National Nurse Readiness for Radiation Emergency- Part 2

Name

Institution

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Introduction

Natural and manmade catastrophic health events contribute to considerable destruction of infrastructure and health all across the world. In New York City, for instance, catastrophic health events including superstorm sandy and the September 11 terrorist attack required well-coordinated and enormous efforts from hospitals and response agencies (Jacobs‐Wingo, Schlegelmilch, Berliner, Airall‐Simon, & Lang, 2019). The recent activities such as the incident in the Fukushima power plant indicates the concern that emergency medical personnel must possess the skills and knowledge to attend to injured individuals as well as those contaminated by radioactive materials after a radiological or nuclear incidence. A widespread perception also exists depicting that clinicians lack adequate training and knowledge for nuclear and radiological accidents, and in most cases, the healthcare practitioners lack the knowledge and confidence regarding the most effective treatment and response protocols for a radiation response (Dallas, Klein, Lehman, Kodama, Harris, & Swienton, 2017). The International Council of Nurses realized the global importance of strengthening capacities so that clinicians can conduct their essential roles during disasters, and coordinated with the World Health Organization in 2009 in developing competencies that promote readiness roles of nurses during catastrophic events. Healthcare providers, during clinical or in-servicing education, receive inadequate training in emergency response in terms of frequency and quality. A wide range of clinicians only receive the emergency response training once, infrequently, or never at all once in the workplace (Jacobs‐Wingo et al., 2019). The inadequate training reduces the likelihood of nurses conducting their pivotal response roles during catastrophic health events as required. The objective of this literature review is to conduct an assessment of nurse preparedness for radiation emergencies.

**Methodology**

The design applied for the study was a systematic literature review to capture various factors that impact the readiness of nurses for radiation emergencies. The systematic review framework provided for a review and search methodology with specifications of exclusion and inclusion criteria and documentation of selection decisions. A systematic review refers to a precisely formulated questions that use explicit or systematic techniques for selection, identification, and critical appraisal of valid research, as well as collection and analysis of data from research contained in the review. The review used a well-developed and detailed search strategy and executed progressive searches with specific key terms to ensure a broad topic coverage. The search strategy encompassed the identification of a wide range of published works, as well as the location of other studies through published works reference review. The articles used for the systematic review met the inclusion criteria after removal of duplicates and review of abstracts and titles for relevance to the topic. A thematic analysis identified the most critical themes and concepts while a final round analysis identified factors and sub-themes related to national nurse preparedness that may be responsive to mitigation. The results of the articles' review supported a variety of previously reviewed literature trends. However, the review did not surface new concepts, depicting the achievement of thematic saturation.

The applied search engines for the systematic review were Google Scholar and EBSCOhost databases. The search terminologies included nuclear, nursing, and emergency readiness terms. Nursing terms included keywords such as hospital nursing staff, emergency nursing, nurses, nurse practitioners, and nursing workforce among others. Radiological and nuclear terms included keywords such as nuclear detonation, nuclear accident, radiation injuries, radiation hazards, radiological dispersal, nuclear, and nuclear weapons among others. Emergency preparedness terms included clinical decision making, civil defense, emergency hospital planning, decontamination, surge response, and public health preparedness among others. Willingness terms included belief in the duty of care, the attitude of health practitioners, willingness in disaster, and health personnel attitude among others. The inclusion criteria of the selected articles included published in English, published between 2014 and 2019, quantitative research, and relevance to the topic.

**Review**

The literature review consists of four selected articles. The first article, by Dallas et al., 2017, was chosen because of its relevance to the research topic, peer-reviewed content, and methodology used. The study by Dallas et al., (2017) focused on evaluating the familiarity with radiological or nuclear contamination risks, willingness to respond, and the relative knowledge among Japanese and United States emergency medical personnel. The research used anonymous paper surveys for the methodology, approved by an institutional review board, and distributed at various disaster and medical conferences as well as in medical courses in the US and Japan. The surveys were in both English and Japanese language and gathered information on the willingness to manage, generalized demographics, knowledge of contamination risks, and disaster systems. The results of the study indicated the completion and collection of 418 surveys. The prevalent survey responders were physicians and prehospital responders. Dallas et al., (2017) identified limited knowledge associated with nuclear and radiological events among the medical staff. The researchers recommended preparing and educating medical staff for inevitable upcoming nuclear or radiological events.

The second article selected was written by Alzahrani and Kyratsis, (2017). The article's relevance to the research topic, peer-reviewed content, and methodology used motivated its selection. The study focused on assessing self-reported skills, awareness, and knowledge among hospital emergency nurses on disaster preparedness to respond to Mecca’s Hajj mass gathering. Alzahrani and Kyratsis, (2017) used cross-sectional surveys that were distributed online, with primary data collection. The research setting was Mecca's four different public hospitals. The study's outcome measures were emergency nurses' perception, skills, awareness, and knowledge related to disaster readiness. The results of the study indicated a reportedly high role awareness in emergency readiness among emergency nurses. However, the study identified limited awareness and knowledge of the wider disaster and emergency readiness plan, including critical components of hospitals' strategies for mass gathering emergency management. The researchers recommended emergency management courses, hospital education sessions, and a short course in emergency preparedness training initiatives to further develop professional skills in disaster response.

The third article selected was written by Jacobs‐Wingo et al., (2019). The article's relevance to the research topic, peer-reviewed content, and methodology used motivated its selection. The study by Jacobs‐Wingo et al., (2019) focused on describing the staged delivery and development mechanism for disaster events curriculum (CBRNE) to promote emergency readiness among nurses. The CBRNE abbreviated disaster events such as explosive, radiological, nuclear, biological, and chemical. The methodology for curriculum development was four-phased. The first two phases encompassed conduction of 7,177 surveys and participation in 20 focus groups by nurses at 20 participating New York City hospitals in identifying training gaps in emergency preparedness. Phase III encompassed developing and refining the curriculum by investigators in response to the identified gaps. Phase IV encompassed completion of train-the-trainer sessions by 22 nurse educators. The findings of the research indicated that the knowledge of radiation emergency events as well as response roles among 11 nurses in pilot training increased to 89% on the posttest from an average of 54% in the pre-test. Jacobs‐Wingo et al., (2019) concluded that participation in CBRNE training in nursing increased nurses' knowledge and preparedness for disaster response. The researchers recommended the application of the CBRNE curriculum in training nurses to prepare and respond to disasters adequately.

The fourth article selected was written by Abaza, (2016). The article's relevance to the research topic, peer-reviewed content, and methodology used motivated its selection. The study focused on assessing the knowledge and willingness of emergency medical response teams, nuclear medicine technologists, and medical staff to participate in radiological emergency response and preparedness operations. The study also focused on determining the radiation detection, imaging, and measuring equipment the staff would have access to during events at their workplace. Abaza, (2016) conducted the study using a survey, sent electronically to 500 members in the nuclear medicine and molecular imaging department in different medical centers, emergency departments in some hospitals, and laboratories that use nuclear material. The results of the study identified the existence of some knowledge and willingness to respond to radioactive emergencies among nuclear medicine technologists, regardless of the duration of work experience. Abaza, (2016) concluded that the initial response to radiological emergencies includes radiation detection, decontamination, population monitoring, and dose assessment. The researcher recommended coordination between public health agencies and nuclear medicine technologists to draw their knowledge and expertise in strengthening the community’s capability to respond to radiological or nuclear emergencies.

**Discussion**

Categorization and review of key findings indicated the grouping of thematic analysis on the basis of education and training, preparedness and capacity, willingness to respond, role, clinical practice, and health hazards or perception of risk. All the four articles that met the inclusion criteria addressed preparedness for the capacity of healthcare to radiological disasters and a wide range of governance systems to appropriately handle aftermaths of nuclear or radiological events. The various articles included various disciplines, ideas, and settings, including New York, Egypt, Saudi Arabia, and Japan. All the articles had a similar perspective and noted the lack of capacity and preparedness for response to disaster events involving radiation accidents and emergencies.

**Preparedness**

The article by Dallas et al., (2017) acknowledged the increased probability of occurrence of threats using at least one nuclear weapon. The value of expertise, training, and knowledge regarding effective emergency response increased as a result of the sheer number of individuals affected by contamination of radiation components following Fukushima’s and Chernobyl nuclear reactor meltdowns. The use of a nuclear weapon or intentional release of radiological elements into the environment immediately provokes an unprecedented public health emergency. The provocation impacts individuals directly affected during the event and other worried people often fearing for the worst. Dallas et al., (2017) noted a steady decline in the training and interest of clinicians equipped to handle victims of radiological and nuclear occurrences in public institutions, as a result of limited occurrences of radioactive elements and the lack of utilization of nuclear weaponry in wars over various decades, despite the Fukushima incident in the recent years. The authors noted that some high-level radiological knowledge, skills, and expertise only exists in a number of civilian and military departments. In medicine, for instance, high-level radiation expertise relates exclusively to proactive training with therapeutic procedures, under strictly controlled environments, with inadequate understanding or training for large scale contaminations and exposures. A paucity of understanding and training on the health impacts as well as the accepted procedures for effective response to environmental radioactivity impacts response exists among the public and medical health professionals. The sets of skills and knowledge among the professionals differ widely from those existing in clinical approaches with radiation.

**Willingness to Respond**

The article by Dallas et al., (2017) examined the clinicians’ will to report to their place of work after radiological disaster events. The authors noted that healthcare practitioners would only report to work and attend to patients for a biological outbreak only when they felt safe. For radiological incidents, however, healthcare professionals often indicate hesitations to respond to unfamiliar emergency situations, because they consider them as dangerous. The finding by Dallas et al., (2017) related to surveys from Asia and the US where study participants termed nuclear events as the most discouraging factors hindering their work attendance, followed closely by chemical and radiological incidences. Nuclear and radiological events discouraged health practitioners 2.5 times more than biological incidents from attending to their medical as well as other essential tasks during a crisis. The results related to a general consensus among medical experts regarding the assessment of radiation risks that under minimal precautions exists little risks to clinicians from radioactive contaminants. The inadequate knowledge regarding little danger to clinicians in Asia and the US gained further clarification from the fact that 90% of individuals who responded to the surveys lacked the awareness of the inexistence of record indicating instances of medical providers sustaining injuries for providing treatment for radioactively contaminated personnel.

Dallas et al., (2017) highlighted the significance of the unavailability of enough health care resources for responding to detonations of nuclear weapons despite the inadequate acknowledgment of the importance of nuclear or radiological knowledge and threats. Only a limited number of references exist on the detrimental impacts of the inadequacies of the possible response for nuclear or radiological weapon use despite the importance of preparedness issues, reflecting the widespread denial pattern for radiation emergency readiness. The types of primary injuries that might occur in an urban detonation include thermal burn, trauma, and radiation (Dallas et al., 2017). The resulting number of casualties in all three categories would almost result in insufficiency in healthcare response. Moreover, the lack of radioactive events would pose difficulties in treatment as a result of a little or unavailable experience in handling environmental radioactivity for a wide range of medical providers.

Denial and despair often result from considering the assumptions of high casualty rates for radiological incidents associated with providers and planners for large scale casual medical responses. The major unfortunate perception existing in radiation emergencies includes the unproductivity of planning and response to the events. However, in the study by Dallas et al., (2017), 33% of the participants indicated an unwillingness to participating in emergency responses that involve the handling of radioactive casualties because of contamination risks. Nuclear welfare, however, consists of a wide range of variants as well as scenarios with appropriate planning enabling the rational application of available resources to reduce suffering and save lives.

**Education and Training**

All the four reviewed articles mentioned that considerable education and training effort would develop a radiation competent workforce. The different authors acknowledged that attacks, whether deliberate or not, possess considerable threats to hospitals and jeopardizes public safety. Therefore, healthcare organizations must enhance emergency response efforts among clinicians and other healthcare personnel. The article by Jacobs‐Wingo et al., (2019) described an interactive process where investigators collected feedback from clinicians in focus groups and a large number of surveys to develop a curriculum to increase nurses' preparedness for catastrophic events. Focus groups and surveys indicated that nurses lack confidence in their potential to conduct emergency preparedness activities. The articles proposed various aspects to prepare clinicians and other healthcare staff for nuclear and radiological events. The various authors embedded radiation training and education into programs addressing biological, chemical, explosive, and nuclear events. Jacobs‐Wingo et al., (2019) noted the need for healthcare institutions to enhance their emergency readiness among clinicians and other personnel because deliberate threats present major threats to public safety. Jacobs‐Wingo et al’s., (2019) article chronologically illustrated the establishment and delivery interventions for a nuclear, radiological, explosive, and biological (CBRNE) events curriculum to promote the readiness of emergencies among healthcare professionals. The authors presented the curriculum in six modules that included an online annual refresher course and a just-in-time training that addressed emergency preparedness gaps identified in focus groups and surveys. The authors discovered that individuals who participated in the CBRNE curriculum enhanced their skills and preparedness to respond to radiological events. The curriculum prepared nurses to effectively engage in their response activities during nuclear and radiological incidents.

The article by Alzahrani and Kyratsis, (2017) noted that training and education of disaster readiness critically vary by nurses’ clinical posts. The authors emphasized that involvement in disaster exercise should be more standardized and include nurses in all emergency departments’ grades, and particularly target individuals in the lower leadership roles of nurse aides and technicians. Respondents in the study by Alzahrani and Kyratsis, (2017) proposed hospital education sessions as well as disaster management courses as the most effective training and education initiatives. The respondents recommended further development and expansion of the course training formats to ensure that all emergency nurses attend frequently. More than 25% of emergency nurse respondents demonstrated the value of self-learning and using online education about disaster management. The respondents noted the value of the online format and their potential for deployment to various nursing students and practitioners with internet access. The authors of the article recommended nursing educationists and policymakers to tap into the avenues for increased competency among nurse practitioners.

The article by Abaza, (2016) emphasized the need to examine efforts to include radiological response procedures for nuclear medicine technologists. The author noted the availability of apparent gaps in nuclear medicine technologists' familiarity and knowledge with response resources. The article recommended radiological emergency preparedness course content design to include appropriate continuing education credit for nuclear medicine technologists. The author suggested healthcare organizations to consider capitalizing on their nuclear medicine technologists' skills and knowledge as well as the willingness to help with training and planning efforts within hospitals. The intervention would help fill gaps in healthcare institutions' planning and potential to respond to individuals contaminated with radiological materials.

**Roles**

Experiences in radioactive events indicate the value of nurses clearly understanding their response and preparedness responsibilities. Nurse practitioners must be in a position to conduct various clinical tasks such as surveillance, prevention, triage, caring of patients, general assessment, and resuscitation. According to Abaza, (2016), the general objectives of nurses in emergency response include reducing risks or mitigating the adverse impacts of an accident at its source. The nurses have a responsibility to prevent deterministic health impacts by taking action on time, either before or immediately after exposure and keep the emergency workers and public individual doses below threshold for deterministic health impacts. However, based on the judging of nurse practitioners as indicated by Alzahrani and Kyratsis, (2017), emergency nurses appear to put less emphasis on psychological care and leadership domains, indicating a narrow clinical focus on physical health. The nurses also indicated focus towards clinical duties of providing acute care instead of the more proactive clinical roles of prevention and surveillance.

The article by Abaza, (2016) indicated that practicing and experience increases the awareness regarding radiation emergency preparedness and radiation protection measures to some extent. The authors noted a wide range of factors that hinder the willingness of nurses to report to work, such as the risk of hazards. However, risks that do not constitute disasters can rapidly spiral out of control, placing considerable demands on community resources. Abaza, (2016) recommended coordinated efforts of physicians and first responders, individual cooperation and solidarity, as well as the preparedness of national agencies involved in responding to catastrophic events. All nurses should be aware of their roles during disaster preparedness and response. For instance, the nurses must be in a position to perform nuclear decontamination of patients, conduct disaster triage, appropriately allocate scarce resources, and care for patients as well as themselves immediately after a nuclear event.

**Risks of Exposure**

The article by Abaza, (2016) indicates that nurse practitioners’ expectations include providing care to patients as a result of a wide range of scenarios. Some of the scenarios involve exposure or contamination with radioactive materials. The medical stability of the affected people represents the most critical consideration in the medical evaluation of individuals involved in a radiation event. Other important considerations include the relative magnitude of the situation as well as the resources needed to address an emergency situation. Small scale radioactive incidents refer to those involving small amounts of radioactive materials in hospitals, laboratories, and nuclear power plants, with the potential contamination and exposure to one or a few people. Large-scale incidents, on the other hand, refer to events such as terrorist attacks with nuclear or radiological weapons and large nuclear power plant disasters, involving relatively large quantities of radioactive materials and large risks of contamination or exposure to a large population of people. Individuals suffer the greatest dangers from ionizing radiations with high-level acute external doses. External or internal contamination of low levels of radioactive material doses generally poses little risks. Responders' garners the most concern, as with all emergency response situations. Sites with histories of radiological contamination should be assessed before general entry and responders must limit their time in areas with high dose rates. Handling radiological-contaminated casualties typically result in minimal risks. Nuclear and radiological incidents pose high risks but, with low probability. A wide range of measures exists to prevent or limit the impacts on radiological materials on the public. The most effective intervention includes preparedness, which remains the key to minimizing mortality and morbidity. The risks of exposure to radiological material, whether intended or by accident pose undeniable possibilities and potential catastrophes. Communities try to ultimately increase the potential of the public health system to a wide range of radiological events. To achieve success, the communities must identify and coordinate with members with considerable expertise. For instance, public health agencies can recruit nuclear medicine professionals to assist communities to respond to various radiological issues.

**Conclusion and Application**

Despite experts' acknowledgment of the inevitable nuclear or radiological incidents, the healthcare community displays inadequate knowledge and preparation to deal with exposed or contaminated individuals. The initial response to nuclear or radiological emergencies may include population monitoring, radiation detection, dose assessment, and decontamination. This literature review conducted an assessment of nurse readiness for radiation emergencies. The findings of the study indicated that effective response to radiation emergencies require willing, knowledgeable, and prepared individuals. Healthcare organizations and public health agencies should coordinate with nuclear medicine technologies and draw on their knowledge and expertise to strengthen their nurses' capability to respond to nuclear or radiological emergencies. Interventions to include radiological response procedures in the clinical setting include continued education and training to bridge knowledge gaps between clinicians' knowledge and familiarity with response sources. The clinical implications of the findings include capitalizing on clinicians' willingness and knowledge to help with training and planning efforts within healthcare facilities. Nurses and other healthcare staff should take part in various activities focused on helping members of the public. Training courses in universities, as well as those offered in hospitals, online, and workshops, must emphasize on radiological disaster preparedness. The national and local-level policymakers should oversee the responsibility for radiological preparedness training and education, with potential involvement of the World Health Organization. The recommendations for this study includes future research to identify strategies for nurses' development in radiation emergency preparedness to support governments in national security.

References

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