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Original article

Gap between knowledge and practice: A cross-sectional study on radiation protection among operating room staff in Zanjan Province, Iran

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ABSTRACT

Objective: To evaluate the knowledge, attitude, and practice (KAP) of operating room staff regarding radiation protection in hospitals affiliated with Zanjan University of Medical Sciences, Iran, and to identify demographic factors influencing their KAP scores.
Methods: This cross-sectional descriptive-analytic study was conducted from May 2022 to April 2023. It included 172 non-radiology-designated operating room personnel (including nurses, surgeons, anesthesiologists, anesthesia technicians, and operating room technicians) from six hospitals, achieving a response rate of 75%. Data were collected using a validated 32-item KAP questionnaire, comprising 10 items on knowledge, 7 on attitude, and 15 on practice. All items were rated on a 5-point Likert scale, and total scores were categorized as good, moderate, or poor.
Results: While 40.1% of participants demonstrated good knowledge and 87.2% exhibited a positive attitude, only 32.6 % reported good practices. Male staff had significantly higher knowledge scores than females ($P < 0.05$), but no gender differences were observed in attitude/practice. Age and education level showed positive correlations with KAP scores ($P < 0.05$), whereas work experience was not significantly associated with knowledge or practice.
Conclusion: Despite adequate awareness and positive attitude, practical adherence to radiation safety protocols among operating room staff remains insufficient. Targeted training programs and systematic monitoring are urgently needed to bridge this gap and enhance occupational safety in operating room settings.

1. Introduction

Ionizing radiation (IR) consists of electromagnetic waves with sufficient energy to penetrate matter and ionize atoms by displacing their electrons. Due to these properties, IR is widely applied in clinical settings. Megavoltage gamma and X-rays are used in radiotherapy for tumor treatment, while kilovoltage X-rays are commonly employed in diagnostic imaging modalities, such as radiography and computed tomography.[1]

Given its high energy levels, IR can cause biological damage to cells, potentially leading to neoplasms and genetic mutations, cognitive impairments and neurological effects in healthcare workers.[2–4] Healthcare professionals exposed to IR must be adequately trained in radiation protection to minimize occupational hazards. Radiation safety principles include reducing exposure time, maintaining a safe distance from the source, and using personal protective equipment (PPE) to minimize radiation doses absorbed by staff.[5]

Occupational exposure to IR is monitored using personal dosimetry devices, such as film badges, to ensure adherence to safety thresholds established by international radiation protection guidelines.[6]

One primary diagnostic use of X-rays in the operating room is intraoperative imaging performed using mobile or C-arm fluoroscopy units. These devices provide real-time visualization during surgical procedures, emitting continuous kilovoltage X-rays. Fluoroscopy-guided interventions combine radiological imaging with minimally invasive techniques for diagnostic and therapeutic purposes, enhancing surgical precision.[7]

C-arm fluoroscopy is extensively utilized across various medical specialties. Its applications are particularly prominent in orthopedic procedures, encompassing areas such as trauma surgeries and joint

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