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Sounding *It* Out

POCUS is proving useful for the diagnosis and treatment of COVID-19.



REMOTE OUTPOSTS

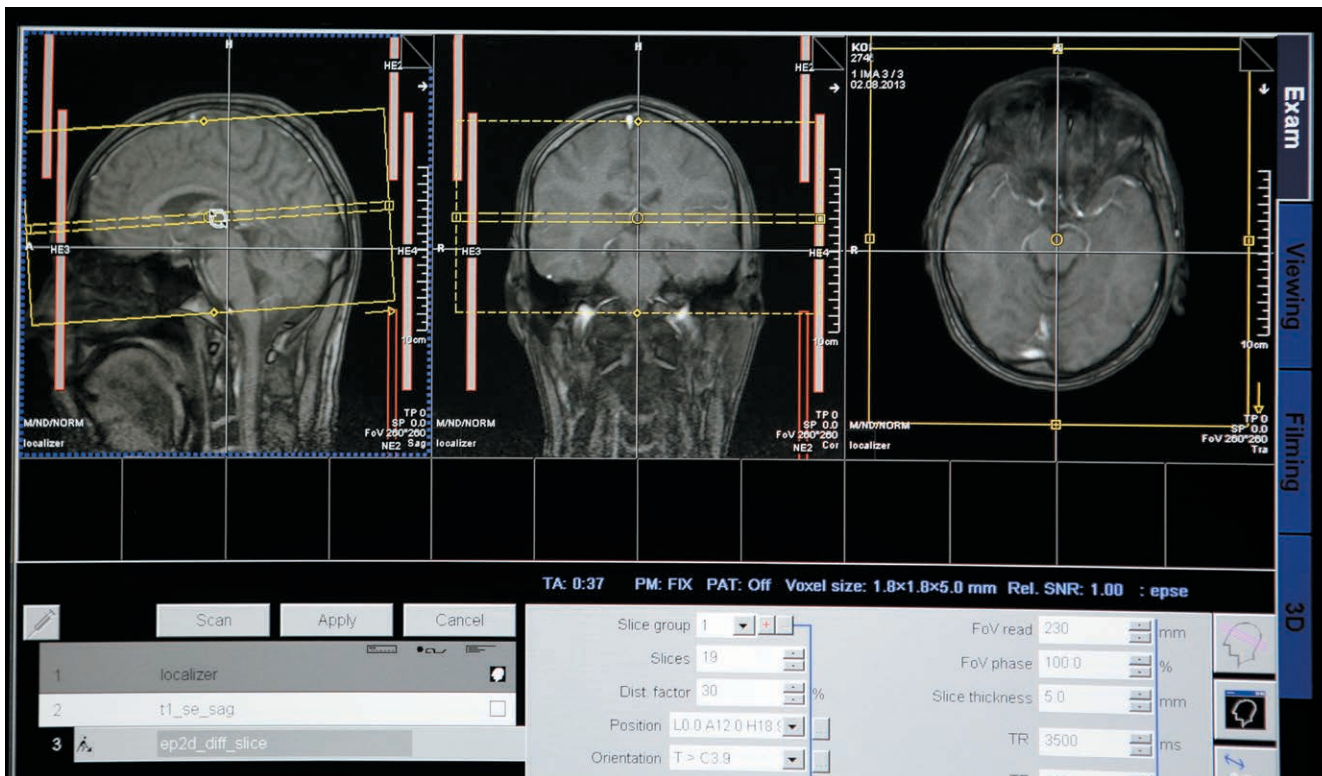
Remote diagnostics help DR vendors ramp up virtual service support.

SHORING UP THE FRONT LINE

Burnout Prevention for Radiologic Technologists in the Wake of COVID-19

A BRIGHTER FUTURE

Advances in medical display technology offer better contrast and higher resolution.



Tips for Home Office Tech

Radiologist Lucas Payor, MD, remembers his first COVID-19 diagnosis back in March. He was reading a chest CT in his Southern California home office and consulting with an emergency department doctor who hadn't yet experienced a COVID-19 case, either.

"He told me this might be his first one and, looking at the scan, I thought it was the real deal," Payor says. "Sure enough, the patient came back positive."

Since then, as the COVID-19 pandemic has swept the country, Payor has seen a jump in chest X-rays and CT scans related to the disease, even as overall radiology volume has dropped. He says his company has started to limit the presence of its radiologists in hospitals for their safety. Still, thanks to teleradiologists such as Payor working full-time from their homes, hospitals and outpatient providers are still being supported 24 hours a day, seven days a week.

"This is an essential piece of the health care puzzle," he says, just before starting his 3 PM to midnight shift. Payor typically reads 80 to 110 studies

during that span. "It allows more flexibility, but, most importantly, it allows for images to get read in a timely fashion, around the clock."

Doctors writing for *Radiology* expect COVID-19 to severely impact the industry, with declines in imaging volume of up to 70%, lasting as long as four months. However, they expect it to bounce back. In their article, Joseph Cavallo, MD, and Howard Forman, MD, MBA, conclude, "Demand for most imaging services should rebound above historical baseline levels as deferred, but necessary, imaging gets scheduled."

Among the ways the authors expect radiology to be affected by the pandemic—and one way they say practices can prepare for the coming demand—is through more teleradiology. "Practices could be permanently redesigned as radiologists become more comfortable reading remotely," according to Cavallo and Forman.

Already, health care systems are adjusting to handling more radiology outside of health care facilities. In a separate *Radiology* study, RSNA collected

best practices from a variety of hospital systems, including Emory University School of Medicine, New York University Langone Health, and the University of Wisconsin, Madison, Hospital. All of the health systems indicated that they are making an effort to allow radiologists to work from home.

Necessary Technology

Ensuring that remote radiologists have the tools they need, therefore, is critical. Not only do they require a computer system to run their preferred PACS, they need diagnostic monitors that allow them to read images with a high degree of accuracy. It is essential that monitors meet digital imaging standards set by organizations such as the ACR and the American Association of Physicists in Medicine (AAPM).

In his home office, Payor operates three monitors at a time: one regular computer worklist monitor to display his PACS application and a pair of high-resolution, 8-megapixel (MP) medical monitors for viewing multiple images at once.

"The more pixels, the better," he says. "In particular, when reading plain films, the medical monitors allow me to see very subtle irregularities."

When looking for display technology to support teleradiology, there are a number of factors to keep in mind.

Begin by asking what the radiologist will be reading. The two most important attributes of diagnostic monitors are spatial resolution, measured in MP, and brightness, measured in candelas per square meter (cd/m^2). For reading mostly CT scans and ultrasounds, for example, a monitor capable of $250 \text{ cd}/\text{m}^2$ brightness may suffice. But a more general-purpose device, capable of also reading X-rays and similar images, should output $350 \text{ cd}/\text{m}^2$, according to guidance from the ACR and AAPM, and deliver 8 MP of resolution—these days, an 8 MP display is commonly referred to as 4K. Mammography, with its imaging subtleties, requires a high-brightness monitor of $420 \text{ cd}/\text{m}^2$.

Make sure the monitor is calibrated to prevailing DICOM standards. If it's used to view medical images, the monitor must comply with DICOM standards that ensure visual consistency and proper luminance. The best monitors come DICOM-calibrated out of the box and have built-in light sensors and

calibration software to ensure they maintain proper DICOM levels.

Today's larger monitors can take the place of two separate displays. While some radiologists use multiple monitors to “hang” images side by side, larger 32-inch—measured diagonally—diagnostic monitors can emulate this hanging protocol on a single screen. This “picture-by-picture” (PBP) mode can save desk space in a home office while still providing a pair of high-resolution 4-MP screens for examining multiple views in fine detail.

Make sure the monitors can connect to the radiologist's computer of choice. For teleradiology especially, it makes sense to use a laptop computer so it's mobile, in case, for example, the IT department needs to do maintenance. But whatever the workstation, especially when it's driving two monitors or a monitor set for PBP, ensuring that each monitor has the input/output ports or appropriate adapters to communicate with the other monitor is key. For two monitors or PBP, the computer needs two output ports. Many medical displays have DisplayPort inputs, but also look for monitors with HDMI, which is

a common output on laptops, as well as Thunderbolt or USB-C. And keep in mind, to support configurations such as 4K PBP, the computer's graphic card needs to be capable of handling it.

Flexibility Is Key

Beyond tech specs, consider technology providers that will ship a replacement if they need to fix a faulty monitor or even one that sells both monitors and laptops for a more streamlined procurement experience.

Payor explains that all of his radiologists are provided a teleradiology workstation from the get-go, enabling them to work from home and setting up his radiology group to service health care clients around the clock—especially now.

“There is this need for [teleradiology] because procedures will eventually have to be done more regularly in the hospital,” he explains. “At this time, our group has worked diligently to minimize the number of rads in hospitals and redistribute them to work at home more.” ■

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