



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** VI **Month of publication:** June 2024

DOI: <https://doi.org/10.22214/ijraset.2024.62874>

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Radiation Awareness among Nursing Professional

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Abstract: Introduction: This research aims to investigate the landscape of radiation awareness among nursing professionals through a comprehensive survey analysis. Notably, it explores variations in familiarity with different radiation types, emphasizing the importance of understanding the current state of knowledge and safety practices within this critical healthcare sector.

Methodology: The study employs a survey approach to gather insights from nursing professionals regarding their awareness of radiation. The questionnaire covers diverse aspects, including familiarity with radiation types, training levels, safety incidents, knowledge of dose limits, and perceptions of cancer treatment. Recognizing its limitations, such as a modest sample size, the research relies on self-reported data to provide a snapshot of the current awareness landscape.

Results: The survey analysis reveals intriguing findings among nursing professionals. X-rays emerge as the most recognized radiation type, while disparities in formal training and self-reported awareness levels become apparent. Varied knowledge concerning permissible radiation dose limits, interpretations of the ALARA principle, and perceptions of cancer treatment highlight the nuances in radiation awareness within this professional group. Despite a high recognition of lead aprons as protective equipment, the study recognizes potential limitations inherent in its design.

Conclusion: In conclusion, the research contributes valuable insights into the current state of radiation awareness among nursing professionals. The study acknowledges limitations, including sample size and reliance on self-reported data. However, the findings underscore the need for targeted interventions such as continuous education, standardized safety protocols, and improved communication strategies within healthcare settings to enhance radiation awareness among nursing professionals and ensure safe and informed practices.

I. INTRODUCTION

The discovery of X-rays by Wilhelm C. Roentgen on November 8, 1895, sparked great optimism about its potential applications beyond medicine, including in industry, agriculture, and trade. However, it is now considered anecdotal that in the 1950s, X-ray machines were used in the US, such as in shoe shops, to evaluate foot alignment within shoes. During the early days of radiation diagnostics, no one had an inkling that ionizing radiation, despite its unquestionable benefits, could have harmful effects on living organisms.[1] This study aimed to assess the knowledge of radiation protection, various radiation types, medical imaging equipment, and radiation effects among nurses in Sri Lanka for the first time. Given that nurses play a crucial role in diagnostic and therapeutic radiography as well as radiation treatment, it is essential for them to possess a comprehensive understanding of these subjects.[2] Radiation plays a crucial role in the field of medicine, serving both diagnostic and therapeutic purposes. It can be categorized into two main types: ionizing and non-ionizing radiation. Ionizing radiation encompasses electromagnetic photons with sufficient energy to induce ionization.[3] Certainly, to put it differently, ionizing radiation disrupts the production of cells and has the potential to damage cell functions.[4] According to the study conducted by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), approximately 4 billion X-ray examinations are performed annually.[7] Nursing care management seeks to highlight the interconnectedness of managing, caring, and educating. It emphasizes a synergistic approach, incorporating elements such as:

Implementing and developing public policies. Managing human and material resources effectively.[8] Hence, it's crucial for nurses to be aware of potential stochastic risks associated with ionizing radiation exposure, while patients should be vigilant about both deterministic and stochastic risks. This highlights the significant role nurses play in the healthcare sector, as they are often with patients. Consequently, they may encounter radiation exposure while working behind protective barriers. From an occupational perspective, there are two likely sources of radiation exposure.[9] The maximum allowable level of occupational radiation exposure stands at 0.25 microsieverts per hour ($\mu\text{Sv/h}$) or 20 millisieverts per year (mSv/y) (2). Nevertheless, a prevalent misconception among hospital personnel is the belief that all doses of ionizing radiation pose a risk to human health. Consequently, many harbor concerns regarding portable radiological examinations[10] Nevertheless, many hospital staff hold the misconception that all doses of ionizing radiation are detrimental to human health, which instills a sense of apprehension regarding portable radiological examinations.[11]

As a result, either excessive precaution or insufficient precaution may lead to significant harm for both patients and healthcare providers. Research has indicated that nurses possess limited understanding of radiation safety, exposure, and protective measures [12]. Rassin et al. assessed the knowledge and attitudes related to radiation among 68 physicians and 76 nurses working in high-exposure clinical settings. Their findings revealed that over 70% of both physicians and nurses had limited understanding concerning radiation hazards, the extent of environmental radiation associated with various radiological examinations, and strategies for radiation protection. [13] Amiri et al. conducted a study on Iranian radiology technicians to assess their radiation protection strategies. The results revealed that 94.7% of the technicians focused on self-protection strategies, while only 26.3% implemented strategies aimed at safeguarding patients and other healthcare professionals. [14] Certainly, it's evident that there is a deficiency in implementing radiation safety precautions in the workplace, which leads to inadequate protective practices for workers. To address this issue, it has been suggested to establish an assessment system to ensure a reasonable level of awareness, offer appropriate training courses, strictly enforce safety procedures, and ensure the availability of all necessary radiation protective equipment and items. [15] According to a recent study conducted in Malaysia to evaluate the knowledge of radiation protection among healthcare professionals, it was found that Malaysian nurses possess sufficient knowledge about the practical application of radiation and its safety. However, there was a notable deficiency in their understanding of the physics underlying radiation. Consequently, Malaysian healthcare organizations bear a significant responsibility in ensuring that all nursing staff in Malaysia are thoroughly knowledgeable about radiation, particularly by elevating educational standards for those working with or exposed to radiation. Ultimately, these findings underscore the vital role of radiation knowledge, understanding, and education in guaranteeing the safe use of medical radiation. [16] Furthermore, comparable studies conducted in Kuwait, [17] Malawi [18] and South Africa [19]. The study reported that the majority of nurses lack awareness and a comprehensive understanding of radiation risks and protection. In contrast, nurses in Saudi Arabia demonstrate a different level of knowledge and awareness regarding these aspects. [20] Shifting our focus to Finland, it's important to note that the situation regarding nurses' knowledge of radiation risks and protection may differ from what was observed in the previous context. Further research or information specific to Finland would be needed to make a comparative assessment. [21] and Nigeria [22].

II. METHODOLOGY

A. Aim

The aim of the study was knowledge of radiation protection and radiation safety. In this study nurses were working in radiology department.

B. Study Design

A cross-sectional questionnaire survey was conducted in which data from nurses working in random hospitals, clinics, and other healthcare sectors across Punjab were collected. The data was created using a Google Form divided with a total 20 questions.

C. Participants and Setting

A self-administered questionnaire was employed to gather data from _____ nurses employed across various healthcare settings including hospitals, and clinics. The questionnaire including inquiries about participants demographic and their knowledge regarding radiation awareness among nursing professionals equipment radiation types, radiation effects and protection. We computed the average scores for each awareness category based on respondents answers. Furthermore, determine the percentage of participants who scored above _____ and _____ in each awareness category.

III. QUESTIONNAIRE

Questionnaire responses regarding radiation awareness among nursing professionals.

1) Which of the following types of radiation are you most familiar with?

- X-rays
- Gamma rays
- Ultraviolet (UV) rays
- Infrared (IR) radiation
- Radioactive particles



- 2) How would you rate your overall awareness of radiation safety practices in the healthcare setting?
 - Very low
 - Low
 - Moderate
 - High
 - Very high

- 3) Have you received formal training on radiation safety during your nursing education or professional development?
 - Yes, extensively
 - Yes, to some extent
 - No, not at all

- 4) How often do you use protective shielding (e.g., lead aprons) when working with radiation-emitting equipment?
 - Always
 - often
 - Occasionally
 - rarely
 - never

- 5) Do you know the permissible radiation dose limits for healthcare workers set by regulatory agencies (e.g., the NCRP or ICRP)?
 - Yes, I am aware of the limits
 - I have a general idea but not the exact limits
 - No, I am not aware of the limits

- 6) Which type of radiation is commonly used in cancer treatment to destroy cancer cells?
 - Alpha radiation
 - Beta radiation
 - Gamma radiation
 - x-rays

- 7) Have you ever witnessed or been involved in a radiation safety incident or near-miss incident in your workplace?
 - Yes, multiple times
 - Yes, once or twice
 - No, never

- 8) In radiation safety, what does ALARA stand for?
 - Always Look And Reduce Accidents
 - As Low As Reasonably Achievable.
 - Achieving the Lowest Allowable.
 - Avoiding Leaky And Radiating Apparatus

- 9) What is the unit of measurement for radiation exposure dose?
 - Option 1Hertz (Hz)
 - Watt (W)
 - Gray (Gy)
 - Newton (N)

- 10) Which of the following imaging techniques uses ionizing radiation to create detailed images of the body's internal structures?
 - MRI (Magnetic Resonance Imaging)
 - CT (Computed Tomography) scan.
 - ultrasound
 - PET (Positron Emission Tomography) scan



11) What is the main purpose of a dosimeter worn by healthcare workers?

- To measure blood pressure
- To monitor exposure to ionizing radiation
- To check oxygen levels in the blood.
- To measure body temperature

12) In your opinion, what are the most common sources of radiation exposure in a healthcare setting? (Select all that apply)

- X-ray machines
- CT scanners
- Fluoroscopy equipment
- Nuclear medicine procedures
- Radiation therapy machines

13) How confident are you in your ability to explain radiation risks and safety measures to patients and their families?

- Very confident
- Neutral
- Somewhat confident
- Not very confident
- Not confident at all

14) Which of the following is a common method to measure radiation exposure?

- Celsius
- Sievert
- Newton
- Fahrenheit

15) Which protective gear should healthcare workers wear when they are in close proximity to ionizing radiation sources?

- Rubber gloves
- Surgical masks
- Safety goggles
- Lead aprons and thyroid shields

16) Which organization provides guidelines and recommendations for radiation safety in healthcare?

- WHO (World Health Organization)
- IAEA (International Atomic Energy Agency)
- CDC (Centers for Disease Control and Prevention)
- FDA (U.S. Food and Drug Administration)

17) What is the first step nursing professionals should take in the event of a radiation spill or accident?

- Evacuate the area immediately
- Begin administering first aid
- Notify the radiation safety officer
- Ignore it and continue working

18) Have you ever undergone radiation monitoring using a dosimeter in your workplace?

- Yes regular
- No, never
- Yes, occasionally

19) Which of the following statements about ionizing radiation is true?

- Is harmless and has no health effects.
- It can only affect the skin and superficial tissues.
- It can damage cells and DNA, leading to potential health risks.
- It is used exclusively for therapeutic purposes.

20) Lead aprons are commonly used as personal protective equipment (PPE) against ionizing radiation in healthcare settings?

- True
- False

IV. DATA COLLECTION

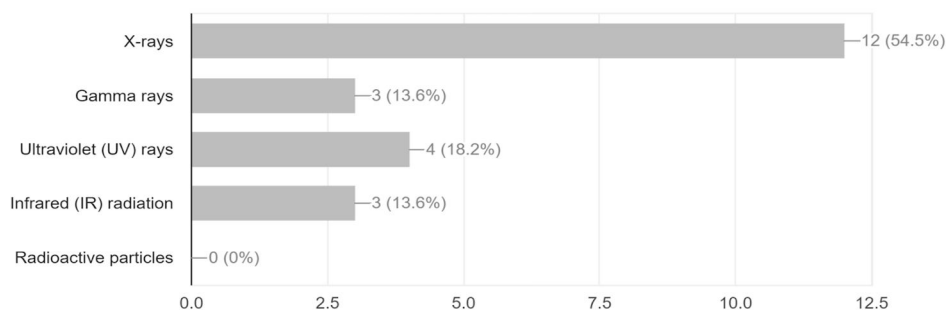
The nursing staff from various departments were invited to take part in the study, with _____ of them accepting the invitation. Data collection was conducted using Google Form, accessible to participants through a distributed message link. The responses of participating nurses were anonymous and handled in accordance with the published standards of good research practice.

V. DATA ANALYSIS

1) "The survey results indicate varying degrees of familiarity among nursing professionals regarding different types of radiation. Among the options provided, the majority (54.5%) are most familiar with X-rays, followed by ultraviolet rays (18.3%) and gamma rays (13.6%). However, respondents showed comparatively lower familiarity with infrared radiation (13.6%), while none reported being familiar with radioactive particles."

Which of the following types of radiation are you most familiar with?

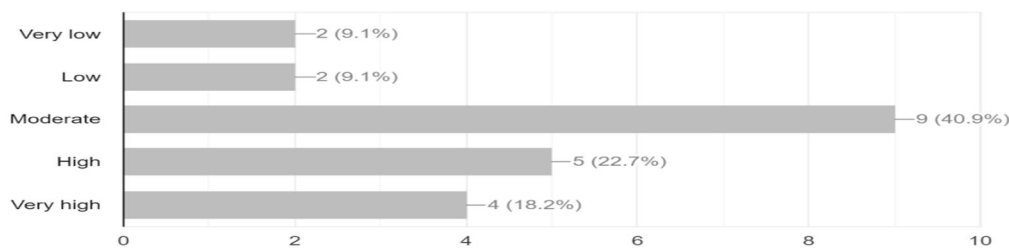
0 / 22 correct responses



2) The survey findings indicate varying levels of self-reported awareness among nursing professionals regarding radiation safety practices in healthcare settings. A significant proportion reported having a moderate level of awareness (40.9%), followed by high awareness (22.7%). Additionally, a notable percentage rated their awareness as very low (18.2%), while an equal percentage reported low awareness (9.1%). Only a small fraction rated their awareness as very low (9.1%)."

How would you rate your overall awareness of radiation safety practices in the healthcare setting?

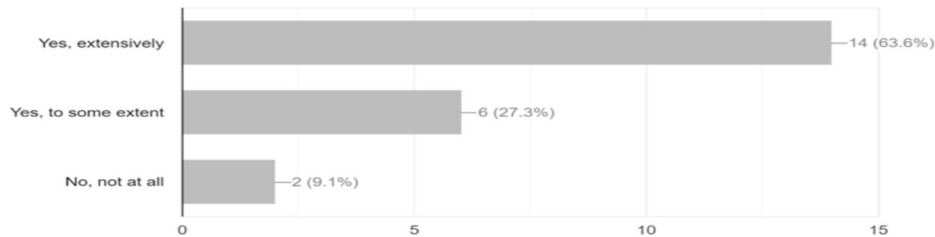
0 / 22 correct responses



- 3) The survey results revealed that among the respondents, a significant percentage (63.6%) received extensive formal training on radiation safety during their nursing education or professional development. Additionally, 27.3% reported receiving training to some extent, while a smaller portion, comprising 9.1%, indicated they had not received any formal radiation safety training throughout their education or professional development as nurses."

Have you received formal training on radiation safety during your nursing education or professional development?

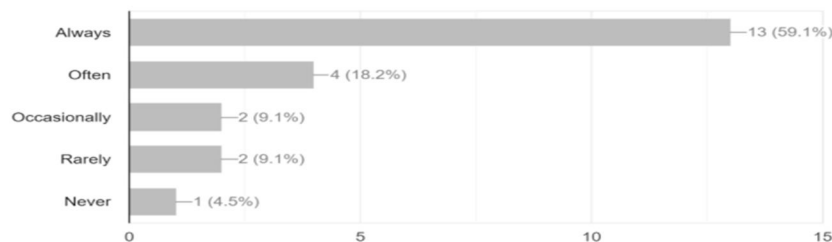
0 / 22 correct responses



- 4) The survey results indicate varying degrees of exposure to protective shielding among nursing professionals when working with radiation-emitting equipment. A majority of respondents (59.1%) reported always encountering protective shielding, followed by those who stated they often (18.2%) observe it during their work. Additionally, a smaller percentage reported occasionally (9.1%) or rarely (9.1%) encountering shielding. A minority of respondents (4.5%) indicated never seeing protective shielding while working with radiation-emitting equipment."

How often do you use protective shielding (e.g., lead aprons) when working with radiation-emitting equipment?

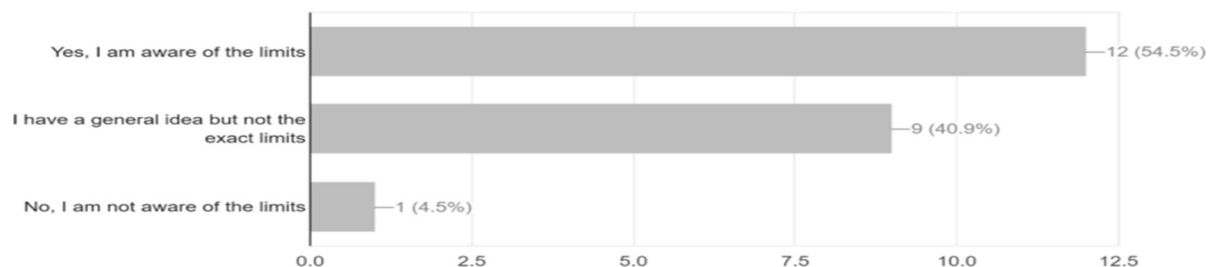
0 / 22 correct responses



- 5) The survey findings reveal varied levels of awareness regarding the permissible radiation dose limits set by regulatory agencies among nursing professionals. A majority of respondents (54.5%) indicated being aware of these limits, while a significant portion (40.9%) reported having a general idea but not the precise details. A small minority of participants (4.5%) admitted not being aware of the established radiation dose limits for healthcare workers."

Do you know the permissible radiation dose limits for healthcare workers set by regulatory agencies (e.g., the NCRP or ICRP)?

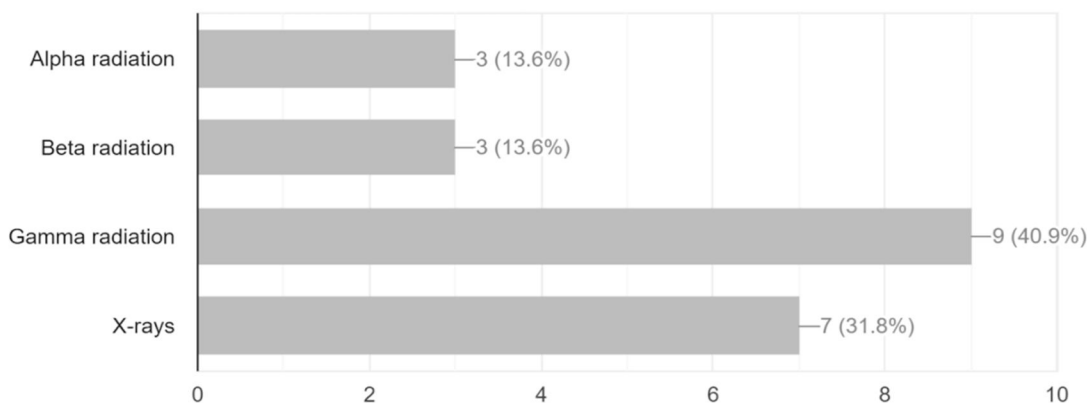
0 / 22 correct responses



- 6) The survey results indicate varying perceptions among nursing professionals regarding the type of radiation commonly employed in cancer treatment to target cancerous cells. A significant majority of respondents (40.9%) identified Gamma radiation as the prevalent type used in cancer therapy. Additionally, a considerable portion of participants identified X-rays (31.8%) as the type used for this purpose. However, a smaller percentage of respondents mentioned Alpha radiation (13.6%) and an equal percentage mentioned beta radiation (13.6%) as the radiation types employed in cancer treatment."

Which type of radiation is commonly used in cancer treatment to destroy cancer cells?

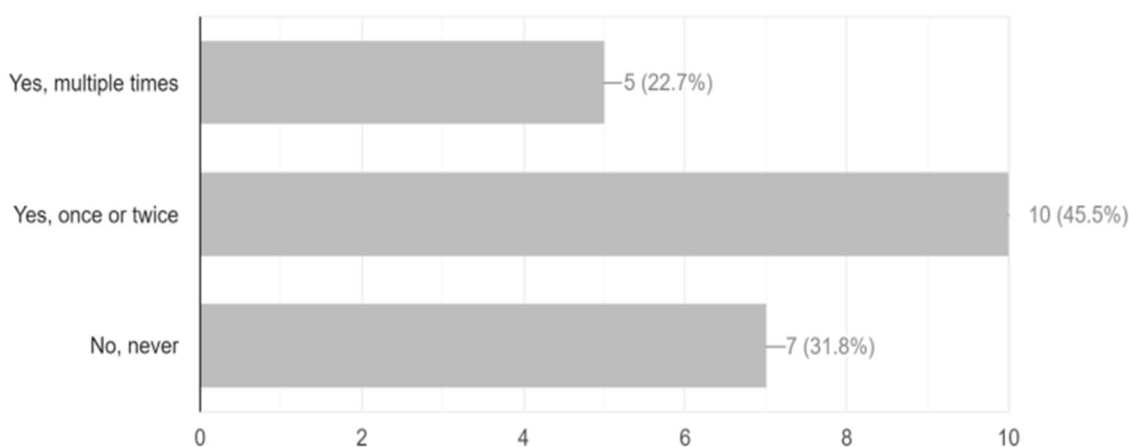
0 / 22 correct responses



- 7) The survey findings reveal a significant portion of nursing professionals reporting their involvement or witnessing radiation safety incidents or near misses within their workplace. Nearly half of the respondents (45.5%) indicated experiencing such incidents once or twice, while a considerable proportion (22.7%) reported multiple occurrences. Conversely, a minority (31.8%) stated that they had never been involved in or witnessed a radiation safety incident in their workplace."

Have you ever witnessed or been involved in a radiation safety incident or near-miss incident in your workplace?

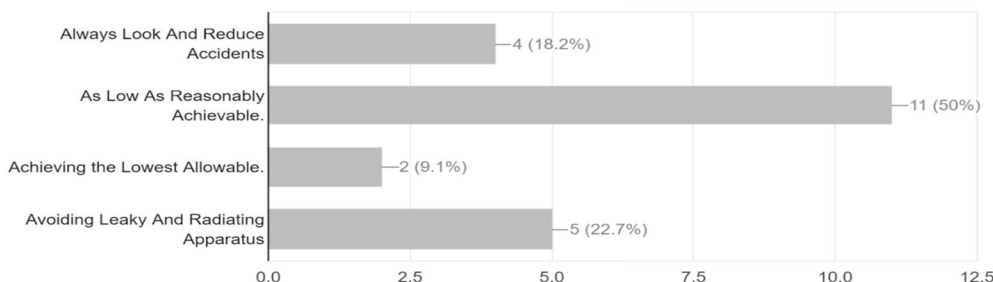
0 / 22 correct responses



8) The survey findings indicate varied interpretations among nursing professionals regarding the acronym ALARA in radiation safety. A significant majority of respondents (50%) correctly identified ALARA as 'as low as reasonably achievable,' demonstrating a strong understanding of this fundamental principle. Additionally, a notable proportion of participants associated ALARA with other interpretations such as 'avoiding leaky and radiating apparatus' (22.7%), 'always look and reduce accidents' (18.2%), and 'achieving the lowest allowable' (9.1%).

In radiation safety, what does ALARA stand for?

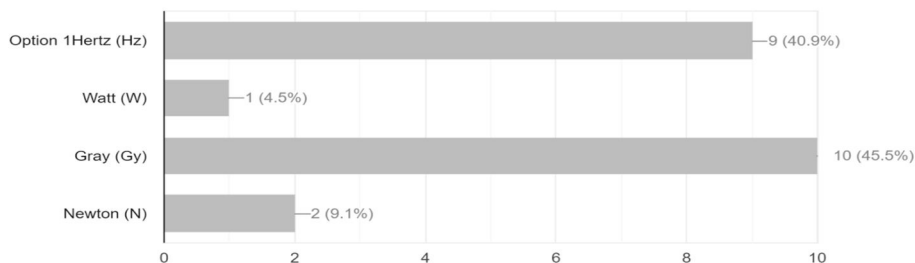
0 / 22 correct responses



9) Based on the survey responses, the unit of measurement for radiation exposure dose is predominantly identified as "gray" (45.5%), followed by "hertz" (40.9%), "newton" (9.1%), and "watt" (4.5%).

What is the unit of measurement for radiation exposure dose?

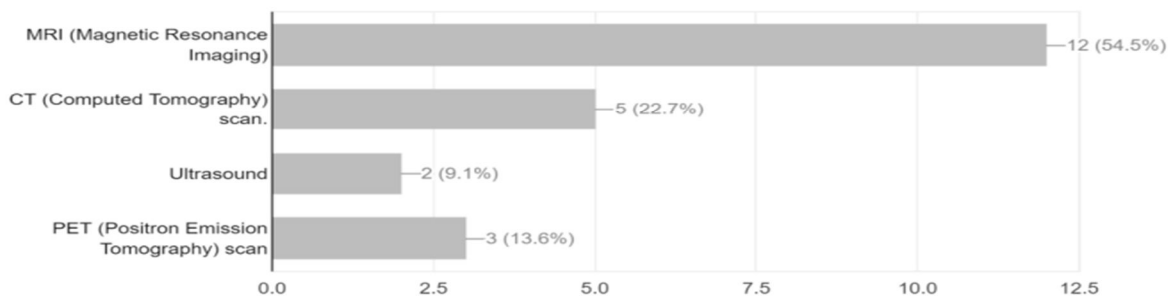
0 / 22 correct responses



10) Based on the survey results, the imaging technique that employs ionizing radiation to produce detailed images of the body's internal structures is predominantly identified as "CT" (Computer Tomography) (22.7%), followed by "PET" (Positron Emission Tomography) (13.6%), "MRI" (Magnetic Resonance Imaging) (54.5%), and "Ultrasound" (9.1%).

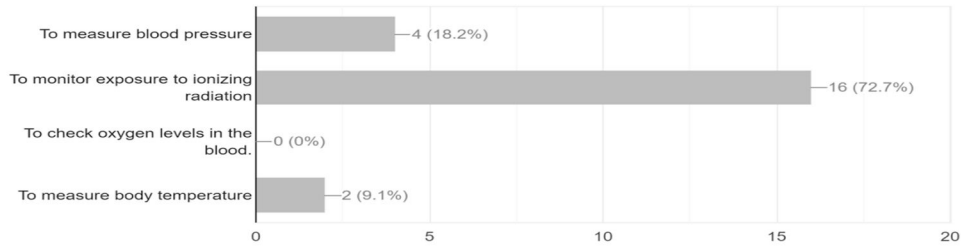
Which of the following imaging techniques uses ionizing radiation to create detailed images of the body's internal structures?

0 / 22 correct responses



11) According to the survey findings, the primary purpose of a dosimeter worn by healthcare workers is predominantly identified as "to monitor exposure to ionizing radiation" (72.7%). Other responses included "to measure blood pressure" (18.2%), "to measure body temperature" (9.1%), and "to check oxygen level in the blood" (0%).

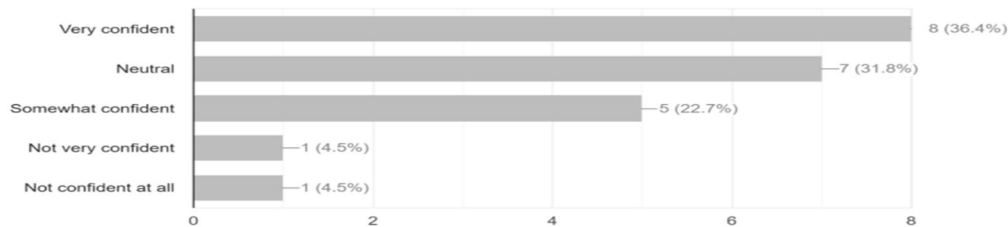
What is the main purpose of a dosimeter worn by healthcare workers?
0 / 22 correct responses



12) As per the survey responses, the most commonly perceived sources of radiation exposure in a healthcare setting, based on opinions, are identified as "x-ray machines" (63.6%), followed by "CT Scanners" (13.6%) and "radiation therapy machines" (13.6%). Other responses included "fluoroscopic equipment" (9.1%) and "Nuclear medicine procedures" (0%).

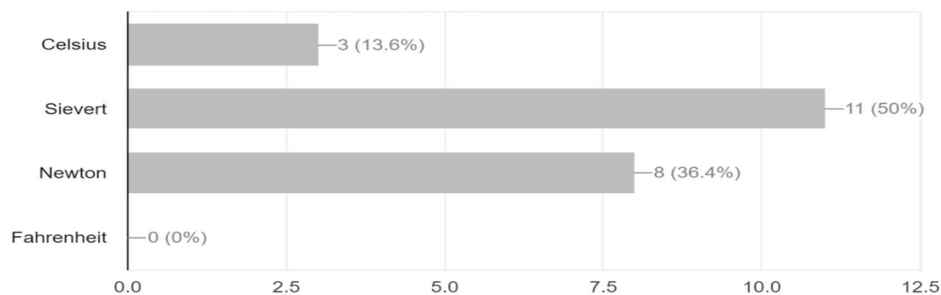
13) Based on the survey responses, the confidence levels of nursing professionals in explaining radiation risk and safety measures to patients and their families vary. The majority of respondents indicated feeling "very confident" (36.4%) and "natural" (31.8%) in their ability to explain these aspects. Additionally, a portion expressed being "somewhat confident" (22.7%), while a smaller percentage felt "not very confident" (4.5%) or "not confident at all" (4.5%) in their explanatory skills regarding radiation risk and safety measures to patients and their families.

How confident are you in your ability to explain radiation risks and safety measures to patients and their families?
0 / 22 correct responses

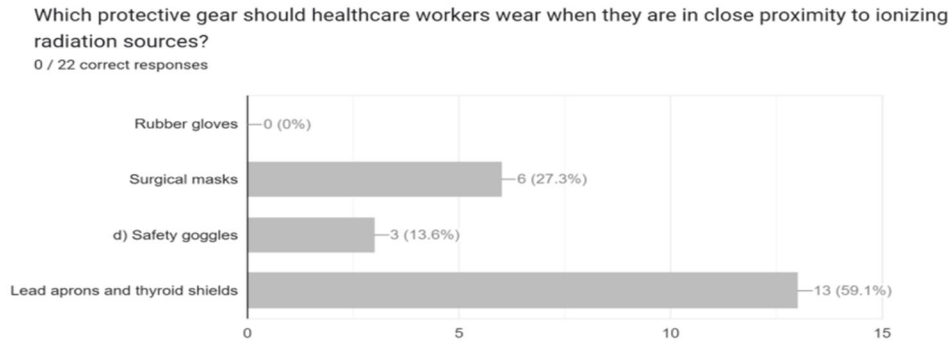


14) According to the survey findings, the common method to measure radiation exposure, as indicated by the respondents, is predominantly identified as "sievert" (50%). Other options chosen included "celsius" (13.6%) and "newton" (36.4%), while "Fahrenheit" received no response in this context.

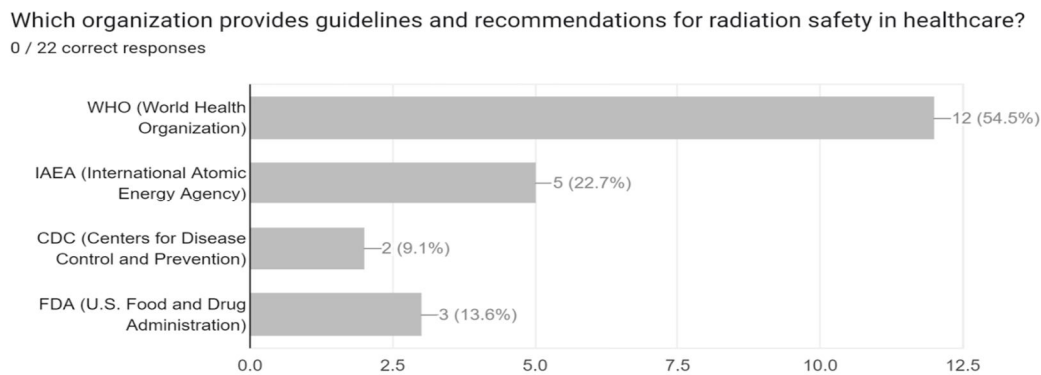
Which of the following is a common method to measure radiation exposure?
0 / 22 correct responses



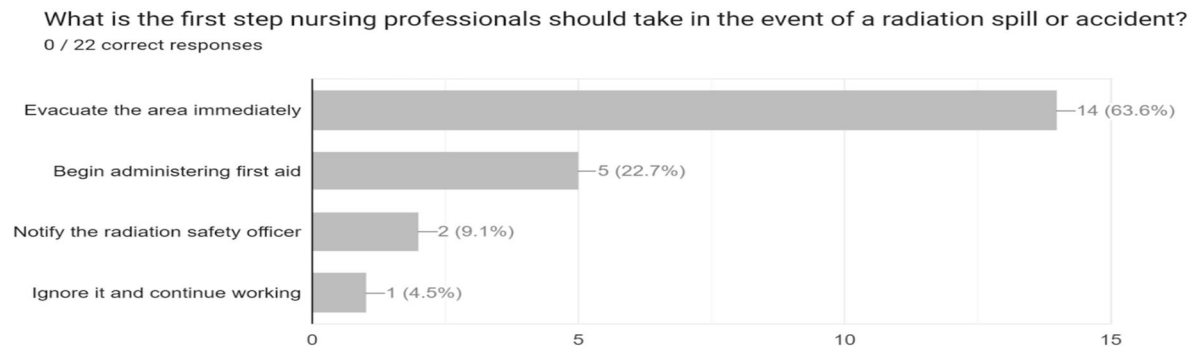
15) Based on the survey responses, the recommended protective gear for healthcare workers in close proximity to ionizing radiation sources, as indicated by the respondents, primarily includes "lead apron and thyroid shield" (59.1%). Other options selected were "surgical masks" (27.3%) and "safety goggles" (13.6%), while "rubber gloves" did not receive any responses in this context.



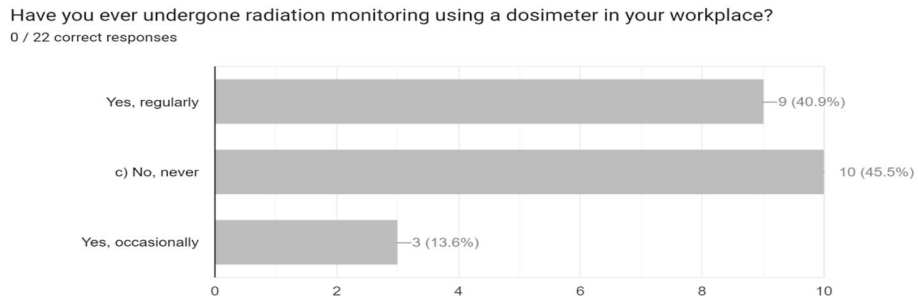
16) Based on the survey results, the organization most commonly recognized by nursing professionals for providing guidelines and recommendations regarding radiation safety in healthcare is the "World Health Organization (WHO)" (54.5%). Additionally, respondents also identified "IAEA" (International Atomic Energy Agency) (22.7%), "FDA" (Food and Drug Administration) (13.6%), and "CDC" (Centers for Disease Control and Prevention) (9.1%) as other organizations associated with radiation safety guidelines in healthcare.



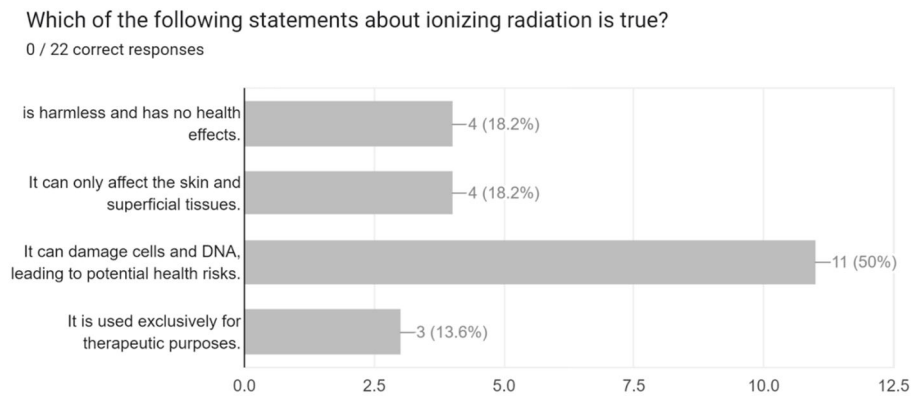
17) Based on the survey responses, in the event of a radiation spill or accident, the first step identified by nursing professionals should be to "evacuate the area immediately" (63.6%). Other responses included "begin administering first aid" (22.7%), "notify the radiation safety officers" (9.1%), and a small percentage indicated "ignore it and continue working" (4.5%).



18) Based on the survey findings, the responses regarding whether nursing professionals have undergone radiation monitoring using a dosimeter in their workplace vary. The majority indicated "no, never" (45.5%), while a significant portion mentioned "yes, regularly" (40.9%). Additionally, a smaller percentage mentioned "yes, occasionally" (13.6%).

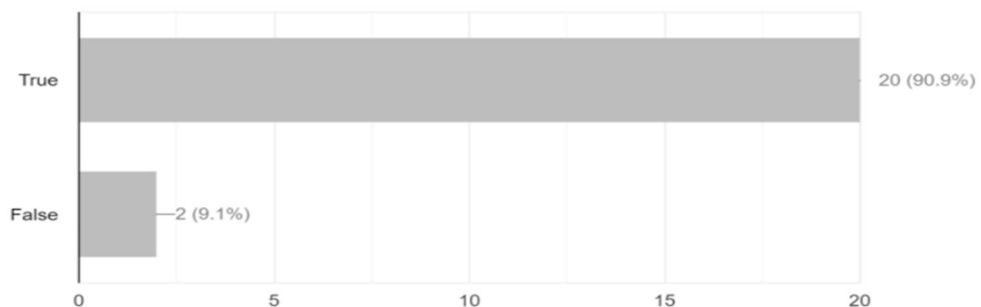


19) According to the survey responses, the statement identified as true regarding ionizing radiation is that "it can damage cells and DNA, leading to potential health risks" (50%). Other statements selected included "is harmless and has no health effect" (18.2%), "it can only affect the skin and superficial tissue" (18.2%), and "it is used exclusively for therapeutic purposes" (13.6%).



20) Based on the survey results, the majority of respondents (90.9%) indicated that the statement "Lead aprons are commonly used as personal protective equipment (PPE) against ionizing radiation in healthcare settings" is considered "true." Only a small percentage (9.1%) marked this statement as "false."

Lead aprons are commonly used as personal protective equipment (PPE) against ionizing radiation in healthcare settings?
0 / 22 correct responses



VI. RESULTS

The survey analysis on radiation awareness among nursing professionals showcased varying degrees of familiarity with different types of radiation. X-rays emerged as the most recognized type (54.5%), followed by ultraviolet rays (18.3%) and gamma rays (13.6%). However, respondents demonstrated limited familiarity with infrared radiation (13.6%), and none reported familiarity with radioactive particles. Findings revealed diverse self-reported awareness levels on radiation safety practices, with 63.6% having received extensive formal training, while 27.3% received training to some extent, leaving 9.1% without any formal training. Regarding protective measures, 59.1% always encountered protective shielding when working with radiation-emitting equipment, while 45.5% reported experiencing radiation safety incidents in the workplace. Additionally, survey results unveiled varied awareness levels regarding permissible radiation dose limits set by regulatory agencies, with 54.5% fully aware and 40.9% having a general idea. In cancer treatment perception, 40.9% identified Gamma radiation as the primary type used, followed by X-rays (31.8%), while incidents related to radiation safety were reported by 68.2% of respondents. Interpretations of ALARA varied, with 50% correctly identifying it, while 22.7%, 18.2%, and 9.1% associated it with alternate meanings. Responses showed varied confidence levels in explaining radiation risks to patients, with 36.4% feeling 'very confident' and 31.8% 'natural.' The unit of measurement for radiation exposure dose was predominantly 'gray' (45.5%), and 'CT' (Computer Tomography) was the leading imaging technique using ionizing radiation (54.5%).

Organizations like WHO (World Health Organization) (54.5%) were recognized for providing radiation safety guidelines. Lastly, 90.9% confirmed lead aprons as commonly used PPE against ionizing radiation in healthcare settings."

This encapsulates the broad array of findings elucidated through the comprehensive survey conducted among nursing professionals on the critical topic of radiation awareness within healthcare settings.

VII. DISCUSSION

In discussing the findings of the survey on radiation awareness among nursing professionals, it's evident that there's a crucial need for heightened awareness within this cohort. The survey unveiled a concerning trend, indicating that a significant portion of nursing professionals lack comprehensive knowledge about radiation exposure risks, safety measures, and protocols. This knowledge gap could potentially compromise both patient care and the well-being of healthcare workers themselves. Interestingly, while a portion of respondents displayed a basic understanding of radiation safety, a notable percentage struggled with identifying appropriate protective measures and understanding the potential risks associated with radiation exposure. These findings suggest a clear imperative for improved education and training initiatives tailored specifically to the needs of nursing professionals within healthcare settings.

Moreover, the comparison with existing literature on this subject illuminates consistent patterns: many studies highlight inadequate levels of radiation awareness among healthcare professionals, with nurses often exhibiting lower levels of knowledge compared to their physician counterparts. Factors influencing this knowledge gap were also identified, including variations in educational backgrounds, limited access to ongoing training, and workplace environments that might not prioritize continuous education on radiation safety. Addressing these factors is critical in devising strategies to bridge the existing awareness gap and equip nursing professionals with the necessary knowledge and skills to ensure their safety and enhance the quality of patient care.

The implications of these findings are substantial. Insufficient radiation awareness among nursing professionals not only jeopardizes their occupational safety but also poses potential risks to patient health. With the increasing use of radiological procedures in modern healthcare, enhancing radiation awareness among nursing staff becomes pivotal in ensuring the delivery of safe and effective care. To mitigate these risks, interventions such as targeted educational programs, regular training sessions, and the integration of radiation safety protocols into nursing curricula emerge as fundamental strategies. Strengthening collaboration between healthcare institutions, regulatory bodies, and educational institutions is essential in implementing these initiatives effectively. While this survey sheds light on the current state of radiation awareness among nursing professionals, it is important to acknowledge certain limitations. The sample size and geographical representation might affect the generalizability of the findings. Additionally, self-reporting through surveys could introduce response bias, and further qualitative studies could provide deeper insights into the underlying reasons behind the observed knowledge gaps.

Moving forward, future research should delve into the efficacy of various educational interventions, explore the long-term impact of enhanced radiation awareness on patient outcomes, and investigate potential barriers to the implementation of comprehensive radiation safety programs within healthcare settings. By addressing these areas, the healthcare community can make significant strides toward bolstering radiation awareness among nursing professionals and ultimately improving both patient care and the occupational safety of healthcare workers.

VIII. LIMITATIONS

While this research paper provides valuable insights into radiation awareness among nursing professionals, certain limitations should be acknowledged. Firstly, the study's sample size may impact the generalizability of findings to a broader population. Additionally, the reliance on self-reported data introduces the potential for response bias, as participants may provide answers influenced by social desirability. The cross-sectional nature of the survey captures a snapshot of awareness levels, but a longitudinal approach could offer a more dynamic understanding of changes over time. Furthermore, the survey design may not capture the depth of certain nuanced aspects of radiation awareness. Despite these limitations, the paper contributes significantly to the understanding of the current landscape of radiation knowledge among nursing professionals.

IX. CONCLUSION

In conclusion, the survey-based research on "radiation awareness among nursing professionals" sheds light on critical insights into the levels of knowledge and awareness within this specific cohort. The findings underscore the importance of ongoing education and training initiatives focusing on radiation safety within nursing curricula and professional development programs. Despite the identified gaps in awareness highlighted by this study, there exists a clear opportunity for interventions aimed at enhancing nurses' understanding of radiation risks, safety protocols, and best practices. Furthermore, this research emphasizes the need for continuous evaluation and improvement of strategies to augment radiation awareness among nursing professionals, ultimately contributing to improved patient safety, enhanced quality of care, and the overall well-being of both healthcare providers and patients alike. Future studies may delve deeper into the effectiveness of tailored educational interventions or explore correlations between enhanced radiation awareness and improved patient outcomes to further support the advancement of nursing practices in this critical area.

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