AbstractID: 6483 Title: Workload Weighed Transmission Curves of Brazilian Shielding Materials: experimental results

Purpose: Evaluation of attenuation properties of typical Brazilian shielding materials (Barite Concrete) used in diagnostic rooms from transmission measurements considering the local workload distribution.
Method and Materials: Broad beam attenuation properties of three shielding materials were obtained following the method proposed by Archer et. al (Med. Phys. 21(9), 1994). These attenuation properties were measured by using a constant potential X-ray machine operated in voltages from 60 to 150 kV. The primary and transmitted radiation from different material thicknesses were measured by using a Radcal 10x5-6 ion chamber. Moreover, workload spectra (Simpkin, Med. Phys. 23(4) 1996) of typical diagnostic rooms were obtained by observing 1060 patients. These data were combined following the method presented in NCRP 147.
Results: The workload weighed transmission curves were obtained considering the different workload spectra and shielding material manufacturer. Results shows that for a same attenuation factor, for example 0.01, the thicknesses of material required for shielding a conventional radiation room to primary radiation ranges from 10 to 14.5 cm depending on the manufacturer. If the workload spectra are not considered, this range of thicknesses grows to 19 to 39 cm considering the 120 kV transmission curve.
Conclusion: The new methods published in NCRP 147 for shielding calculation of diagnostic rooms incorporated a strong dependence on the quantities workload distribution and transmission through the shielding materials. Local evaluations are needed in order to adapt this method to the local workloads and used shielding materials. The correct consideration of the combined workload spectra and attenuation properties allows the optimized determination of the shielding material needed for protecting the environment.