

## Knowledge, Attitude and Awareness of Radiation Hazards among Paramedical Staff: A Hospital Based Study

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### ABSTRACT

**Background:** Occupational radiation protection measures are necessary for all individuals who work in the diagnostic imaging departments. The level of awareness concerning with radiation protection influences in staff behavior. This study aimed to assess the knowledge and attitude of radiation hazards among paramedical staff.

**Materials & Methods:** A cross sectional survey among the paramedical staff who works in Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand (India) was conducted. The primary aim was to evaluate their awareness regarding radiation safety and their personal practices regarding the use of these protection devices. Collecting the data relation to first part of the subject was performed by designing a special questionnaire. The reliability of the questionnaire was assessed by its internal consistency, and by measurement of its test-retest reliability.

**Results:** A total of 460 questionnaires were distributed and 300 were filled and returned within a period of one month giving a response rate of 65%. The study found that female respondents were 180 (60%) while male were 120 (40%). The respondents age ranged from 21 to 50 years and above with a mean age of 27.8 years. Our study shows that, 240 (80%) agreed radiation used in medical imaging can possibly cause

harmful effects while 45 (15%) disagreed to it, and 15 (5%) do not know. Out of total, 225 (75%) of the respondents keep away from patients during radiographic exposure. Only 15 (5%) don't know and 60 (20%) do not.

**Conclusion:** We concluded that participants had good knowledge and attitude towards ionizing radiation during theatre and ward radiography and this was influenced by the level of education attained and years of professional practice.

**Keywords:** Radiation Hazards, Paramedical Staff, Education Level, Ionizing Radiation.

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### INTRODUCTION

Ionizing radiation in medical imaging is one of the powerful diagnostic tools in medicine<sup>1</sup>, several studies have revealed that many doctors have reported that to complete their diagnosis they always sent their patients for a radiologic examination.<sup>2</sup> Although all medical interventions have potential benefits but its potential risks should not be ignored.<sup>1</sup>

Ionizing radiation may effects on gastrointestinal system, central nervous system, gonads or even whole body. These effects may appear as a somatic effects or in next generation as a genetic effects.<sup>3,4</sup> So Occupational radiation protection is necessity whenever radiation is used in the practice of medicine. Occupational radiation protection measures are necessary for all individuals who work in the diagnostic imaging departments. This includes not only technologists and nurses, but also individuals who may be in a radiation environment only occasionally.

The potential risks of radiation comprises of stochastic effect of which probability increases with dose and deterministic effect of which severity increases with dose<sup>5</sup>. Cancer induction and genetic effects are stochastic effects while cataracts, blood dyscrasias and impaired fertility are examples of deterministic effects.<sup>5</sup> Therefore before undertaking any radiological examination, it is important that the physician, radiologist and radiographer all understand the potential risks of radiation and also its advantages or benefits to the patients.<sup>5</sup>

Reduction of exposure time, increasing distance from source, and shielding of patients and occupational workers have proven to be of great importance in protecting patients, personnel, and members of the public from the potential risks of radiation.<sup>5</sup> Hence three radiation protection actions of "time-distance-shielding" are the triad of radiation protection. Radiation protection

is a general term applied to the profession or science related to protecting man and the environment from radiation hazards.

All of these individuals may be considered radiation workers, depending on their level of exposure and on national regulations. All workers require appropriate monitoring continuously by common personnel dosimeters like film badge and thermo luminescence dosimeter. They must also receive education and training appropriate to their jobs and protect by tools and equipment.<sup>6,7</sup>

The amount of absorbed dose is related to exposure factors such as kV/ potential difference and mA/ intensity of the beam and time. Personnel protection device, working in the safe construction decrease personnel exposure dose. Moreover development and refinement of basic safety standards has a great important role to protect radiology staffs.<sup>8,9</sup>

The level of awareness concerning with radiation protection influences in staff behavior. If they have not enough information related to mentioned issue, their action will not be safe and resulted to adverse effects.<sup>10,11</sup>

This study aimed to assess the knowledge and attitude of radiation hazards among paramedical staff.

**MATERIALS & METHODS**

A cross sectional survey among the paramedical staff who works in Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand (India) was conducted. The primary aim was to evaluate their awareness regarding radiation safety and their personal practices regarding the use of these protection devices. Collecting the data relation to first part of the subject was performed by designing a special questionnaire. The questionnaire has mainly two parts with various questions around radiation protection and safety related to staff and patients. The first part contained information about demographic data like name, age, sex, work experiences and etc. The second section was about awareness and attitude of employees around protection acts, protection device and dose limit. The reliability of the questionnaire was assessed by its internal consistency, and by measurement of its test-retest reliability.

The questionnaire forms were completed by staff during 6 months and their responses was only base on their subjective data without referring to any books. Data analyzed by Chi square and Fisher exact tests to detect relationship between categorical data with statistical package for social sciences (SPSS) version 10.00.

**Table 1: Demographic characteristics of respondents.**

| Sex                              |     |        |
|----------------------------------|-----|--------|
| Male                             | 120 | 40%    |
| Female                           | 180 | 60%    |
| Age (yrs)                        |     |        |
| 20-29 yrs                        | 70  | 23.33% |
| 30-39 yrs                        | 110 | 36.66% |
| 40-49 yrs                        | 70  | 23.33% |
| 50 yrs and above                 | 50  | 16.66% |
| Level of education               |     |        |
| Diploma or less than             | 80  | 26.66% |
| Associate degree                 | 160 | 53.33% |
| Bachelor and higher              | 60  | 20%    |
| Years of professional experience |     |        |
| 1-4yrs                           | 115 | 38.33% |
| 5-9 yrs                          | 55  | 18.33% |
| 10-14 yrs                        | 52  | 17.33% |
| 15-19 yrs                        | 40  | 13.33% |
| More than 20 yrs                 | 38  | 12.66% |

**Table 2: Paramedical staff knowledge on radiation.**

| Items  | Yes          | No          | Don't know  | Total      |
|--|--------------|-------------|-------------|------------|
| ▪ Radiation can cause harmful effects  | 240 (80%)    | 45 (15%)    | 15 (5%)     | 300 (100%) |
| ▪ X-rays used in medical imaging cause more harm than benefit  | 42 (14%)     | 240 (80%)   | 18 (6%)     | 300 (100%) |
| ▪ Radiation that is used in wards and theatres are more dangerous than those in the radiology department | 32 (10.66%)  | 258 (86%)   | 10 (3.33%)  | 300 (100%) |
| ▪ Radiation is used for boosting the immune system   | 40 (13.33%)  | 228 (76%)   | 32 (10.66%) | 300 (100%) |
| ▪ Generally we receive radiation in our everyday life  | 220 (73.33%) | 50 (16.66%) | 30 (10%)    | 300 (100%) |
| ▪ The lifespan of radiology workers are less compared to other health Workers                            | 170 (56.66%) | 80 (26.66%) | 50 (16.66%) | 300 (100%) |
| ▪ Objects in the room emit radiation after an X-ray exposure   | 135 (45%)    | 90 (30%)    | 75 (25%)    | 300 (100%) |

**Table 3: Attitude of paramedical staff towards radiation.**

| Items  | Yes          | No          | Don't know | Total      |
|--|--------------|-------------|------------|------------|
| ▪ Staying away from patient during exposure.   | 225 (75%)    | 60 (20%)    | 15 (5%)    | 300 (100%) |
| ▪ Use lead apron during radiographic exposure. | 242 (80.66%) | 40 (13.33%) | 18 (6%)    | 300 (100%) |
| ▪ Coming to the vicinity after x-ray exposure. | 125 (41.66%) | 150 (50%)   | 25 (8.33%) | 300 (100%) |

**RESULTS**

A total of 460 questionnaires were distributed and 300 were filled and returned within a period of one month giving a response rate of 65%. The study found that female respondents were 180 (60%) while male were 120 (40%).The respondents age ranged from 21 to 50 years and above with a mean age of 27.8 years. Respondents with the age group of 30 -39 years had the highest while those within the age group of 50 yrs and above had the least frequency. Most of the staff 160 (53.33%) had associate degree as their highest level of qualification. In years of experience, 115 (38.33%) had practiced for 0-5 years while 38 (12.66%) had practiced for more than 20 years (Table 1).

Our study shows that, 240 (80%) agreed radiation used in medical imaging can possibly cause harmful effects while 45 (15%) disagreed to it, and 15 (5%) do not know. Majority, 240 (80%) of the nurses agreed that X-ray used in medical imaging has more benefit than harm. The remaining 42 (14%) answered yes and only 18 (6%) of the population admitted that they don't know. Majority of the nurses, 135 (45%) wrongly assumed that objects in the room emit radiation after an X-ray exposure. Only 90 making (30%) answered no while 75 (25%) don't know (table 2).

In Table 3, 225 (75%) of the respondents keep away from patients during radiographic exposure. Only 15 (5%) don't know and 60 (20%) do not.

**DISCUSSION**

A total of 460 questionnaires were distributed and 300 were filled and returned within a period of one month giving a response rate of 65%. The study found that female respondents were 180 (60%) while male were 120 (40%). The respondents age ranged from 21 to 50 years and above with a mean age of 27.8 years. Respondents with the age group of 30 -39 years had the highest while those within the age group of 50 yrs and above had the least frequency. The higher number of female participants could perhaps be because the nursing profession is viewed as a female profession and dominated by them. This is in agreement with a study by Alotaibe and Saeed<sup>12</sup> and Maliro<sup>13</sup> who also found higher frequency of female.

Most of the staff 160 (53.33%) had associate degree as their highest level of qualification. In years of experience, 115 (38.33%) had practiced for 0-5 years while 38 (12.66%) had practiced for more than 20 years. These findings were similar to that of Alotaibe and Saeed<sup>12</sup> who found that most of the nurses had diploma as their highest qualification. The participants had good knowledge of ionizing radiation and about 60.4% knew the source, benefit and the potential harm of ionizing radiation. This is probably due to general knowledge about radiation and its associated hazards. These findings are in agreement with that of Rassin et al.<sup>2</sup>, who found that majority (70%) of the nurses had average knowledge on radiation. However studies conducted by Alotaibe and Saeed<sup>12</sup>

and Maliro<sup>13</sup> revealed that nurses lack knowledge on radiation sources and radiation protection methods.

The study also found that the respondents had positive (good) attitude towards ionizing radiation during theatre and ward radiography, whereas 242 (80.66%) of them practice good radiation protection by shielding (use of lead apron) and keeping distance from patients during radiographic exposures. This is perhaps because of the fear of radiation motivating them either ignorantly or intentionally to adopt good radiation protection practices. These findings are different from that of Rassin et al.<sup>2</sup> who found that though there was an average knowledge on radiation, most of the participants do not follow radiation safety methods. This study also revealed that as participants' years of practice increased, their attitude towards radiation also got better. This might be because of the abated fear and misconceptions about ionizing radiation that may accrue over the length of years of practice. This is not in agreement with to the findings of Alotaibe and Saeed<sup>12</sup> and Maliro<sup>13</sup>, who found that years of professional practice did not affect the attitude towards radiation. However, geographical location, place and nature of practice should not be ignored as this could also impact on their attitude towards ionizing radiation.

**CONCLUSION**

We concluded that participants had good knowledge and attitude towards ionizing radiation during theatre and ward radiography and this was influenced by the level of education attained and years of professional practice, however, more needs to be done to improve on the curriculum content on ionizing radiation in the institutions and paramedical staff should also be encouraged to pursue further studies to meet up with the current trend of evidence based practice.

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