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<b>Title of the paper:</b>			
Improvement of Radiation Safety in Radiotherapy Facilities: Catering for Neutrons Outside Short Mazes in 10MV Linear Accelerators			

It has been demonstrated that neutron leakage cannot be neglected at 10MV when direct access doors are used or when short mazes, typically less than 7 metres in length, are employed. The majority of radiotherapy facilities in Africa have Co-60 machines installed that are now being replaced by linear accelerators. The in-coming linear accelerators are being installed in the same bunkers that were designed for Co-60 energy ranges albeit with some shielding modifications. The modifications do not alter the length of the maze and where the maze length is less than 7 metres, neutron leakage will occur in 10MV linear accelerators. There is lack of capacity within the regulatory bodies in Africa to handle this changeover from a technical and equipment perspective.

The justification of medical exposures ensures that the benefits to the patients substantially outweigh any risks that the patient may incur. As such, the justification process needs to be implemented through the effective use of evidence-based referral guidelines and clinical audits. In the case of most African countries, medical diagnostic exposures of patients are not underpinned by an effective justification system. This, coupled with the scenario where physicians own outpatient diagnostic centres to which they refer patients (self-referral) increases the conflict of physicians due to dual roles as professionals and businessmen, further compromising on patient protection.

Nuclear security is the responsibility of the Member State and requires that a number of key stakeholders work closely together. In the case of research reactors and nuclear power plants, this cooperation is evident and functional. However, this does not extend to the use of high-activity radioactive sources in medicine (category 1&2) where in most cases the regulators seem to be the only authority having oversight on the security of these sources without the benefit of direct input and collaboration of other key security stakeholders.

This paper is motivated by Radiation Protection Authority of Zimbabwe's experiences in dealing with a 10MV linear accelerator installed in a bunker with a short maze, observed unjustified cases of medical exposure and the need to upgrade the physical protection infrastructure of brachytherapy facilities with the involvement of other key security stakeholders.