Chapter Three

Materials and Methods

3.1Materials

This study was carried out in Tumor Therapy and Cancer Research Center (TTCRC) -Shendi in nuclear medicine department for ^{131}I when capsulated to patients in isolated room for many days leave them after the measuring of radiation to each patient less than the dose rate allowed from the IAEA. The staff related to this area exposed to radiation so the study tends to estimation of staff radiation dose during working in iodine therapy.

3.1.1 Pocket dosimeter

In this study we were use Electronic Personal Dosimeters (EPD) to measure staff doses using calibratedtypeGratez (GPD150G).Gratez EPD which is capable of dose measurement in the range between 0.05 µSv to10 Sv covering photon energy in the range 55 kevto3 Me.

Figure 3.1 Electronic Personal Dosimeters (EPD) typeGratez (GPD150G).

3.1.2 Survey meter

The auto-ranging 451P features a pressurized ion chamber, providing enhanced sensitivity (µR resolution) and improved energy response to measure radiation rate and dose from x-ray and gamma sources. (Figure 3.2)

Well-suited for a wide range of end users, including: x-ray manufacturers, government agencies, state inspectors, biomedical technicians, and maintenance technicians for airport baggage scanners.

A fast response time to radiation from leakage, scatter beams and pinholes.

The low noise chamber bias supply provides for fast background settling time.

Figure 3.2 show 451P Pressurized µR Ion Chamber Radiation Survey Meter

3.1.3 Barrier

Barrier is made of lead element of 2mm thickness, where the physicist, nurse or doctor stand behind it when he enters the patient. The lead acts to attenuate the radiation energy that come from patient. Here in the center the barrier height two meter and 40 cm wide and closed on right and left side to ensure maximum protection. In the middle there is glass of lead to facilitate

monitoring and communication with patients and it equipped with small wheels for easy movement from one room to another. Figure (3.3)

Figure 3.3 images for barrier in Tumor Therapy and Cancer Research Center (TTCRC)

3.1.4 Isolate room

In the section where the study was conducted there are four isolated room for four patients during their staying in the hospital when uptake their capsules of ^{131}I, where the rooms is equipped with full processing of drinking water and bath room and each room also has a warning device and telephone to reduce the process of entry into the patient rooms in addition to television in each room so that patient not be bored.

3.1.5 Staff

This study targeted radiation worker involved in nuclear medicine including: two physicists and two nurses. , every radiation worker provided with electronic personal dosimeter, EPDs used were type GRATEZ (GPD150G).

3.1.6 Samples

The number of electronic personal dosimeter (EPD) was five (EPDs). For dose measurements EPDs were worn on the chest and read at the end of the day after patients were taken their capsules. EPD was reset to zero after finished the work and reused again in the next day. Staff doses were monitored in each day for a period of six procedures. A lead barrier was used to reduce the dose to which workers were exposed, and no other radiation protection tools was used ^{131}I emits both beta and gamma with energy 600 Kev and 364 Kev respectively. The personal dose equivalent at 10 mm depth is used to provide an estimate of effective dose that avoids both underestimation and excessive overestimation.

Patient must be given capsule has an activity of 100 mCi, 150 mCi or more hold in container. Figure 3.4

Figure 3.4 container of iodine capsule

3.2Methods

3.2.1Technique

The dose is receiving by the physicist and the measurement were made to ensure that the radiation level from the container is within recommended level by IAEA this caused radiation exposure to the physicist.

After that the patients were entered to specific room to isolate them from the public. So they need care which done by the nurse for many days thus the nurse exposed to radiation.

The radiation level of the patient is read after the second day of the dose given by the physicist, and the survey meter is used to determine the time of the discharge from the isolation room based on the values recommendedby the international atomic energy agency(IAEA).

After discharged the patients; the isolation room are mostly contaminated by radiation as a result of the patient stayed during the isolation period by the medical physicist to remove this contamination which exposes him to additional radiation dose.

3.2.2 Procedure

The dose was measured for the workers from the receipt of the dose until the treatment of the radioactive waste through measuring the daily dose of the patients and meeting all the requirements of health care and living.