

# Guidelines for Personnel in Radiotherapy and Nuclear Medicine

To work in a Radiotherapy and Nuclear Medicine Department of today is quite safe and is a service to the suffering humanity, say M.S. AGARWAL and G.C. PANT of Centre of Radiotherapy & Radiation Medicine, Institute of Medical Sciences, Banaras Hindu University, and also indicate in this article how best to do this.

**R**ADIO THERAPY and Nuclear Medicine Departments use 'Ionizing Radiations' for diagnosis and therapy of various disorders.

Radiations capable of producing ions directly or indirectly in their passage through matter are known as ionizing radiations. These are essentially of two kinds: The Electromagnetic Waves such as X-rays or Gamma-rays, particularly such as electrons, neutrons and alphas. The ionizing radiations have been in the service of mankind since the day of their discovery.

In the field of medicine, their use is increasing day by day and now-a-days we have many hospitals with separate Radiotherapy and Nuclear Medicine Departments. The nursing staff posted in these departments need some special training and knowledge about ionizing radiations. In this article, an attempt has been made to guide the nursing profession about the nature of work in these departments, the radiation hazards and their control.

## Many Sources

There are sources of radiations which are used for therapy and diagnosis. Few of them are :  $C_{60-60}$ ,  $C_{s-137}$  for teletherapy;  $C_{60}$ ,  $C_{s-137}$ ,  $R_{a-296}$  for intra-cavitary and interstitial implants;  $I-132$ ,  $P-32$  for oral therapy and  $I-131$ ,  $P-32$ ,  $H_{g-203}$ ,  $F_{o-59}$ ,  $C_{r-51}$ , etc., for diagnostic purposes.

The radiations emitted out by these sources are harmful to a healthy person if he receives a high exposure. The adverse effects of over exposures are classified as 'somatic' and 'genetic' effects. The somatic effects are evident in the life time of the exposed person and may be :

- Cataract formation
- Impaired fertility
- Damage to bone-marrow
- Developmental abnormalities

- Life shortening
- Tumour induction

The genetic effects of radiation are :

- Early losses in utero,
- Abortion,
- Live births,
- Abnormalities in future generations.

## Maximum Permissible Dose

The effects of radiation on a healthy person are due to over exposures only. The question then arises: what is an over exposure? It is difficult to answer this question. However, a radiation dose known as 'Maximum Permissible Dose' (MPD) has been defined. This is a dose which is not expected to cause appreciably bodily injury to a person during his life time. The MPD is given in the accompanying Table. It should be borne in mind that though the values proposed for maximum permissible dose involve minimal risk, every effort should be made to reduce the exposure to the lowest possible level.

Table I

### Maximum Permissible Doses

(For Radiation workers including nursing staff in Radiotherapy and Nuclear Medicine Departments)

| Organs                             | M.P.D.     |
|------------------------------------|------------|
| Gonads, Bone-marrow and whole body | 5 rem/yr.  |
| Skin, Thyroid, Bone                | 30 rem/yr. |
| Hands and Forearms, Feet and Ankle | 75 rem/yr. |
| All other organs                   | 15 rem/yr. |

rem : Unit of Radiation Dose and is equivalent to roentgen (the more commonly used unit of radiation dose) for X-rays and gamma rays.

To keep the exposure level low, certain principles of 'Radiation Protection' are practised. Working behind a shield or a barrier which absorbs the radiations, spending minimum time near the sources and keeping a distance between the source and self can reduce radiation doses. There are certain other precautions which the nursing staff has to take for the patients in Radiotherapy and Nuclear Medicine Departments. For this purpose, we would divide patients into four categories :

- Patients getting external therapy;
- Patients getting intra-cavitary or interstitial implant therapy;
- Patients on therapy by radio-active isotopes;
- Patients for diagnostic studies by radioactive isotopes.

We now deal with each category separately from the point of view of nursing care :

a) **Patients getting external therapy :** These patients do not require any special care or precautions for nursing care and they have to be treated in a way similar to any other patient, in any of the wards of the hospital.

b) **Patients getting intra-cavitary or interstitial implant therapy :**

i) Patients should not be allowed to leave the ward. They should be confined to bed.

ii) Bed-pans should be provided for them. These should be monitored for any loss of sources before disposal.

iii) Nurses should spend only the adequate amount of time near the patient that is required for routine nursing.

iv) These patients should be allowed to receive visitors as per hospital rules but they should sit at least one metre away from the patient. Small children and pregnant women should be discouraged to visit the patient.

v) Surgical dressing, etc., should be changed only if directed by the physician concerned.

vi) If radium, cobalt or caesium tubes, needles or containers become loose or fall out, do not try to replace them. Call the consultant on duty.

vii) No special precautions are needed for sputum, urine, vomitus, bedding, etc.

c) **Patients on therapy by Radioactive Isotopes :**

(i) All such patients should be kept in special rooms for them.

(ii) Nurses may spend whatever time is necessary near the patient for ordinary nursing care unless otherwise specified.

(iii) Patients should be allowed to receive visitors according to the hospital rules unless instructed otherwise. However, for the first 2-3 days, the visitors should sit at least a metre away from the bed.

(iv) Pregnant ladies and children should be discouraged from visiting the patient, at least for the first few days.

(v) All excreta of the patient should be collected and disposed of as per instructions of the consultant concerned. Rubber gloves must be worn while handling them.

(vi) In case the patient vomits within 24 hours of the oral administration of the dose, send a call to the Radiation Protection Officer/Consultant.

(vii) If the bed or the clothes of the patient get contaminated with excreta, send a call to Radiation Protection Officer/Consultant.

(viii) Surgical dressings and bandages should be changed only as per the instructions of the consultant.

d) **Patients for diagnostic studies by radioactive isotopes :**

(i) Normal nursing care as in case of other patients in any other ward.

(ii) Patients are allowed visitors as per hospital rules.

(iii) Special precautions may be necessary if urine or stools are to be saved for isotopic studies. If so, the physician in charge will inform the nursing staff.

(iv) In case the patient vomits or contaminates his bed with urine or faeces during the first 24 hours, call the Radiation Protection Officer/Consultant.

#### **Additional Precaution**

In addition to the precautions mentioned for various categories of patients in these wards, the nursing staff must wear a film badge while on duty. This records the dose received by the staff concerned and in case of over exposure, necessary steps can be taken.

If the staff nurses in the Radiotherapy and Nuclear Medicine Departments follow the instructions given above, they are quite safe from the harmful effects of radiations. Moreover, strict control on the patients in these departments will give less radiation dose to other persons also.

Thus, to work in a Radiotherapy and Nuclear Medicine Department of today is quite safe and a service to the suffering humanity and general public.

## **ANNOUNCING**

**Second Edition (1977)**

**OF**

## **TEXTBOOK OF COMMUNITY HEALTH FOR NURSES**

**By**

**J. E. PARK**

● *Completely revised and brought up-to-date*

● *Approved by the Indian Nursing Council*

**Publishers :**

**Asrani Publishers**

242, Bhartipur—JABALPUR (M.P.)