

Exploring Nurse Readiness for a Radiological or Nuclear Incident: A Cross Sectional Study

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Abstract

As the largest component of the healthcare workforce, the nursing profession will play a critical role in the effectiveness of a disaster medical response to any public health emergency resulting from the large-scale release of radioactive materials into the environment.

Triage, the clinical care of patients who are ill or injured due to a radiological event (e.g., wound care, fluid management, infection control, and administration of medical countermeasures), community screening for radiation exposure and contamination, decontamination, and the provision of supportive emotional and mental health care will be overwhelmingly nurse intensive.

However, currently schools of nursing are not providing radiation content and much of the current nursing workforce may not have received adequate education and training regarding how to respond and care for patients and communities in the event of a radiological or nuclear emergency. Current radiological/nuclear preparedness plans may be built upon false assumptions of readiness which would have serious implications for response.

This study explored nurses' current knowledge and skills regarding response to radiological/nuclear events using a descriptive cross-sectional survey. Findings include low knowledge score for all respondents. Prior attendance at a radiation emergency medical management course, use of online resources, and having a preparedness plan were associated with higher scores. Experience with a radiation emergency was associated with the highest score.

The results of this study have helped identify nursing educational gaps and can be used to strengthen the range of educational offerings and materials developed by global radiological/nuclear emergency preparedness and response leaders.



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Study Questions

Knowledge & Skills:

- Radiation Triage
- Patient Decontamination
- Radiation Countermeasures
- Basics of Physical Dosimetry
- Dickey Chromosome Assay
- Patient Counseling and Follow-Up

Other Questions: demographics, experience, personal preparedness, use of resources



Question With Highest Score

One of the earliest symptoms of a 2 Gray acute whole-body exposure (penetrating radiation) is:

- Infection
- Bleeding
- Vomiting**
- Epilation (hair loss)

83.6% correct

Question With Lowest Score

A 24-year-old male patient is injured in a dirty bomb explosion. He is brought to the ED by a bystander. On auscultation, no breath sounds are heard on the left side of his chest. He has an altered level of consciousness, a weak pulse, and is in severe respiratory distress. His clothes appear covered in dirt and dust from the explosion. Which of the following statements is correct?

- The patient should be surveyed for contamination with radioactive material prior to bringing him into the resuscitation room and inserting a chest tube
- The patient should be wrapped in sheets and taken immediately to the resuscitation room for an emergent chest tube insertion**
- The patient should be rapidly decontaminated with soap and water prior to resuscitation
- Providers can protect themselves from radiation emitted from the patient's contaminated body by wearing lead aprons

20.95% correct

Study Participants

This study was distributed to Emergency Nurses Association (ENA) members and nurses employed within the Radiation Injury Treatment Network (RITN). The U.S.-based ENA is a professional organization that represents emergency nursing and examines issues relevant to emergency care. RITN is comprised of a group of hospitals and health care centers that are prepared to care for mass casualties with marrow toxic injuries. A total of 420 people responded, with 244 respondents answering both knowledge questions and demographic/experience questions. All responses were anonymous.

- 84% female, 16% male
- 71.4% between ages of 30 and 60
- 65.2% held bachelor's degree
- 84% worked in a hospital setting
- 37.3% had attended a radiation emergency management course
- 2.5% had personal experience with a radiation emergency



Findings

- Passing performance (> 80%) on only two questions:
 - Determinants to evaluate risk of dose received
 - Earliest signs/symptoms of 2Gy whole body exposure
- Scores from 73% to 76.6%:
 - Irradiation v. contamination
 - Care of patients with hematopoietic sub-syndrome
- Performance on remainder of knowledge questions ranged from 20.95% to 58.2%
- Attendance at a radiation emergency medical management course was correlated with higher scores. Those who attended more courses had higher scores.
- 94.2% found value in mobile education and training applications in either a downloadable or online platform.



Implications for Emergency Care

- It is difficult in times of fiscal constraints and other disasters and public health emergencies for hospitals to consider workforce preparedness for low-frequency, high-impact events such as radiological or nuclear mass casualty events.
- This study reinforces existing research that nurses do not currently possess the knowledge, skills, and abilities to care for and protect patients after a radiological or nuclear event.
- This finding has implications for emergency health care system sustainability and for the safety and well-being of emergency nurses and their patients.
- Key implications for emergency nursing practice are that nurses need more education and training and that they are willing to use mobile technology to enhance their ability to respond to a radiological or nuclear event.



Conclusions

- Emergency nurses may not possess adequate knowledge or skills to participate effectively in radiation emergency response actions. Many of these nurses may not be comfortable or proficient providing clinical care during a radiological or nuclear event.
- Importantly, findings suggest that nurses are very willing to receive information regarding radiological response through mobile information formats and that repeated exposure to this material is associated with improved scores.
- The results of this study have helped identify nursing educational gaps and strengthen the range of educational offerings and materials being developed.

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