Applying Image Gently® and Image Wisely™ in Nuclear Medicine

Radiation dose to patients from medical imaging is a serious concern for imaging professionals and the general public. Computed Tomography (CT) been the main target of media attention and the principal focus of radiation dose reduction efforts. Radiation dose from nuclear medicine procedures is frequently overlooked, despite an effective dose per procedure that is often comparable in magnitude to effective dose per scan from CT.

Patient radiation dose from nuclear medicine comprised 12% of the collective effective dose to the U.S. population in 2006. This fraction is likely to rise as the “Baby Boomer” generation ages, since the need for cardiac, bone, and oncologic nuclear medicine imaging procedures is likely to increase. Application of the principles of the Image Gently® and Image Wisely™ campaigns to Nuclear Medicine can reduce patient radiation dose from these procedures.

Radiopharmaceutical doses for 24 pediatric nuclear medicine procedures at our site were compared to those in the North American Consensus Guidelines for Administered Radiopharmaceutical Activities in Children and the European Association of Nuclear Medicine Paediatric Dose Card. All radiopharmaceutical doses were determined to be comparable to Consensus Group Guidelines or EANM recommendations with the exception of the minimum dose for the pediatric nuclear medicine renogram without flow, which uses Tc-99m mercaptoacetyltriglycine (MAG3). The site administered dose was adjusted, image quality evaluated, and dose savings calculated.

As is true for many nuclear medicine departments outside of pediatric hospitals, the pediatric patient population makes up a very small fraction of total procedure volume. Patient volume statistics showed that 7232 nuclear medicine procedures were done at our facility in 2010-2011. 217 of those procedures were on patients 0-17 years of age (3.0%) and 7015 were on patients 18 + years of age (97%). Since our Image Gently project only affected a small fraction of our patients, we decided to add a second phase to the project and implement Image Wisely™ for our adult radiopharmaceutical doses.

Site radiopharmaceutical doses for 52 adult diagnostic Nuclear Medicine exams were compared to doses in NCRP Report No. 160 and IAEA Safety Report No. 40. Since the names of the site procedures did not always match the procedure names listed in NCRP Report No. 160, CPT codes were used to ensure the proper comparison. All radiopharmaceutical doses were determined to be comparable to values in NCRP Report No. 160 values or IAEA Report No. 40 with the exception of the Tc-99m sulfur colloid egg yolk gastric emptying study. The site administered dose was adjusted, image quality evaluated, and dose savings calculated.

Comparison of administered radiopharmaceutical doses to standards is important, but it is only the first step in implementation of Image Gently and Image Wisely in nuclear medicine. Additional steps to reduce patient radiation dose include decision support to reduce inappropriate ordering, technique optimization for the CT scan portion of SPECT/CT and PET/CT, use of vendor’s dose reduction camera and software technology, use of shorter lived radiopharmaceuticals, and “right sizing” patient doses by weight. Information on the above steps is available on the Image GentlySM and Image WiselySM websites, http://www.pedrad.org/associations/5364/ig/ and http://www.imagewisely.org/.