

Mobile PET/CT: Evaluating Exposure

by Ann H. Carlson

Proper precautions may minimize staff radiation risk.

When it comes to identifying cancer, PET/CT is one of the most powerful imaging tools available. However, many imaging facilities do not have the patient volume to justify investing in a static PET/CT unit, especially in light of reimbursement cuts due to the Deficit Reduction Act of 2005 (DRA). As a result, more facilities now look to mobile PET/CT solutions as an economically viable way to offer patients this service. But are mobile units exposing technicians to more radiation than their static counterparts?

A recent study from the University of Surrey, Guilford, UK, presented at the UK Radiological Congress 2007 held this past June in Manchester, suggests that this is the case. Researchers observed 118 PET/CT scans—56 conducted in mobile units, 62 in static units—to track technical staff's radiation doses and exposure times. Although the staff's radiation exposure levels during the injection phase of the examination were comparable in both static and mobile units, researchers noted a 20% increase in dose exposure for staff working in mobile units who escorted patients to the restroom.

The implication: Mobile staff spent additional time with the patient because the bathrooms were farther away, thereby upping their risk of increased radiation exposure.

The study's authors were unavailable for comment, but in a press statement, they suggested that more dose awareness and training are warranted to maintain lower radiation exposure levels. However, it is unclear whether the study's findings apply to all mobile PET/CT setups. Dwight Heron, MD, chair of radiation oncology at the University of Pittsburgh Medical Center, who was not familiar with the study, said that with the proper process, there should be no significant difference in radiation exposure levels between mobile and static units.

"There's no reason why you can't use an identical process in a fixed versus a mobile unit, so I would be surprised if our staff is getting any more radiation in the mobile solution than the fixed," said Heron.

Improving Access

Ever since fixed PET/CT was invented at the University of Pittsburgh, it has become an important tool to diagnose and treat patients with cancer. "The benefits of PET/CT cannot be discounted," Heron said. "It is clear that PET changes the management in one quarter to one third of patients. This is a valuable resource in the accurate staging, diagnosis, and assessment of response in patients who are treated for cancer."

To ensure that all patients in the geographic area have access to this technology, the University of Pittsburgh has 21 radiation centers in western Pennsylvania, with more than half being serviced by a mobile PET/CT solution. One of these mobile locations scans up to 14 patients per day.

"We came at this with the fundamental principle that patients should have to travel no more than 30 minutes in any direction to get high-end, quality care from a National Cancer Institute-designated cancer center," Heron said.

The PET/CT units are transported inside a trailer, which is commonly 8.5 feet wide, 13.5 feet tall, and 53 feet long. Calutech Mobile Solutions, Hammond, Ind, a company that builds trailers for mobile PET/CT units, works closely with facilities to address radiation concerns. "[The facility] will hire a physicist to say how much lead they are going to want in the walls and in the hot-lab area," said Michael Hardesty, sales manager for medical imaging at Calutech. "We build around whatever the input is from the customer."

In day-to-day operation, only small calibration adjustments are required for mobile units. "When you have a fixed unit, the lasers are pretty stable from day to day, but when you have a mobile unit, those lasers may shift as the vehicle is moving; when you get to a location, each day you need to do some quality assurance methods to make sure that the lasers are accurately aligned," Heron said.

"The units themselves are fundamentally the same—it's just that one is on a truck and one is fixed," Heron said.

Promoting Awareness

Whether conducting PET/CT exams at a static or a mobile unit, technicians receive some radiation exposure. "The techs get their radiation from being close to the patient when they're injecting and moving them, and a little bit usually from the radiation just leaking through the shields around the room," said G. Donald Frey, PhD, professor of radiology at Medical University of South Carolina, Charleston.

To minimize this exposure, technicians are trained to provide patients with as much care and information as possible before the injection. "As soon as they finish injecting the patient, they leave the room," Frey said. "That's good for both letting the patient rest quietly, which is important for a good-quality study, and for reducing the radiation dose to the tech. The second part is that when they move the patient from the injection room to the scanner room, they do it as efficiently as possible so that they minimize the amount of time they spend with the patient."

One potential difference between mobile and static units is their proximity to the restrooms. As part of the PET/CT process, patients must empty their bladders; however, restrooms usually are not incorporated into the trailers. "They almost never are because then you get into actual nuclear waste," Hardesty said. "It's not something that is handled in the trailer."

Researchers from the University of Surrey noted that the distance between the mobile unit and the restroom can impact technicians' radiation exposure levels. To minimize staff exposure, the authors suggested using domestic helpers to escort patients to the restroom. Additionally, facilities can consider transporting patients in wheelchairs, which reduces the time it takes to move between the trailer and the restroom.

Although Frey was not familiar with the study, he said that facilities should consider factors such as radiation exposure before selecting a scanner. "They need to assure themselves that the technologists are not going to receive excessive radiation doses," he said. "And they should work with their medical physicists after they have a scanner to monitor the doses to the technologists."

Still, using mobile units should not involve precautions above and beyond the norm, according to Heron. "In our experience, there are no significant other precautions that you have to take," he said. "Use the same precautions that you would use in a fixed unit."

As the mobile PET/CT market continues to grow, Heron believes that this model offers an important technology to patients who may not have had access to it previously. "In centers that may not necessarily have the volume to sustain a fixed unit, the mobile solution is a very attractive choice because it offers predominantly greater convenience for the patient," he said.

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