NMT Gadgetry

Inexpensive and Effective Radiation Protection Structures

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Nuclear medicine departments are continually looking for methods of decreasing radiation exposure to their personnel. Two structures—(A) a safety shield with a leaded glass window and (B) a storage cabinet that is completely encased by leaded walls—are described which have decreased the amount of radiation exposure that one can receive from preparation of radiopharmaceuticals, drawing up doses, and storing of nuclides. A substantial cost reduction is realized when these structures are privately constructed rather than being purchased from a commercial supplier.

Radiation protection is rapidly becoming an area of great interest for the concerned technologist. Syringe shields and lead brick storage areas are two widely used means for increasing protection, the former being used for dose preparation, and the latter for shielding in the storage of radioactive materials (Fig. 1). With both of these, however, there is still a considerable amount of radiation exposure to the technologist. This article describes two devices, a table-top shield and a storage cabinet, that were designed for use in preparation and storage of radioactive materials. Radiation exposure has been significantly reduced since the installation of these devices.

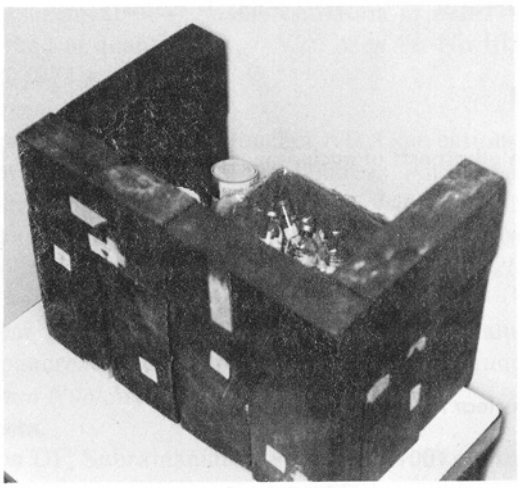

FIG. 1. Conventional lead brick storage area.

FIG. 2. Technologist using table-top shield for dose preparation.

Materials and Methods

The table-top shield (Fig. 2) is constructed of ½-in. plywood, ⅛-in. sheet lead, and ¼-in. lead glass (11 in. high × 15 in. wide). The sheet lead and lead glass can be purchased from a local x-ray supplier. The sheet lead is sandwiched between two pieces of plywood for construction of the front and floor panel. The entire shield is then painted to inhibit the porousness of the wood. Material and labor costs are approximately $165.00, which represents a 45% savings when compared to some available commercial models.

The storage cabinet (Fig. 3) is constructed of leaded plywood, lead glass, and Formica. The leaded plywood was purchased in sheet form (4 ft. wide × 8½ ft. high × ¼ in. thick) from Bar Ray Company of New York, while all other supplies can usually be purchased locally.

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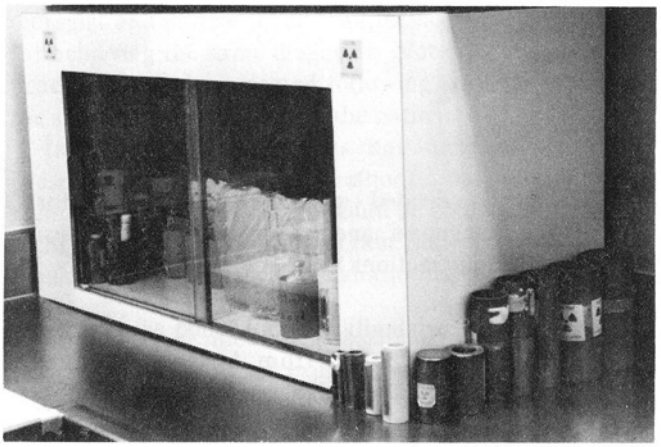

FIG. 3. Custom built storage cabinet.

The cabinet shell is constructed of leaded plywood with the Formica bonded to all outer surfaces and to the inside floor of the structure. The sliding doors are made of two ¼-in. pieces of leaded glass. The total cost of materials and labor is approximately $500.00, which is a 65 to 75% savings when compared to similar commercial models. The outside dimensions are arbitrary and may be accommodated to the specific needs of the laboratory, which is an advantage to in-house construction of the cabinet. Both the table-top shield and storage cabinet were built in our hospital's carpenter shop.

Discussion

A comparison of exposure rates using conventional and improved protection modes is given in Table 1. Both of these improved methods offer a substantial increase in technologist protection at a minimal cost to the department.

TABLE 1. Exposure Rates (mR/hr)

	Storage cabinet*		Table-top shield†‡	
Body levels	Cabinet	Pb brick storage	With shield	Without shield
Eyes	0.08	2.0	0.1	1.0
Thorax	0.12	3.0	0.06	10.0
Gonads	0.12	0.1	0.03	1.5

**Measured at 1 ft.*

†Measured at body surface (100 mCi in vial).

‡All values are with use of syringe shield.

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