

The Importance of Radiation Safety for Healthcare Workers as Well as Patients

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Author(s):

Jane Kiah, RN, Director of Invasive Services, Baptist Cardiac & Vascular Institute, Miami, Florida; Program Director, Innovations in Cardiac and Vascular Care: Advanced Interventions for Nurses and Technologists, The International Symposium on Endovascular Therapy (ISET)

Dick Stueve, RT, radiation safety consultant to Philips Healthcare, providing on-site radiation safety courses for physicians, nurses and technologists performing fluoroscopically guided vascular interventions.

Marie Curie died due to excess exposure to her discovery, radium. Thomas Edison invented the fluoroscope, but stopped his work in this area when his assistant died of an x-ray overdose. Many years later, we have a better understanding of the dangers of radiation, and yet, we often fail to handle it safely. It is easy to become complacent about the dangers of radiation: it is invisible and odorless, and often we are so caught up in performing procedures that we overlook the tools that help us accomplish this goal. As a result, we may expose patients as well as ourselves to higher levels of radiation than necessary. The World Health Organization (WHO) has classified radiation as a carcinogen. The risks of excess radiation exposure are not insignificant, potentially leading to a variety of health issues, from cataracts and hair loss to birth defects and the development of cancers.

Following the best radiation safety practices, therefore, is beneficial both for patients and healthcare workers. To shed light on the realities of radiation use and misuse, as well as provide guidance on myriad approaches to reducing exposure, radiation safety expert Dick Stueve, RT, will be giving a talk on radiation safety at a symposium for nurses and technologists to kick off The International Symposium on Endovascular Therapy (ISET) Sunday, January 15, in Miami Beach, Florida.

The dangers of radiation in the hospital received significant attention early last year when the New York Times published a series of exposes on radiation therapy treatment accidents and overexposures. Consequently, the Food and Drug Administration (FDA), The Joint Commission, and the Occupational Safety and Health Administration (OSHA) are among the entities paying closer attention to this issue.

Although the *New York Times* articles focused primarily on radiation therapy, radiation used for imaging, particularly during interventional procedures, also is of major concern. The top three sources of excessive and risky radiation are nuclear medicine, computed tomography (CT) and fluoroscopy, often employed in long exposures during endovascular procedures.

Those who regularly work with radiation need to take a long, hard look at their actions and ask themselves if they and their coworkers are doing everything they can to reduce exposure, for their own sake as well as for patients.

Why is Radiation Safety an Issue?

One of the root causes of excessive radiation exposure arises from the fact that many in the healthcare field who work with radiation have received only rudimentary radiation training. Whereas interventional radiologists are trained in the safe use of radiation, interventional cardiologists and vascular surgeons, for instance, typically receive minimal radiation training. Because they typically are unfamiliar with all of the sources of radiation exposure, they may know little about risk-reduction and safety strategies. Compounding the problem is that, while a radiologist's key team member is a radiologic technologist (who also has received radiation safety training), an interventional cardiologist or vascular surgeon's key team member may be a nurse, who likely has received little to no radiation safety training. That's not to say that all radiologists employ best radiation safety practices, either. Despite their training, many of them have become complacent.

Additionally, we often use far more radiation than necessary. In the United States, there is an increased emphasis on ensuring the highest quality images, which means more radiation. That's not the case in Europe and Japan, where safety is more highly valued. The ideal dose is the least amount of radiation possible to produce an acceptable image. A good operator knows how to produce good images without excess radiation.

Who's Keeping Tabs?

In most hospitals, radiation safety is the joint responsibility of the facility's radiation safety officer and the technologists who work in the department. The safety officer keeps track of healthcare workers' radiation exposure via the dosimetry badges that should be worn at all times and turned in every month for exposure assessment by an outside company. The American Council on Radiation Protection & Measurements allows that those who work with radiation can safely receive 5,000 millirems a year, in addition to what they receive in background radiation.

Once or twice a year, the state typically performs an inspection. Additionally, the Joint Commission requires hospitals to have written procedures regarding the use of precautions and personal protective equipment regarding the use of hazardous materials, which include radiation and x-ray equipment. The Commission requires that hospitals provide protective devices, such as lead aprons and shields, and show they are worn as required. They also require records be maintained regarding individual worker exposure, as recorded by dosimetry badges.

But when no one's watching, it's easy to fall back into bad habits and complacency. Hospitals get busy and when a dosimetry badge value comes back high, some clinicians choose not to wear a badge, rather than take the time to determine the cause. What is particularly unfortunate is that the reason for the high dosimetry numbers often is easily resolved, and typically increases the safety of the worker and everyone around him or her.

Making Improvements in Radiation Safety

The good news is there are numerous ways healthcare facilities can make radiation safety improvements. An excellent first step is to require that all who work with or around radiation, including physicians, equipment operators, technologists, nurses, anesthesiologists, and any others, take a radiation safety course. Although some may argue there is no time in the work day for this, it must be made a priority. Training can't help but result in improvement in safer use of radiation. California, for instance, requires anyone who works with fluoroscopy, including technologists, physician assistants, nurses and physicians, to attend a fluoroscopy class and be issued a permit.

It is also important to foster good communication among the healthcare team, and ensure that everyone understands radiation safety is his or her job. Nurses and technologists must be encouraged to speak up if they are concerned about safety practices. Physicians must be made to know that their support staff is required to speak up, and that they need to take those concerns under consideration and not ignore them. The U.S. military has created a system of openness and communication, where all team members are expected to speak up and make suggestions. Unfortunately, this isn't part of the culture at many hospitals.

Dose reduction also is important because radiation scatter from the patient causes the most exposure to workers. Controlling patient dose, therefore, benefits workers as well as patients. That includes minimizing fluoroscopy time as well as the number of fluoroscopic images.

Shielding is another important safety mechanism, and there are many types in existence. It is important to not only use all that are available (requesting additional shielding, if appropriate), but to use them effectively. Shielding includes: 1) Personal: aprons with thyroid shields, leaded glasses; 2) Equipment-mounted: protective drapes (particularly important for eye protection during interventional procedures); 3) Rolling and stationary shields; and 4) Disposable patient drapes to prevent scatter radiation. Architectural shielding is also required, in that any room where radiation is used must have a predetermined thickness of lead in the walls, doors, windows, etc.

Additionally, there are numerous positional and equipment-related radiation safety features that require full knowledge not only of the equipment, but of the properties of radiation. Again, those who do not have a radiation background are at a disadvantage because they don't fully grasp how radiation works and, therefore, how to work with it more safely.

Technologists should make full use of radiation-reduction features built into the equipment. Manufacturers should be requested to regularly provide training for new workers, who may be unaware of the equipment's safety features. Operators should learn how to use and position the system around the patient to ensure the lowest radiation dose to the patient and workers. Positioning can be done effectively or poorly, and again, physicians and healthcare workers must learn about the benefits and trade-offs.

In particular, one area that is often overlooked is the positioning of the tube that produces the x-ray, which passes through the patient to the detector. The detector should be as close to the patient as possible, in order to block scatter radiation, improve image quality, and require less radiation. During procedures such as cardiac angioplasty and stenting, many operators consider it a convenience to have the detector further away from the patient so it is more easily moved around the patient. Unfortunately, this results in 50 to 60 percent more radiation to the patient if it's done incorrectly.

Radiation is an important diagnostic tool, but it must be treated with respect. It has become apparent that there is significant room for improvement in radiation safety practices, which can vary widely from institution to institution, and from clinician to clinician. All who work in hospital radiation environments, including technologists, nurses, physicians and others, must make a commitment to the safer use of radiation, for the good of everyone.

“What We Now Know About Radiation Safety” will be held at 3:30 pm Sunday, January 15th at the upcoming Sixth Annual Innovations in Cardiac and Vascular Care: Advanced Interventions for Nurses and Technologists” prior to the International Symposium on Endovascular Therapy (ISET) meeting. The ISET meeting runs January 16-20, 2011, in Miami Beach, Florida. The 24-year-old ISET meeting is the premier gathering for specialists and allied professionals working in vascular and cardiac intervention. To learn more, visit ISET.org.