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Radiation: to be respected, not feared in the interventional setting

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With the ESC Congress 2016 Annual Meeting in Rome beginning this month, specialists will have the opportunity to learn and experience first-hand the latest innovations, as well as debate the latest developments in cardiology. Among the discussions, I expect one hot topic for the interventional community will be the growing importance of managing radiation dose in the interventional suite.

In my own experience, having performed interventions over the past 16 years, I have seen tremendous growth in minimally invasive image guided procedures, and have also seen these procedures become longer and require more imaging.

As we all know first-hand, x-ray fluoroscopy has revolutionized medicine, allowing us to perform many types of life-improving procedures, but we must acknowledge that it also has the potential to cause harm. An increasing amount of data is now available suggesting there may be a detrimental effect not just to patients, but also to the cath lab support staff, and us, the very physicians who perform these procedures.

Interventional cardiologists have the highest radiation exposure of any medical professional. [1] The average interventional physician in the U.S. gets almost three times the annual radiation dose compared to the average nuclear power plant worker. And this is likely underreported, as we all know colleagues that have either not worn their dosimeters, or even taken them off when they approached their hospital limits. The International Atomic Energy Agency (IAEA) surveyed interventional cardiologists in 56 countries, and discovered only 33-77% utilize radiation badges routinely.[2]

Recent studies are showing we are not immune to the very effects of radiation we deliver. One study published by a team from the IAEA in 2013, discovered posterior subcapsular cataract development (consistent with ionizing radiation exposure) in 50% of interventional cardiologists and 41% of nurses and technologists (versus < 10% in the control group).[3]

A 2013 study published in the American Journal of Cardiology studied 31 interventional physicians with brain tumors, and discovered a disproportionate incidence of left-sided brain tumors in 85%. Given that our left side of the head is known to be more exposed to radiation than the right, these findings raise concern.[4] This past May, researchers from the U.S. National Cancer Institute observed elevated risks of brain cancer, breast cancer and melanoma in a cohort of over 90,000 technologists who assisted in interventional procedures.[5]

These data all contribute to the ongoing debate about the validity of risks related to radiation and there is no question the ALARA principle remains paramount. In other words, we should make every reasonable effort to maintain exposure to radiation “As Low As Reasonably Achievable.”

Fortunately, technology now exists to help us better understand radiation exposure, and more importantly to even reduce dose. For instance, rather than waiting many weeks to see if you’ve reached your limit of radiation exposure and after it is too late to do anything about it, we can now see this information during the procedure via a real-time personal dosimeter like PhilipsDoseAware. This allows us to make changes in real-time to manage dose to ourselves and our staff. This author reported data at the 2014 American Roengten Ray Society (ARRS) showing a 45% physician dose reduction after DoseAware badges were utilized (in over 6,000 procedures over 2 years). Another published study from Cincinnati Children’s Hospital observed a nearly 6-fold reduction in median staff dose simply by using DoseAware.[6]

Philips technologies like AlluraClarity with ClarityIQ technology allow us to obtain high quality imaging for a comprehensive range of clinical procedures, achieving excellent visibility at low X-ray dose levels for patients of all sizes.

Philips has a strong heritage in X-ray technology and healthcare having produced x-ray tubes for nearly a century. More than 28 million patients per year are helped by one of our Philips Image Guided Therapy (IGT) technologies worldwide. However we recognize our future is beyond simply developing x-ray systems and we believe we are in the business of helping treat patients better. And with the acquisition of Volcano as our first step in the marriage of smart devices combined with novel imaging techniques, we indeed are moving closer to our vision of a safer radiation-less or even radiation-free interventional suite.

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Given the growing number of minimally invasive procedures, I believe physicians, society and industry all share responsibility to manage dose effectively. There is no single group that can solve this alone. We as physicians need to educate ourselves on how to reduce dose for our patients, staff and ourselves. Societies play a role, and both the Multispecialty Occupational Health Group (MSOHG) and Organization for Occupational Radiation Safety in Interventional Fluoroscopy (ORSIF) are bringing focus to the occupational hazards of interventionalists. Finally, manufacturers have a responsibility to keep creating technologies to help support the next generation of safer procedure environments. Radiation should be respected, not feared, and awareness of the risks is our first step towards influencing change.

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Dr. Atul Gupta is Chief Medical Officer for the Business Group Image Guided Therapy (IGT) at Philips. Atul began his clinical career in interventional radiology in 2000 and continues to practice today. He joined Philips in April 2016 and serves as a member of the Philips IGT Management Team to deliver medical leadership and clinical support to all IGT businesses.

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Published on : Thu, 1 Sep 2016

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