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DIAGNOSTIC X-RAY ROOM DESIGN USING PHOTON ATTENUATION AND SPECTRUM EVALUATION MODELS: SIMULATION AND PARTIAL RESULTS

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Introduction An empirical model for photon attenuation and a semi-empirical model for evaluation of tungsten target x-ray spectra were combined in order to provide an optimized method for designing a shielding for diagnostic rooms. The proposed method allows for the evaluation the amount of shielding material to be used at X-ray rooms to meet radiation protection international requirements.

Materials and Methods A parametrical model for photon attenuation proposed by Archer *et. al.* (Archer model - Health Phys. 44:507, 1983) was combined to a semiempirical model for X-ray spectra generation (TBC model-Med. Phys.18:211, 1991) in order to evaluate the actual thickness of shielding material needed for the adequate protection of diagnostic rooms. The realistic workload obtained from typical diagnostic departments were considered. The TBC model was simulated using a Mathcad (Mathsoft Inc.) routine which provides the avearage radiation spectra from primary, scattered and leakage radiation reaching each structural barrier in an hypotetical room.

Results Typical primary and secondary spectra were generated considering an average behaviour of diagnostic departments. Primary and secondary X-ray spectra weighted by a workload amount typically obtained from a R&F room are presented in Figure 1. These spectra were used to calculate the thickness needed to protect each public and controlled area of an X-ray room. Comparison to a conventional shielding calculation showed a thickness reduction as large as 35% in lead when protecting the same area.

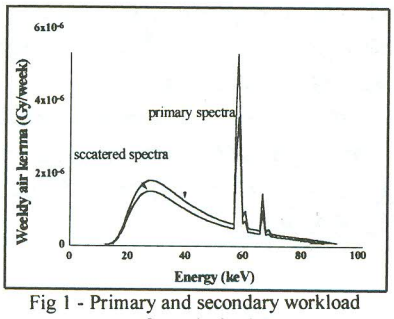

Fig 1 - Primary and secondary workload spectra of a typical R&F room

Conclusion The proposed method provides a most realistic shielding evaluation which results in economic advantages during diagnostic installations design and construction. The advantages of an easy computer implementation of this methodology and the cost/benefit project evaluation from the fast shielding calculations, considering different commercially avaiable materials, are evident in this work.

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NUCLEAR MEDICINE, RADIOPROTECTION AND QUALITY PLAN

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Introduction: According to the technological evaluation applied to Nuclear Medicine, the necessity of implementing Radioprotection - in a effective way- elapse from creation of new routines and procedures . The Radioprotection Plans of Nuclear Medicine Service predict the Radioprotection System and its management based in specif rules in each country. The optimism of these Radioprotection Plans create more complex systems and garantee that there is more difficulty in effective practice, increasing the necessity of a bigger trace, organization and quality in the Radioprotection Service.

Material e Méthods: The rules of Quality board, among others items, the elaboration of System of Quality predicting a clear and secure Management Quality, including all the indispensable procedures for the best discharge of installation. A ISO/GUIDE 25 define exclusevely System of Quality for laboratories, serving as reference in the elaboration of Manuals of Quality. The anology accomplished among laboratories such Light of Quality and Nuclear Medicine Services, under aspect of Radioprotection, it allows a elaboration of Radioprotection written as Manuals of Quality, optimising the Management System purposed by Radioprotection Services. Such elaboration is possible through the adequation a ISO/GUIDE 25 of the applicable items for a Nuclear Medicine Service based in the national rules of Radioprotection dispatched by (CNEN) - Nuclear Energy National Comission.

Results: The results obtained were the development of a Elaboration Guide of Radioprotection Plans, as Manuals of Quality, for Nuclear Medicine which attends a demanded requisition for the national rules and adjust for the international standard Quality demanded for supplying credentials of laboratories.

Conclusion: With the development of this work, it was showed that through the utilization of avaliable possessions for the implemention of tools of Quality, is possible optimize Radioprotection Plans. Furthermore, it was projected a Radioprotection System with organizacional structure, responsability, produceres, process and possessions, all in conformity to the national security rules valid in Brazil and which is written in a clear and self-explicit way.