

Radiation Contamination from Diagnostic Nuclear Medicine Procedure : A Study in Bangladesh

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We have studied the extent at which the patients, undergone the diagnosed nuclear medicine procedure, contaminate the medical facilities. Contamination of hospital facilities with radioisotope, dosed with diagnostic quantities, is more or less common⁽¹⁾.

In most of the developed countries, every hospital have a radiation safety officer, usually a radiologist or a physicist, who is responsible for establishing and monitoring radiation safety measurement in hospital. In Bangladesh, radiology and radiotherapy department is controlled by Health Ministry of the government and is an integral part of the hospitals. But, though Nuclear Medicine Department is working in cooperation with the hospital authority, it is controlled by Bangladesh Atomic Energy Commission. In the government hospitals there is no provision for appointment of any medical physicist⁽²⁾, though it is a prerequisite for any establishment dealt with radiation. There is no existence of any radiation safety board or radiation safety officer in any hospital of our country. And for this reason, still there is no system for periodic radiation survey⁽²⁾. In contrast, Nuclear Medicine department has far better systematic staffs, like medical physicist, technologist, scientist etc. and time to time we perform such survey in our centres as well as in hospitals occasionally.

We included one medical college hospital and one general hospital in our study, with the bed capacity of 400. Number of patients referred from these hospital is average 3 per week.

For this reason, we undertook this study as a test case with the aim to find out the actual extent at which our establishment as well as hospital facilities are contaminated by the patients undergoing diagnostic nuclear medicine procedure.

MATERIALS AND METHODS

Two patient-wards from medical college hospital and one ward from another general hospital were included in our study. Number of patients referred from each of these hospitals was on average 2 per week.

We performed this study in 87 cases, referred from the hospital. All the patients were referred from general ward (where on average 24 patients stay in a room of approximate 750 sq.ft. of room area). So, to work with our survey, we monitored the patient bed, bed side locker, spit bowl, beds on each side of the said patient, common use area like toilet / bathroom etc. in the hospital ward. In the nuclear medicine premise, the seat in the waiting area, hand basin and toilet seat in bathroom, light switches, rest bed were monitored. We did not monitor the hot lab, dispensing room or Camera room because generally these areas are more prone to become contaminated.

All monitoring was done by wipe testing and were counted in NaI (Tl) well counter. The counter was set with a wide window ranged from 25 keV - 1 MeV. Three 1 minute counts were taken along with the background. As like Wiatrowski et al.⁽³⁾ we considered the wipe positive for contamination if the net count was twice the variance of the background.

Monitoring of patients were done in two phases. Firstly in the nuclear medicine premise on the day of investigation and secondly when the patient returned to the hospital on the same day and the day after.

RESULTS

^{99m}Tc was the only isotope administered to the patients. The total radioisotope given to a patient was ranged between 2 mCi - 20 mCi.

The results of area surveyed are shown in Table 1 and table 2. The most common areas of contamination were toilet seat and spit bowl. Except in 2, in all instances, the contamination level were very small, far below the hazardous level. In the above mentioned two cases, contamination was probably due to leakage of indwelling urinary catheter of two unconscious patients, undergone brain scanning.

The contamination levels in general was very small. It was never more than 7 % of the statistical variance of the mean background count rates.

DISCUSSION AND CONCLUSION

Some contamination of hospital facilities with radioisotope investigation procedure is more or less common. It is more expected in our country, where neither health physicist nor radiation safety officer is available in govt. hospital. Also the ignorance of the illiterate people about the hazard of

Table 1 Nuclear Medicine Premise, percent of patient's areas contaminated

Area	No. of monitored areas	% contaminated
Bed	87	11.3
Toilet Seat	87	47.8
Sink / Hand basin	87	27.1
Chairs	87	3.9
Light Switches	87	0.7

Table 2 Medical College Hospital / General Hospital, percent of patient's areas contaminated

Area	No. of monitored areas	% contaminated
Bed	87	9.2
Toilet Seat	87	37.0
Hand basin	22	20.0
Bedside locker	87	9.1
Spit Bowl	87	17.3
Light Switch	48	0
One bed area on each side of the investigated patient.	174	0

radiocontamination may lead to such circumstances. However, our study suggests that diagnostic nuclear medicine procedure

in our centre, with such workloads, radiocontamination does not possess any major problem for the patients.

Table 3 Percent of patient areas contaminated by different procedures

Type of investigation	No. of patients	% of contamination
Brain	32	62.5
Bone	17	47.0
Thyroid	12	0
Liver / Spleen	9	11.1
Parotid	2	50.0
Renal	15	27.0

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