

Did MR Safety Take a Hit During COVID-19?

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The COVID-19 pandemic upended health care throughout the world with near-capacity hospitalization rates, overworked staff, and new personal protective equipment (PPE) requirements. Patient and staff safety was often at the forefront of operational decisions made during the pandemic. But how did the pandemic impact MR safety?

In December 2020, the US FDA issued a safety communication that face masks with metal in the nose wire or in the fabric may cause burns during an MR exam. The announcement came on the heels of a report that a patient's face was burned from the metal in a face mask worn during an MR. The FDA reminded MR providers to screen all patients for masks containing metal and even encouraged them to provide MR-safe face masks.

"The more important aspect of the FDA's announcement is that patients should not be wearing their own mask into the MR exam," says William (Bill) Faulkner, BS, RT(R)(MR)(CT), FSMRT, MRSO (MRSC), owner and CEO of William Faulkner & Associates, LLC, and an established consultant on the subject of MR Safety.

"COVID or not, you don't allow anything in that MR scanner room that you don't provide," Faulkner adds. "That includes hearing protection as well as masks."

Christine Harris, RT(R)(MR), MRSO (MRSC), Corporate Director of Medical Imaging at Jefferson Hospital in Philadelphia, says it is hospital policy not to allow anything in the MR suite not provided

or approved by its safety committee. Department managers should continue to follow normal practices, regardless of COVID-19 or any other global pandemic.

"People were focusing a lot more on COVID, PPE, and taking care of patients. In cases of patients with COVID-19, many MR department staff members were more concerned about COVID and taking it home to their families, and I think that they tended to relax a bit more on MR safety," says Harris.

Also, the need for PPE and potentially more support personnel for a critically ill COVID-19 patient undergoing MR made it more difficult for technologists to ensure proper safety protocols were followed, adds Faulkner.

"The safety risk already increases with a very seriously ill patient," he says. Add a highly contagious infectious disease such as COVID-19, and MR safety becomes more problematic, he adds.

Kristan Harrington, MBA, RT(R)(MR)MR-SO(MRSC), a credentialed MR Safety Officer and MR safety consultant with Faulkner's firm, adds that in many institutions, there are now "dirty" technologists and "clean" technologists, owing in part to the pandemic. While a technologist dressed in full PPE handles the patients and cleans and sanitizes the scanner and room after each exam, another performs the scans.

"I have noticed that everyone is paying so much attention to COVID-19 that sometimes other

important safety protocols may be overlooked,” Harrington says.

COVID-19 added to the complexity of MR safety protocols, says Daniel R Karolyi, MD, PhD, MRMD, Chair of Radiology at Carilion Clinic and Virginia Tech Carilion School of Medicine and a faculty member of the ACR Education Center Body MR course.

However, “it was not an additional layer of complexity that we have not experienced before,” Dr. Karolyi says, noting that MR scans are routinely performed on patients with tuberculosis and other airborne infectious diseases.

“The real issue was the scale or number of patients that had this infectious disease,” he explains. “Before, we may have seen one or two airborne precaution patients a month, at most. With COVID-19, we were getting requests for MR exams on several patients each day.”

The enhanced protocols included checking masks for magnetic metal wires and ensuring no providers with powered air-purifying respirators entered the MR suite.

Because COVID-19 is both an airborne and contact infectious disease, departments had to clean the equipment and the room according to specific guidelines as outlined by the RSNA COVID-19 Task Force.¹

Dr Karolyi adds that his institution followed the RSNA COVID-19 Task Force best practices guidance. “We had to follow airborne precautions, including the requisite room air exchange to make sure any infectious particles floating in the air were cleared prior to the technologist or next patient entering the room.”

A More Complicated Environment

The Michael Colombari tragedy in 2001 (see AR July 2020 article: <https://appliedradiology.com/articles/twenty-years-of-MR-safety-a-progress-report>) highlighted the need for a more systematic approach to MR safety. That accident and others led to the first American College of Radiology (ACR) white paper on MR safety² and creation of the ACR subcommittee on MR safety which later passed the ACR Guidance Document on MR Safe Practices: 2019.³

While well-demarcated MR safety zones, restricted access into Zones 3 and 4, comprehensive screening of patients and clinicians, and the use

of ferromagnetic detectors are recommended, MR safety has become more complicated, experts say.

“There are more implanted devices in patients, and some come with conditional labelling and others don’t,” Dr Karolyi says, suggesting that it would be helpful for manufacturers to test all of their devices for MR conditional status so personnel can make more informed decisions about a patient’s eligibility for MR.

Dr Karolyi says his department has attempted to identify patients with metal implants through the hospital’s electronic medical record (EMR) system. However, he says every orthopedic screw, staple, and other item—ferromagnetic or not—that had been placed in the patient made the process cumbersome. He would like to see EMRs become more sophisticated regarding implanted devices.

Ferrous Free

Moving to a completely ferrous-free environment, including requirements that MR staff wear clothing with no ferromagnetic components, is one approach being taken by some facilities. But Harris says such approaches are difficult to manage, in part because clinicians from other departments often must visit the MR department for various reasons.

“If we go ferrous free, then it has to be everything and everyone, not just the MR staff,” Harris says. “It should include the other clinicians, such as an anesthesiologist or nurse, who comes into the MR department, as well.”

Ferromagnetic detection devices are strongly recommended, though not required, by the ACR subcommittee on MR safety. As a result, the devices have not been adopted throughout the country. But, “it would be helpful if these devices were used to not only screen patients and staff before they enter Zone 3, but also [to screen them] before they enter Zone 4,” Dr Karolyi says. Since Zone 4 is the magnet room and persons in Zone 3 may have physical access to Zone 4, additional ferromagnetic detection further enhances safety by alerting the technologist and staff of the presence of ferrous material.

Still, there is the potential for the development of “alarm fatigue” if institutions rely only on ferromagnetic detection systems.

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School of Medicine



pay less attention to it,” says Faulkner, who adds he has consulted with institutions where the alarm goes off so often that the staff has begun to ignore it. “If you ignore it, how do you know whether or not someone is taking something dangerous into the scanner room?”

There is precedent for strictly enforcing access to sensitive areas of healthcare facilities, Faulkner points out: the surgery department. He explains that anyone entering a surgical suite in street clothes is denied entry until they are properly dressed and have undergone proper cleaning procedures.

“The reality is that I’m not a safety problem until I enter an OR suite improperly dressed,” Faulkner says. “What they are simply doing is stopping me before I pose a safety problem. In the MR department, this is the same process as controlling access to Zone 3.”

Technologists must be empowered to control access to the MR suite by everyone, staff, including department chiefs and other high-level administrators, as well as patients.

“When someone tells me they can’t tell the head of radiology they can’t come in if they are improperly dressed, I say, ‘yes you can,’” Harris says. “That’s the policy, and they signed off on it.”

In her own experience, she says, she had to keep documenting, educating, and pushing for MR safety protocols. “As technologists, we must push our safety agenda forward,” she says.

The advantages to engaging with patients on safety protocols may include a shorter scan times. At one facility where Harrington worked as an MR technologist, she said, she was more efficient than the techs who cut corners on patient screening.

“My scan times were actually shorter because I had less repeats,” Harrington explains. “I created a rapport with the patient, and some of the techs who cut corners had to do repeat exams, which is just more RF exposure to the patient.”

MR safety is a matter of education and controlling the environment, says Faulkner, noting that the “five-gauss line” has moved over the years from approximately 36 feet from the MR scanner to the scanner room itself. “We’ve moved our focus from the surrounding area in the MR department to just the magnet, and that leads to more risk,” he argues.

Faulkner calls this “normalization of the deviation,” where people tend to slightly deviate from a policy or procedure; over time the deviation

becomes more pronounced. That deviation can include locating Zone 3 closer to the MR scanner or allowing clinicians or patients into the MR scanner room without being screened.

Failing to address safety issues and allowing deviations from MR safety protocols leads to a higher risk of accidents. Prior to the death of Michael Colombini, incidents at other institutions included a sheet-metal worker being blinded by an iron fragment in his left eye and the death of a patient with an intracranial aneurysm clip.^{4,5}

“But we didn’t pay attention until a child died,” Harrington says.

Faulkner, Harrington, and Harris all agree that MR safety requires more than guidelines. They applaud the 2020 ACR Manual on MR Safety for delivering stronger language on what constitutes standard of care in MR safety.⁶

Addressing the core culture surrounding MR safety remains a work-in-progress, Faulkner says.

“The technologists are the last line of defense,” he says. “However, facilities can have serious safety risks when the technologist is the *only* line of defense.”

“I can’t highlight enough how important it is that everyone at every medical facility really pay attention to what the MR technologist is saying when in that environment,” Dr Karolyi adds. “They are there to not only keep the patients safe, but to keep their colleagues and other hospital staff safe as well.”

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