

Shielding estimation for Nuclear Medicine Therapy Ward – our experience

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The aim of this study was to calculate and estimate the shielding thickness for a new Nuclear Medicine Therapy Ward.

Parameters available for shielding calculation were: ground plan of the ward, radionuclides planned for use, maximum administered activity of I-131, maximum delivered activity of I-131 to the ward per week, average time spent in the hospital after the treatment.

The most hazardous and most commonly used radioisotope is I-131.

The target dose that needs to be met for occupationally exposed workers is 0.3 mSv per year. There are several factors that could be changed in order to achieve this value: distance from the source, shielding thickness, angle of incidence, occupational and usage factors. The maximum dose rate at 1 meter from the thyroid gland of the patient was considered to be 100 mSv/h. The distances and incidence angles could not be changed since these values were predetermined in the ground plan. Different usage and occupational factors were used for different rooms in the ward. We used occupational factor 1 for the bed and 1/6 for the bathroom, and usage factor 1 for nurses' room and patient room and 1/6 for the corridors, etc. The easiest way of calculating dose attenuation in material was by introducing the HVL and TVL for broad beams. TVL and HVL were taken from the graph.

The results show that shielding thickness should be in the range of 3 mmPb for room doors to 30 mmPb for the wall adjacent to the nurse's office. Most of the walls are 20 mmPb thick.

These values were calculated using conservative assumptions and are more than enough to protect staff, patients and public from external radiation. If the construction cannot support the weight of lead some rearrangements regarding patient positions could be made.