what’s going on? Let’s say the RT-PCR test had a sensitivity of only 70% - detected 70 of 100 infections, missed 30 cases. But do the test again the next day. Even with a 70% detection rate, 70% times 30 cases – by day 2, you correctly get 21 of the 30 cases. So 2 tests in a row – 70 plus 21 gives you a sensitivity of 91%. Test the patient three times – it’s 97%. China did massive amounts of RT-PCR testing for COVID-19, unlike the United States.

One more observation. Maybe you are a radiologist; maybe you had flu-like symptoms. But your COVID test is negative. Well – do you have it or not? You might become uniquely interested if that COVID test was right or wrong. But in the United States, we don’t usually do another test. We don’t have enough testing; COVID tests are rationed. You look up the publications. COVID testing has a nearly 100% detection rate in the research lab. But in real life, in people, it’s only about 70%. Why? You start to consider the possibilities.

#1) – one possibility. 70% -that result is China. They’re just doing the test wrong. We are so good in the United States. Our test is better. Maybe – but I seriously doubt it. First, a lot of those tests in China were actually developed in Germany.

And what about the US make us so much better? Remember the first COVID test developed by the Centers for Disease Control in Atlanta was a complete failure. The test was withdrawn.

#2) Another possibility. Search the literature, a report from China, published in JAMA. Patients with confirmed COVID. The authors tested every possible body fluid, blood, feces, secretions. The best place to get positive test for virus was bronchoalveolar lavage fluid. Insert a bronchoscope, test the fluid – positive for virus 93% of the time. It’s all downhill though from there. The next best: sputum – they got virus 72% of the time; nasal swabs – 63%; pharyngeal swabs – back of the throat – positive for only about one third of cases. There simply is not enough viral shedding from the nose or mouth. The COVID test only works when there is enough virus in that region of the swab.

Back to the American College of Radiology: Part 2. It’s not just China that becomes a war zone: next Italy, then Spain, then Iran. Then New York City. Terrible number of cases – not enough testing. Now it’s not just China that’s using CT. Italy as well. Ultrasound in Iran. Chest x-ray in New York.

The Veterans Affairs, or VA, federal government hospital in my own city of Madison. Initially, no COVID testing. They start using...
CT to screen for COVID. Why? The ACR says don’t do it. But an older, high risk patient with pretty severe flu-like symptoms comes to the emergency department. COVID-19 test takes 1-3 days. You're not just going to send them home. Do a chest x-ray or CT.

Last week, I heard from a lead radiologist in private practice - major city in the United States – located just 10 miles away from the #1 or 2 Hospital in entire country. They can’t get RT-PCR results. COVID testing taking 5-7 days. But the ACR says you can’t do an x-ray or CT for these patients. Or look at a letter in a Lancet journal, a group of 6 leading chest radiologists in the United States. They say, that for COVID-19, quote: “We believe CT does not add diagnostic value.”

Well 11 days after the first statement, the ACR changed their mind: On March 22, they add point #5 to their statement. I quote: “As an interim measure, until more widespread COVID-19 testing is available, some medical practices are requesting chest CT to inform decisions on whether to test a patient for COVID-19, admit a patient or provide other treatment. The ACR strongly urges caution in taking this approach.” And they say, “Clearly, locally constrained resources may be a factor in such decision making.”

My feeling: we needed a deeper analysis—when to use X-ray or CT. I thought of one of the most thoughtful and highly respected chest radiologists that I know: Dr. Geoff Rubin at Duke. I’ve known Geoff for almost 30 years: super smart, always gives state-of-the-art lectures, and one more characteristic – I call it “depth of thought”.

So I called Geoff. My request to Dr. Rubin – we need more clarity on COVID-19. Could you get a small group of experts together? Maybe look at a few different scenarios, maybe like New York. When should we do imaging for COVID – and when not? Both radiology and the medical community, we need more granularity: when to use CT and imaging for COVID19. That’s how it started.

10 days later, Geoff responds with lots of clarity. He assembled a group of 29 experts, members of the Fleischner society: 15 chest radiologists, 10 pulmonologists, an intensivist, plus experts in pathology, emergency medicine, infection control, lab medicine. From the US, Italy, China, Germany, France, the UK, Holland, South Korea, Canada, and Japan, representing 9 of 15 countries with the most COVID-19 cases in the world. Physicians with experience in managing COVID19. Intense analysis by the group – arriving at 3 different scenarios for managing patients who might have COVID19. Published online simultaneously in the journals Radiology and Chest. And 29 experts who not only analyzed the problem, but give you definite answers to the best of their knowledge. They might be right or wrong, but they took a stand and give you a place to start. They give you 14 different analyses where imaging should be used. You need to see their analysis in print, but here’s a brief overview. There are 3 main scenarios.

Scenario #1: This might be for a region where I am, for example, Madison, Wisconsin. A month into the pandemic: at least for now we have COVID testing, we have PPE, we have enough ventilators for now, we have enough ICU and hospital beds. Scenario 1 is when you have plenty of resources to manage your local patient population. For a patient with mild COVID symptoms, start with RT-PCR testing. If it's positive in an otherwise healthy patient with no risk factors, then no imaging is needed. But if that COVID-positive patient is immunocompromised, older than 65 years, or has risk factors like diabetes or heart disease – get imaging. Get a CT or chest x-ray. That's up to you. The committee doesn’t care which. You decide, but get imaging. Use it get a baseline for the disease. You might end up admitting this patient, maybe even to the ICU if they get worse.

Scenario 2: Moderate to severe symptoms of COVID, no limitations on hospital beds, PPE, or COVID testing. Again, start with RT-PCR. If it’s positive, get imaging. You have a baseline on this moderate to severely ill patient. If the COVID test is negative, also get imaging. Why? Maybe the patient has lobar pneumonia, some other etiology of severe symptoms. Imaging will help triage that patient. And some patients might have CT or x-ray findings due to COVID; the RT-PCR could be wrong.

Scenario 3: Another sick patient. Moderate to severe illness that might be COVID-19. But now imagine you are in New York, not Madison. You don’t have enough PPE, not enough ventilators, not enough hospital beds or COVID tests. The committee calls this “resource limited”. Here it’s more like a war zone. You need to triage the patient – admit to the hospital or not. Admit maybe to the ICU or not, in a situation where not enough beds are available. Get a chest x-ray right away and a COVID test. In Italy, they are getting chest CTs right away. Monitor that patient. Look for a viral pneumonia; determine if they get admitted or not.

That’s a lot of information, but still only about 10% of the full recommendations for COVID. Besides the algorithms, the committee thought there were 3 more important questions. So briefly:

#1) – Don’t get a chest x-ray every day for intubated patients with COVID-19. No value for everyday chest x-rays. It does not change patient management, and you just put more hospital staff at risk.

#2) – Patient recovers from COVID, goes home. Still hypoxic. The panel says to get a chest CT. There could be complications from mechanical ventilation, secondary infection, lung injury, or complications.

#3) – About a week ago on Twitter – a nice case of a thoracic spine MRI. An astute neuroradiologist saw a posterior subpleural infiltrate in the lung – maybe COVID. In the setting of known community transmission, make sure you call someone; recommend the patient have immediate COVID-19 testing. Last week - my colleague at Madison showed me another similar case: cardiac MRI after acute infarct, but also substantial peripheral lung infiltrates. You need to test and treat as if COVID-19 might be present. You might be wrong; you might be overcalling. But clearly those lungs are not normal; it’s not just heart failure.

Conclusion: Look up the Fleischner statement online, print it out, put it in the reading room. Have a staff meeting to discuss it. You might agree, you might disagree, but you have a place to start. The RSNA will have a webinar with Dr. Rubin and other authors in the middle of April. And thank you so much to Dr. Rubin for leading this effort - adding depth to the question: when should we use CT or x-ray in the current pandemic?

Please stay safe.