

Accurate Measurements are Key to the Quality of Cancer Care in South Africa

Cancer remains one of the leading causes of morbidity and mortality among nations. Although most of its risk factors are beyond human control, it has been demonstrated that the death rate can be significantly reduced if the disease is diagnosed at an early stage and treated effectively. Early diagnosis strategies focus on providing timely access to cancer treatment by reducing barriers to care and/or improving access to effective diagnosis services. The goal is to increase the proportion of cancers identified at an early stage, allowing for more effective treatment to be used and reducing the risks of death from breast cancer.

Nuclear technologies play a critical part in the diagnosis and treatment of cancer in South Africa, from imaging using machines such as fluoroscopy, mammography, and computed tomography (CT), to treatment with external beam radiotherapy and brachytherapy. As important a role as these nuclear technologies play, they could also be detrimental to the patients and other health workers. Ensuring that these radiation emitting machines are correctly calibrated, using instruments that have valid calibrations traceable to the international measurement standards would greatly safeguard against this danger. The national metrology institute of South Africa (NMISA) was established under the Measurement Units and Measurement Standards Act, No.18 of 2006, to provide for the

use of measurement units of the International System of Units (SI) and to provide for the keeping and maintenance of the national measurement standards.

The dosimetry standards section at NMISA, first accredited for ISO 17025 in 2003, provides traceability to the health sector amongst many other industries, through the calibration of radiation detectors used to ensure safe use of the mentioned nuclear technologies, and calibration of personal monitoring devices used to ensure safety of health workers. NMISA plays an important role in ensuring the optimization of protection and safety in medical radiation exposure. This is because, calibration is the cornerstone for accurate radiation dose measurement in hospitals using ionising nuclear technologies for diagnostic and/or treatment of cancer.

Safe and effective cancer treatment relies to a large extent on accurate radiation dosimetry. Differences as small as 5 per cent from the prescribed radiation dose can change the outcome of treatment. Dosimetry mistakes can also result in radiation injuries, which in serious cases can even lead to death. For this reason, international organisations such as the IAEA recommend that a radiotherapy hospital radiation beam should be regularly audited.

NMISA also provides radiotherapy audit service to ensure a high standard of cancer care and improved safety of the patients in the country. The

audits are performed by issuing dosimeters to a participating radiotherapy hospitals, which give them a radiation dose as they would for a patient. The dosimeters are then sent back to NMISA's Dosimetry Audit laboratory, where the radiation dose the hospitals intended to give is compared with the one they actually gave. The advantage of this type of audit is that it can be performed remotely by sending the radiophotoluminescence dosimeters (RPLDs) to participating centres where they are irradiated to a specified dose under clearly defined conditions. When an audit detects discrepancies, the Dosimetry Audit laboratory informs the hospital in question and may advise that the hospital requests new dosimeters to be irradiated. This follow-up procedure may also include on-site visits by NMISA experts.

Without the calibration of devices, it is impossible to know with certainty how much radiation has been administered to a patient, leading to either overdosing or underdosing which could both be detrimental to the cancer care for patients.

For additional information about the services NMISA offers in support of quality in cancer care contact us at info@nmisa.org.