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Assessing Nursing Staff Knowledge and management in Radiation Protection

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Abstract:

Background: Exposure to radiation among nursing staff, though typically below established limits for radiation workers, remains a concern due to its potential impact on routine activities in specific hospital departments. Moreover, nursing staff, regardless of their classification as radiation workers, must be equipped to respond to radiological emergencies and provide care to patients affected by radiation. Despite this imperative, there is a gap in understanding the extent of awareness and preparedness among nursing staff regarding radiation safety. This study seeks to address this gap by assessing the level of radiation safety awareness among nursing staff in various departments of a major hospital.

Methods: A prospective study was conducted involving 200 nurses across nine different departments of the hospital. A structured multiple-choice questionnaire, designed to evaluate knowledge typically covered in basic radiation safety courses, was distributed to the participants. The questionnaire aimed to gauge the level of awareness and understanding of radiation safety principles among nursing staff. Participation was voluntary, and responses were anonymized to ensure confidentiality. Data analysis involved examining the average score achieved by participants and assessing their perceptions regarding the need for further radiation safety training in their respective departments.

Results: Of the 200 nurses approached, 147 (74%) completed the questionnaire. The analysis revealed an average score of 40% among participants, indicating varying levels of knowledge regarding radiation safety principles. Furthermore, 85% of surveyed nurses expressed a perceived need for additional radiation safety training within their departments to support their daily activities. These findings underscore the importance of addressing gaps in radiation safety knowledge among nursing staff and implementing targeted training programs to enhance preparedness.

Conclusion: The study highlights significant gaps in radiation safety awareness among nursing staff in the hospital's various departments. The findings emphasize the importance of providing tailored radiation safety training to nursing staff, considering their specific departmental responsibilities and potential exposure risks. It is imperative to prioritize ongoing education and training initiatives to ensure nursing staff are adequately prepared to mitigate radiation-related risks and respond effectively to radiological emergencies. By addressing these gaps in knowledge and practice, healthcare facilities can enhance the safety and well-being of both patients and nursing staff.
Keywords: radiation safety, radiation awareness, teaching & training

Introduction:

Navigating ionizing radiation in the workplace can present a formidable challenge for those unfamiliar with radiation safety protocols. However, a comprehensive grasp of fundamental radiation safety principles not only enhances patient care but also fosters a secure working environment, whether nurses are supporting procedures in specialized domains like catheterization laboratories or tending to patients undergoing therapeutic nuclear medicine treatments. Neglecting to utilize appropriate protective measures poses heightened risks for nurses, while a lack of awareness regarding associated hazards may result in suboptimal adherence to radiation safety practices. (Çiraj-Bjelac et al., 2010)

Contemporary literature underscores a notable dearth of recent, pertinent studies conducted in major tertiary centers concerning the awareness of radiation safety among nursing staff. Research from a Kuwaiti radiology department, for instance, revealed a prevalent lack of understanding among nurses regarding the risks inherent in working with ionizing radiation. Similarly, investigations into the readiness of hospital nurses to manage radiological emergencies have underscored the necessity for additional training, citing factors such as reluctance to respond to emergencies and concerns regarding personal safety as significant barriers. (Rassin et al., 2005)

While nurses within hospital settings generally adhere to yearly radiation exposure limits, possessing an accurate perception of their individual radiation risk contributes to more effective patient care. Furthermore, studies have demonstrated that comprehensive radiation safety education leads to improved management of radiation doses for both patients and staff. This improvement is attributed to staff members' heightened inclination to utilize available protection measures following a thorough understanding of associated risks. (Alotaibi & Saeed, 2006)

This paper seeks to explore the awareness of basic radiation safety among nurses working in departments that regularly interact with ionizing radiation. Additionally, it aims to evaluate the potential necessity for further training in this domain. (Veenema et al., 2008)

Methods:

The study was conducted with a nursing staff exceeding 1000 members. Although basic radiation safety training is available upon request through Nursing Unit Managers (NUMs), its implementation is not uniformly mandated across all departments. The hospital is supported by a medical physics department, offering radiation expertise and assistance as needed.

A prospective multiple-choice questionnaire was administered to nurses across nine distinct departments within the tertiary hospital. These departments encompassed Radiology, Radiation Oncology, Operating Theatre, Neurology ward, Nuclear Medicine, Iodine Therapy ward, Intensive Care Unit, Endoscopy, Emergency Department, and Catheterization laboratory. The questionnaire was designed to assess fundamental knowledge pertaining to radiation safety, encompassing principles of shielding, spill management, safety during pregnancy, and general safety protocols. Ethical approval for the study was obtained from the Human Research Ethics Committee

The questionnaire comprised the following questions:

1. Have you received formal radiation safety training since commencing employment at the hospital?
2. What is the approximate background radiation dose in Australia?
3. What is considered an effective shield against alpha particles?
4. What is considered an effective shield against beta particles?
5. What is considered an effective shield against gamma rays?
6. How is exposure from external radiation sources minimized?
7. In the event of a radioactive spill (e.g., radioactive bodily fluids, radiopharmaceutical administration), what action should be taken?
8. Under what circumstances should a lead gown be worn?
9. What precautions should be observed by pregnant staff members in relation to radiation exposure?
10. Do you believe there is a need for additional radiation safety training to support your daily work within your department?

Each question presented four possible answers, along with an additional fifth option, "I don’t know," intended to signify uncertainty and discourage guesswork.

Surveys were disseminated either through departmental meetings or via NUMs for distribution among staff members. Participant details included departmental affiliation and frequency of interaction with radiation. Responses were categorized as correct, incorrect, or "do not know," and average scores were computed for each department and individual question.

Results:

Out of the 200 nurses surveyed, 147 nurses (74%) responded to the questionnaire. Analysis revealed that questions concerning general concepts of shielding and background radiation predominantly elicited incorrect answers and "do not know" responses, outweighing the number of correct responses. Conversely, questions 4 through 9, focusing on hospital protocols and protection against gamma rays, garnered more correct responses than incorrect ones, along with fewer "do not know" responses.

Overall, the percentage of correct responses to all survey questions was 42%, with 26% of respondents providing incorrect answers and 32% indicating "I do not know." A detailed breakdown of responses to each question is illustrated in Figure 1. Figure 2 depicts a comparison of the average scores across departments.

Of the surveyed nurses, 59% indicated that they had not received formal radiation safety training since joining the hospital. Furthermore, 85% of respondents expressed a desire for additional training to bolster their confidence in managing radiation exposure in their daily work routines.

Discussion:

Nursing staff working in departments such as Radiology, Radiation Oncology, Nuclear Medicine, and the Catheterization Laboratory are typically required to undergo a basic radiation safety course before commencing employment at our hospital. However, in some departments, refresher courses are only provided upon request, meaning that a staff member may only undertake radiation safety training once throughout their entire career. Conversely, staff in other departments receive informal training sessions during meetings and receive support on an as-needed basis when dealing with specific patient cases.

All surveyed departments regularly encounter ionizing radiation during their workweek. Despite this, only 41% of staff reported receiving formal radiation safety training since starting their employment. Furthermore, even experienced staff noted that they had not received formal radiation safety training since joining the hospital, nor had they completed any refresher courses. A significant 85% of respondents expressed a desire for further radiation safety training to bolster their confidence in their day-to-day work. Post-survey completion, some respondents even requested additional radiation safety training from the hospital's Radiation Safety Officer (RSO).

Observations indicate that staff members in departments without formal training tend to exhibit greater caution when dealing with radioactive patients. For instance, nurses in the Iodine Therapy ward refrain from entering patient rooms unless absolutely necessary, opting instead to assist patients from behind closed doors. Such precautions, while not endorsed by the RSO, demonstrate heightened awareness among staff. In contrast, nursing staff in Nuclear Medicine, who regularly interact with radioactive patients and undergo radiation safety training before employment, engage with patients without additional protection, illustrating how radiation awareness enhances staff confidence and patient care.

Furthermore, survey respondents scored higher on questions relevant to their daily practice compared to other aspects of radiation awareness. For example, while the Catheterization Laboratory conducts yearly radiation safety courses for its staff, focusing specifically on encounters in the lab, the average score in the survey was only 45%. However, if only questions related to X-rays were considered, the average score would rise to 80%. This aligns with the views of departmental heads who advocate for radiation safety courses tailored to specific nursing practices. Therefore, it is recommended to customize courses to suit the needs of each department.

Regarding course delivery, survey respondents indicated a preference for additional training in the form of pamphlets and handouts rather than traditional courses or lectures. This approach ensures that information not retained during formal training sessions remains easily accessible within the department. Additionally, nursing staff who have not undergone formal training in radiation safety would still have access to essential information until they receive proper training.

Conclusion:

In conclusion, the awareness of radiation safety among hospital nursing staff is found to be suboptimal, consistent with previous literature findings. However, this study reveals disparities in knowledge among nurses working in different departments, despite identical radiation training opportunities upon request. Surprisingly, the extent of radiation training received does not appear to correlate with the level of knowledge and practice in the workplace.

It is concerning to note that certain departments with regular exposure to radiation still have nursing staff who have not undergone relevant radiation safety training. We recommend that departments with monthly or more frequent involvement with radiation mandate their staff to undergo basic radiation safety training. For departments that encounter radiation in emergency situations only, we suggest providing posters and pamphlets containing essential safety information to ensure staff possess the knowledge necessary for safe practice and quality patient care. Tailoring this information to the specific needs of each department will enhance knowledge retention and practical applicability.

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