Human Health

Objective

To enhance Member State capability to address needs relating to the prevention, diagnosis and treatment of health problems through the development and application of nuclear and related techniques within a quality assurance framework.

Estimating Required Medical Physics Staffing Levels for Radiology and Nuclear Medicine Departments

The vast majority of the population's exposure to ionizing radiation is due to medical imaging, yet the role of the medical physicist in this area is still largely underestimated. The widespread, and rapidly expanding, use of radiopharmaceuticals for therapeutic purposes requires clinical medical physicists competent to oversee equipment specification, maintenance and routine quality control, and to carry out specialized dosimetry calculations, all of which are key to quality management, dose optimization and clinical dosimetry. To help medical imaging departments determine the number of medical physicists needed to support established services, in 2018 the Agency published *Medical Physics Staffing Needs in Diagnostic Imaging and Radionuclide Therapy: An Activity Based Approach* (IAEA Human Health Reports No. 15). The publication, endorsed by the International Organization for Medical Physics, describes activity based staffing levels developed based on the roles and responsibilities of the medical physicist as described in international guidelines such as IAEA Safety Standards Series No. GSR Part 3 and in IAEA Human Health Series No. 25. These roles and responsibilities are divided into the following six major categories: equipment dependent; patient dependent; radiation protection related; service related; training related; or academic teaching and research related.

The publication also includes an accompanying spreadsheet developed to facilitate calculations of staffing needs in line with the guidance set out in the main text. The algorithm can be used to estimate staffing levels required for different sized institutions, including scenarios where comprehensive services are provided across multiple sites. The significance of and need for such guidance is evident from the interest of end users in Member States — the report has remained one of the ten most downloaded publications on the Agency's web site since its publication in February.

"The publication… includes an accompanying spreadsheet developed to facilitate calculations of staffing needs in line with the guidance set out in the main text."

Information Technology to Enhance Management of Cervical Cancer

Every year, over one million gynaecological cancer cases and half a million related deaths are registered worldwide. The highly specialized oncology workforce needed for safe, effective management of these cancers is not readily available in all Member States. To

FIG. 1. A PET–CT image of a 57 year old female patient with ovarian cancer showing high abnormal uptake in different areas corresponding to peritoneal carcinomatosis. (Image reproduced courtesy of the University of Lyon, France.)

help address this need, particularly in isolated regions in Africa, the Agency founded the African Radiation Oncology Network (AFRONET) in 2012. AFRONET provides access to training, up-to-date published literature, expert opinion and peer review of clinical cases in Africa, to support better diagnosis and treatment of gynaecological malignancies through case presentations and discussions. In 2018, this virtual platform was expanded to include other regions and languages and further site specific specialization, including a dedicated space for cervical and childhood cancers.

In July, the Agency launched a new e-learning module that presents 12 clinical cases involving the use of ^{18}F-FDG PET–CT (fluorine-18 fluorodeoxyglucose positron emission tomography–computed tomography) to manage diverse gynaecological tumours in different clinical stages (e.g. evaluation of recurring disease, restaging after adjuvant therapy, monitoring the efficacy of treatments, radiotherapy planning) (Fig. 1). It also covers the emerging application of radioguided sentinel lymph node biopsy in patients with vulvar and cervical cancer.

At the 12th Congress of the World Federation of Nuclear Medicine and Biology in April, technical experts from the Agency gave a presentation entitled ‘International Guidelines on Sentinel Lymphoscintigraphy in Gynaecological Cancers’.

Increasing Human Capacity through Research, Education and Workshops

The Agency continued to support Member States in the use of nuclear techniques to address non-communicable diseases such as cancer and cardiovascular diseases, as well as infectious diseases such as tuberculosis and malaria. The use of hybrid imaging technologies plays a crucial role in the early diagnosis and management of patients suffering from these diseases. The Agency assists Member States in improving their technical capabilities through coordinated research projects and e-learning activities, including the development of e-learning modules.

In the area of cancer management, the Agency emphasized the clinical applications of standard and novel radiopharmaceuticals for medical imaging. In 2018, it successfully concluded four coordinated research projects on the appropriate use of medical imaging in the management of breast cancer, paediatric lymphoma and lung cancer, and on the role of different imaging modalities in the evaluation of patients with spinal infection after surgical interventions and the identification of patients with multidrug resistant tuberculosis. The results of the projects were used to establish standardized evaluation criteria for these clinical conditions and for clinical application of hybrid imaging in both non-communicable and communicable diseases. In addition, participants in the workshops and training courses on hybrid imaging were awarded continuing medical education credits from the European Union of Medical Specialists, which assists them in maintaining their professional accreditation in their home countries.

During the year, the Agency released e-learning modules entitled 'Peptide Receptors Radionuclide Therapy' and 'Radionuclide Imaging in the Management of Gynaecological Cancer'. The modules support interactive learning and provide immediate feedback for each task accomplished as well as enhanced interaction for learners.

The Agency also provided training for nine nuclear medicine specialists and an electronic engineer from the Centre for Nuclear Medicine of the Clinical Centre of Serbia. Equipment provided to the Centre by the Agency in 2018 has contributed to faster, more accurate patient diagnosis, particularly for thyroid disease. The Centre hosted the IAEA–EANM European School of Multimodality Imaging & Therapy (ESMIT) Autumn School in September, enabling nuclear medicine professionals in the region to share experiences and knowledge.