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“Rule Out” vs “Do Without”



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For better or worse, we practice in the era of the “Rule Out.” Rule out algorithms come in all shapes and sizes, with the use of any combination of history, physical examination findings, laboratory values, and diagnostic imaging to ensure a dreaded disease is not present. There has been a veritable explosion of rule out schemes over the past decade, many of which are highly relevant to chest medicine. Some decry the relegation of clinical diagnosis to decision rules as devolution of our profession. Others, especially those who sanctify evidence-based medicine, are not so nostalgic about previous generations of medical practitioners acting on personal experience and intuition. They welcome algorithmic care as an advance, provided that it is supported by high-quality research. We have met both types. Either way, the rules are here to stay.

Rule outs grow from a void, a seemingly unsolvable clinical dilemma. Pulmonary embolism is notoriously difficult to detect by history and physical; welcome the pulmonary embolism rule out criteria.¹ Which patients with lower respiratory tract infections have a bacterial vs a viral cause can be hard to distinguish; bring in serum procalcitonin.² Alas, sometimes there are no suitable clinical criteria or reliable biomarkers. How am I 100% confident that this patient does not have aortic dissection? Let’s talk CT angiography.³

Enter the COVID-19 pandemic. Diagnosis of SARS-CoV-2 infection has been challenging from the initial

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outbreak until today. Soon after the recognition of COVID-19 as a unique threat, the poor performance, limited availability, and long turnaround times of polymerase chain reaction-based testing led to the use of thoracic CT as a screening test for active infection.⁴ Even when molecular testing is available, there is growing evidence for the utility of CT in COVID-19 risk stratification.⁵ Most recently, a prospective study documented the efficacy of CT to rule out SARS-CoV-2 infection.⁶

What about chest radiography? If there was such a thing as a diagnostic imaging underdog, it would certainly be portable chest radiography. With the burgeoning fields of CT and point of care ultrasound, there is scarcely anything left in the domain of radiography. Assessment of indwelling support lines and tubes in the critically ill? We have already learned that the faithful daily ICU radiograph is likely unnecessary.⁷ What bearing could radiography have on excluding COVID-19?

Pagano et al⁸ surprised us in this issue of *CHEST* with an insightful analysis that evaluates the portable chest radiograph as a tool to rule out complications of COVID-19, demonstrating impressive negative likelihood ratios for admission, mechanical ventilation, the development of ARDS, and death. Their data from the Mount Sinai Health System during the New York COVID-19 surge last spring implies that a negative radiograph, especially in younger patients with few comorbidities, indicates exceedingly low-risk for severe complications. It is important to remember that the patients with suspected COVID-19 who received portable chest radiographs in the study were not part of a clinical or research program designed to test the performance of portable chest radiograph as an effective rule out tool. Additionally, inclusion of all patients with high suspicion of COVID-19 was a pragmatic design that reflected the limited resources in New York City during the spring 2020 pandemic surge. However, only 71.2% in the overall study and a minority (46.9%) of those with negative chest radiography results had positive SARS-CoV-2 polymerase chain reaction, which left us with uncertainty regarding actual COVID-19 diagnosis in many patients.

The portable chest radiograph has several inherent benefits in the setting of front-line triage. Its worldwide

availability exceeds not only other diagnostic imaging modalities but also many laboratory assessments. No patient transfers are necessary. Portable radiography devices require minimal disinfection and can be dedicated to the care of patients under infection control protocols to reduce staff exposure to infected patients. Finally, the portable chest radiograph is performed generally with a source, an image receptor distance of approximately 180 cm that is suspiciously close to the 6 feet recommended for social distancing.

Implementation of a portable chest radiography program for COVID-19 severity assessment would likely result in the expansion of use of radiography into lower and lower risk groups, so that they too can be safely “Ruled Out.” We caution against this intervention. In very low-risk groups the yield is low, and the risk of false-positives is substantial. A recent publication from Singapore by Kuo et al⁹ provides evidence. They describe a series of 1,964 real time-polymerase chain reaction-positive, foreign workers, predominantly young men, who had no or minimal pulmonary symptoms and underwent portable radiography. Radiographs were positive in only 39 patients (2%). Among those with positive radiographs, 14 asymptomatic patients were hospitalized on the basis of their radiographic results, none of whom required oxygen supplementation or had complications. Another eight patients were hospitalized with respiratory symptoms; one required intensive care. In such a scenario, “Do Without” rather than “Rule Out” makes clinical sense. This is reflected in the Fleischner Society consensus statement on the role of chest imaging during the COVID-19 pandemic, which recommends against imaging for mild illness in a low-risk population.¹⁰

There is another important scenario where “Do Without” applies, but for the opposite reason. We are impressed by the proliferation of diagnostic criteria, scoring schemes, and myriad artificial intelligence algorithms for imaging diagnosis of COVID-19. In our estimation, the majority of articles on radiography in

COVID-19 require a computer science degree to fully appreciate. We have also read with great interest several articles claiming to differentiate between COVID-19 and other viral pneumonias. Although the intentions behind these articles are good, we have seen scarcely any non-COVID-19 viral pneumonia this winter. During the New York City COVID-19 surge, just about all of our radiographs were positive and just about all patients had COVID-19. No need for a test when the pretest probability is huge and the differential diagnosis is short.

In conclusion, we applaud the findings of Pagano et al⁸ and wish the reader success in choosing when to “Rule Out” and when the best strategy is to “Do Without.”

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