Personal dosimetry system monitors radiation exposure in real time in the interventional suite

Each year approximately 3.6 billion x-ray examinations are performed worldwide, leading to earlier and more accurate diagnosis of medical diseases. However, concern has been raised regarding the stochastic and even deterministic impact on both patients and medical staff. Authorized bodies have emphasized the importance of ensuring the proper performance of X-ray equipment and of keeping the dose to medical staff and patients as low as reasonably achievable (ALARA). Unfors RaySafe has developed comprehensive solutions to monitor and reduce radiation in the X-ray room.

**Personal dosimetry**

The most significant personnel doses in the hospital environment often occur in the interventional suite where fluoroscopy is performed. Recent studies have shown hospital workers who are routinely exposed to ionizing radiation are at an increased risk to cancer, cataracts and other health problems. These findings have forced radiation safety professionals to look at more effective methods to reduce personnel exposures.

In the past, health and medical physicists relied primarily on training and the use of shielding to reduce personnel exposures. They would then review passive dosimeter results months later in hopes of seeing a dose reduction. However, as interventional techniques grow longer and more complicated, this delayed method has become less effective. Some hospitals have tried to use electronic dosimeters to monitor staff exposures during interventional procedures to obtain more accurate dose measurements. However, this method is only minimally accurate. Some electronic dosimeters are not capable of accurately monitoring cumulative exposure in a pulsed radiation field as found in the fluoroscopy suite. Additionally, some are too heavy and are uncomfortable to wear, and all electronic dosimeters require the user to retrieve and view the LED display, which can occasionally be difficult to read. As a result, efforts to achieve ALARA for staff in the interventional suite have been challenging and largely unsuccessful.

Unfors RaySafe, a Fluke Biomedical company, recognized the need for a more accurate dosimeter, and developed the RaySafe i2 system to overcome the limitations of passive and conventional electronic dosimeters. In 2012, RaySafe introduced the i2, an active dosimetry system that gives real-time insight about personal radiation exposure, as well as access to time stamped dose data. The i2 wirelessly transmits exposure rate data to a large display monitor at the centre of every interventional suite. Displaying exposure rate and cumulative data allows each individual to make real-time adjustments such as shielding to immediately see the results of their efforts to achieve ALARA during interventional procedures. A study by the University of Rochester showed a 50 percent reduction in staff dose over a nine month period as the result of using these real-time personal dosimeters.

A primary challenge of real-time dose monitoring is in pricing to compete with passive dosimetry. However, as any radiation safety officer knows, the more significant cost of a dosimetry programme lies not in the cost of the dosimeters, but in the time and resources needed to collect and distribute dosimeters on a monthly and quarterly basis, and in the unpopular task of chasing after unreturned badges. Anything which can reduce or remove this administrative burden will be welcomed. The move from passive dosimeters being used only “to demonstrate compliance” to the use of real-time dosimeters to “demonstrate compliance AND achieve ALARA” is fast approaching.

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