

Two keys to transforming occupational safety and health culture in radiology: effective training and safety induction strategies for radiographers

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Abstract. Many radiographers lack adequate training in safety. Best practices in safety training have not been consistently applied. The purpose of this study is to examine the impact of induction and training on safety culture. The research methods include a quasi-experimental design and a quantitative methodology. Eighty-seven respondents were radiographers at type C and D Hospitals in the Sleman and Bantul areas. Data collection using questionnaires and observations. The research procedures for data collection in time series include pretest-1, pretest-2, training interventions, phase 1 safety induction, posttest-1, phase 2 video safety induction, and posttest-2. Data analysis with the Linear Mix Model and Wilcoxon Signed-Rank Test. The results of the study show that simulation-based training and safety induction are highly effective in improving Radiographers' safety behavior and can reduce the risk of work accidents. Thus, creating a sustainable safety culture in the workplace ensures that safety is a top priority. A new understanding of the importance of safety and induction training for Radiographers can be realized. The recommendation is to establish better training standards, thereby improving the quality of radiography services.

1 Introduction

Safety and induction training can support a safer working environment for Radiographers and patients. Human factors can also compromise safety, such as fatigue and non-technical skills. Radiographers must possess sufficient knowledge of radiation protection to minimize exposure to risk factors that could harm them and their patients. Practical safety training and induction are key elements in the success of any well-functioning company. Given the high level of risk in the workplace. Workers may be exposed to X-ray radiation, which poses potential hazards to their health, including accidents and health problems. Thus,

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creating a safe environment is the shared responsibility of all team members [1]. Proper training can increase the effectiveness of emergency response and the confidence of radiology staff in medical situations. Well-designed training not only enhances technical capabilities but also provides valuable experience, enabling staff to face critical situations with greater confidence. With proper training, a strong safety culture can be established to minimize radiological examination errors. Thus, improving overall safety communication and response to safety issues is a top priority for achieving better healthcare outcomes [2].

Many radiographers lack adequate training in safety aspects. Medical professionals, particularly radiographers, often lack a basic understanding of radiation and emergency preparedness [1,2]. According to research conducted in the Gaza Strip, 78.2% of radiographers had never taken an infection control course, indicating that their practice and expertise were only moderate. This highlights critical training gaps that can jeopardize patient safety. Unsafe workplace conditions, including exposure to hazards, inadequate safeguards and policies, and workers' limited awareness of occupational safety and health, further exacerbate this situation. Additionally, a lack of understanding, interest, trust, and fear of safety can deter workers from taking the necessary training. Therefore, a study emphasizes the need for radiation protection education in the curriculum and the work environment, given that many healthcare workers lack adequate training, leading to unsafe behaviors [3,4].

Best practices in safety training have not been consistently applied. Poor working conditions, including work-related injuries and a high frequency of accidents, underscore the need for training, personal safety development, and worker awareness. However, existing training practices are often ineffective and rarely leverage best practices identified in the broader research literature [5]. In addition, evaluations of safety training outcomes often fail to achieve the desired results. Therefore, to achieve significant safety improvements, improvements in training and evaluation methods are urgently needed. The long-term impact of safety induction on radiographers' behavior in emergencies remains unclear. Therefore, there is a need for a more standard radiation safety protocol [6]. There is no clear standard for measuring the success of safety training and induction, making it difficult to evaluate the effectiveness of such programs. So it poses challenges in assessing its efficacy [7]. This research is necessary because it relates to patient and radiographer safety. The solutions offered are practical training and structured safety induction. The purpose of this study is to examine the impact of induction and training on safety culture.

2 Methods

This study used a qualitative method with a quasi-experimental design. The population consisted of 115 radiographers, while the respondents were 87 radiographers selected from Type C and D hospitals in the Sleman and Bantul areas of Yogyakarta, Indonesia, based on sampling quotas. Data collection was carried out by asking respondents to complete a pretest-1 questionnaire with a two-week break, then a pretest-2 questionnaire. Next, take part in the training and watch a safety induction video for 4 weeks. They then filled out posttest 1. The next step was for respondents to watch a safety induction video for 4 weeks, complete a posttest questionnaire 2, and then undergo safety behavior observations. Data analysis with the Linear Mix Model and Wilcoxon Signed Rank Test.

3 Results and discussion

3.1 Results

Safety training for Radiographers is effective in increasing risk awareness and promoting safety practices. The results of the assessment of the implementation of occupational safety and health training in the field of radiology, with the highest satisfactory score, are the materials presented, which are 87%. Meanwhile, what is considered less critical is punctuality and work application, each at 2%. The results of posttest-1 and posttest-2 improved after respondents viewed safety induction videos and received training interventions. The increase was in the good category, compared to the pretest-1 result of 27.6%, which was achieved in posttest-2. In the variable attitude towards occupational safety and health in Radiology, which falls into both pretest-1 and pretest-2, there is a decrease. However, after respondents received the training intervention and viewed the safety induction video, the results improved from the pretest to the posttest. This increase is 16.1% compared to the pretest-2 and posttest-2 scores.

Table 1. Data on the effect of safety training and induction on safety behavior

| Partner | Variable | Significance | Conclusion |
|------------------------|-----------|--------------|---------------|
| Pretest 1 Pretest 2 | Knowledge | 0.320 | Insignificant |
| | Attitude | 0.052 | Insignificant |
| | Practice | 0.261 | Insignificant |
| Pretest 1- Post test 1 | Knowledge | 0.0001 | Significant |
| | Attitude | 0.0001 | Significant |
| | Practice | 0.001 | Significant |
| Pretest 1 – Posttest 2 | Knowledge | 0.0001 | Significant |
| | Attitude | 0.0001 | Significant |
| | Practice | 0.0001 | Significant |
| Pretest 2 – Posttest 1 | Knowledge | 0.0001 | Significant |
| | Attitude | 0.046 | Significant |
| | Practice | 0.031 | Significant |
| Pretest 2 – Posttest 2 | Knowledge | 0.008 | Significant |
| | Attitude | 0.015 | Significant |
| | Practice | 0.014 | Significant |
| Posttest 1- Posttest 2 | Knowledge | 0.003 | Significant |
| | Attitude | 0.044 | Significant |
| | Practice | 0.0001 | Significant |

Based on table 1, pre-test-1 and pre-test-2 occupational safety and health factors in radiology have dropped into the good group. However, after respondents received the training intervention and viewed the safety induction video, the results improved between pretest-2 and posttest-2. In comparison, this represents a 13.8% growth. The results of the bivariate analysis showed that there was no difference between the two, because in the pretest-1 and pretest-2 stages, the respondents had not received any intervention, be it training or watching videos. However, after receiving training interventions and safety induction videos for posttest-1 and posttest-2, a significant difference was observed ($p \leq 0.05$), indicating that H1 was accepted. The results of the Linear Mixed Model analysis showed that age, education, working period, length of work, and hospital type did not affect all behavioral elements, including knowledge, attitudes, and practices. Meanwhile,

intervention factors significantly influence Radiographers' safety behavior.

3.2 Discussion

The findings demonstrated the effectiveness of the safety induction and training programs for type C and D hospital radiographers in the Bantul and Sleman regions. Radiographers who attended the training showed a higher level of participation in implementing safety [8,9]. This training program is implemented to address knowledge inconsistencies for Radiographers. A structured safety training and induction program is essential to improve radiographers' skills, confidence, and safety [39]. Thus, safety training and induction can enhance radiographers' participation and knowledge, thereby contributing to higher-quality patient care [10].

The study's results demonstrated that regular use of safety induction and training significantly improved safety behavior in radiology. Continuous professional development is also crucial for maintaining high safety standards. By doing so, organizations can improve the consistency and effectiveness of their safety training programs, ultimately enhancing workplace safety and reducing risk [11].

Factors such as co-workers, leadership supervision, infrastructure, policies, and the work environment affect work safety behavior in Radiology. Strong leadership support and effective communication within the radiology department are essential to fostering a safety culture. Building a culture of safety requires strong leadership. Effective leaders establish standards by advocating rigorous safety protocols, fostering open and transparent communication, and recognizing contributions to safety [11,12].

A clear safety induction can have a long-term impact on radiographers' safety behavior. Ongoing education and training are necessary to keep radiographers informed of the latest best practices and safety protocols. Radiology managers play a crucial role in advancing safety programs and fostering an environment that values sustained performance and ongoing professional development. In this regard, it has been demonstrated that multimedia-based instruction is more successful in increasing knowledge of radiation safety guidelines. Additionally, standardizing radiation safety protocols and providing comprehensive training are essential to ensure compliance and enhance workplace safety [13]. To improve workplace safety: safety awareness, emergency preparedness, job skills, safety culture, and safety training [14,15].

4 Conclusion

This research creates a new understanding of the importance of safety training and induction for Radiographers. Practical training can reduce risk and improve safety. This research can provide recommendations for improved training standards, thereby enhancing the quality of radiographic services. This research aims to examine the impact of induction and training on safety culture. Suggestions for further studies are made in hospitals with other types and Radiology clinics.

No specific grant from a public, private, or nonprofit organization was obtained for this study.

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