

CHALLENGES AND BEST PRACTICES IN THE SAFE AND SECURE TRANSPORT OF NUCLEAR AND RADIOACTIVE MATERIALS: A TANZANIAN PERSPECTIVE FROM OCEAN ROAD CANCER INSTITUTE

Background

The safe and secure transport of nuclear and radioactive materials is crucial in the practice of Nuclear Medicine, particularly in developing countries such as Tanzania. At the Ocean Road Cancer Institute (ORCI) in Dar es Salaam, we rely heavily on radioactive isotopes like Technetium-99m (Tc-99m) for diagnostic imaging and iodine-131 (I-131) for the treatment of thyroid diseases, including Graves' disease and thyroid carcinoma. Additionally, we are transitioning into using Gallium-68 (Ga-68) sourced from Germanium-68 (Ge-68) generators for Positron Emission Tomography (PET) scans. With the completion of a new cyclotron for radiotracer production, we aim to reduce our dependency on imported materials. However, the importation and secure transport of these materials present significant challenges due to infrastructure limitations, regulatory issues, and security concerns.

The transportation of radioactive materials is governed by international regulations, notably the International Atomic Energy Agency (IAEA) guidelines, but applying these regulations within the Tanzanian context is often challenging. The complexities of navigating local legislation, weak enforcement mechanisms, and logistical hurdles create a challenging environment for ensuring safe and secure transport.

Challenges in Transporting Radioactive Materials to Tanzania

Regulatory and Compliance Issues

The first challenge we face in transporting radioactive materials is regulatory compliance. International standards, such as the IAEA's safety regulations, provide clear guidelines on the safe transportation of radioactive substances, but local implementation remains inconsistent. The Tanzanian regulatory framework, though governed by the Tanzania Atomic Energy Commission (TAEC), lacks sufficient capacity for enforcement and oversight. This results in confusion among suppliers, especially when importing complex materials like Mo-99 generators and I-131 capsules. Furthermore, customs officers and logistics personnel often lack specialized training in handling and processing radioactive materials, leading to delays and inefficiencies in the transport process.

Logistics and Infrastructure

Transport infrastructure is another key challenge. Tanzania's roads and ports, especially in Dar es Salaam, are ill-equipped to handle sensitive shipments of radioactive materials. While most radioactive materials arrive through Julius Nyerere International Airport and Dar es Salaam Port, the absence of specialized storage facilities and secure transport systems heightens the risk of theft, contamination, and delays. The lack of dedicated routes for the transport of radioactive materials further complicates the situation, as shipments are often subjected to the same security measures and logistical inefficiencies as conventional goods.

Environmental Risks

Many of the materials we import, such as Mo-99 generators, the environmental safety is a critical concern. The risk of radiological contamination, especially during accidents or mishandling, could pose serious threats to public safety and environmental integrity.

Security Concerns

The risk of diversion, theft, or sabotage is a particular concern, especially given the long distances these materials must travel across borders and through areas where enforcement of security measures may be weak. This risk is compounded by the lack of a dedicated, regionally coordinated security framework for the safe transport of radioactive materials in East Africa.

Conclusion

The safe and secure transport of radioactive materials is a significant challenge for facilities in Tanzania, including ORCI. Addressing the regulatory, logistical, environmental, and security issues associated with the importation of these materials requires substantial improvements in infrastructure, training, and regional cooperation. At ORCI, we have made strides in mitigating these challenges through collaboration with international suppliers, enhanced staff training, and the establishment of secure storage facilities. As we expand our

capabilities with the cyclotron and PET/CT scan technologies, continued focus on safe and secure transport will be essential to ensure the sustainability and growth of nuclear medicine services in Tanzania.

Country or International Organization

Instructions

Author: Mr SABAYA, Faraji (Ocean road Cancer Institute)

Presenter: Mr SABAYA, Faraji (Ocean road Cancer Institute)

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