

## Compliance on Radiation Safety Policies of Selected Unionized and Non-unionized Private Tertiary Medical Centers in Metro Manila

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### Abstract

The hospital industry is one of the industries with a number of different occupational hazards. This is why individuals in the industry have good compensation and adequate protection. On top of the list for high level of protection is the field of medical radiation. Various institutions in the field follow certain guidelines to promote safety. Health care workers expect labor unions to cooperate with hospital managements for the promotion of their safety in the work place. This study aims to determine the relationship of labor unions in the promotion of radiation safety in hospitals, and to pinpoint the aspects for improvement. A survey was conducted to the employees in unionized and non-unionized hospitals using questionnaires with principles based from the International Atomic Energy Agency (IAEA) and the Magna Carta of Public Health Care Workers. Four unionized and three non-unionized private tertiary hospitals in Metro Manila having a bed capacity of 150 and more were featured in the study. The t-test was used in measuring the statistical significance of the differences of the responses between the unionized and non-unionized employees with regards to their institutions' compliance to radiation safety. The analyses of data showed that the existence of labor unions in a medical establishment does not have a significant influence in its effective compliance with the radiation safety principles.

**Keywords:** Union; Radiation safety; Compliance

### Introduction

The health care field is deemed as one of the most dangerous industries (Hospital Employee Health, 2007). Health care workers face a wide range of hazards on the job including needle stick injuries, back injuries, latex allergies, and stress. Cases of nonfatal occupational injuries and illnesses among health care workers are some of the highest in any industry sector (Center for Disease Control and Prevention – The National Institute for Occupational Safety and Health, 2012).

Several authors have cited the different hazards that health care workers are constantly battling with. These hazards are broadly divided to biological, physical, chemical and psychological/psychosocial hazards [1,2]. Center for Disease Control and Prevention – The National Institute for Occupational Safety and Health, 2012). Medical radiation falls under the physical division.

Radiation, specifically ionizing radiation, is a type of energy that has the capability of producing ion pairs in biological materials [3]. This carries the risk of certain diseases, especially when one is exposed to it on a gradual and daily basis. If the dose is low or delivered over a long period of time (low dose rate), there is a greater probability for damaged cells to successfully repair themselves. However, long-term effects may still occur even if the cell damage is repaired. The repair incorporates errors, rendering the irradiated cell as a source for future mutations. These may lead to cancer after years of exposure [4].

In the event of radiation protection and usage, techniques and devices are now asked as requirements for the provision of license to any health care facility that utilizes radiation. On a national level, the Department of Health (DOH) and the Philippine Nuclear Research Institute (PNRI) are the main regulating bodies in the use of radiation. They provide and enforce guidelines on the uses of nuclear energy for the safety of the radiation-exposed workers and the general public. Accordingly, on an international level, the International Atomic Energy Agency (IAEA) develops nuclear safety standards, promotes the achievement and maintenance of high level of safety in applications

of nuclear energy, and protects human health and the environment against ionizing radiation [3].

Despite the regulations implemented, cases of occupational radiation still persist. Some studies indicate that non-compliance with radiation safety may be directly attributed to the lack of knowledge and proper training for employees of the company [5]. Other references stress the lack of skill in radiation protection in certain hospitals as the primary reason for the non-compliance [6].

The government has recognized these issues and has already enforced certain legislative measures to address them. One particular piece of legislature is the Republic Act 7305 or the Magna Carta of Public Health Workers which states that workers constantly exposed in hazardous areas, such as radiation areas, are given additional allowance of up to 25% of the monthly salary depending on the salary grade. However, the republic act only encompasses the public sector; thus, leaving the private sector on its own formulation of hazard compensation.

In addition to measures from the macro level, the issues on radiation protection and safety are also addressed by labor unions in most private institutions. These assemblies have long been argued to be the primary defense of workers, providing not only improved wages and benefits, but also rights and protection related to the exercise of authority and ultimately, and to the realization of democratic values at work [7].

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Labor unions or unions have long been a source of power and guidance for workers inside the workplace. They have the power to at least maintain equilibrium and give the workers the right to get what is due them. Benefits are some of the things unions bargain for in collective agreements. These properly compensate workers for jobs that are very hazardous to them. In fact, a study claimed that occupational illness and injury rates are somehow decreased through the presence of a labor union in a company [8]. Even so, because of disparity between institutions, allowances and policies still differ.

Unions have also been proven to pose a great threat to administrators when it comes to managing the institution for they sometimes stress the management to give in to their demands. Furthermore, unions restrict output flexibility less when the cost of inflexibility is higher, and high unionization companies tend to have a higher average cost as compared to companies with lower unionization [9]. When it comes to efficiency, however, studies show that unionization does not have a significant effect on it while non-unionization gives out a more significant relationship because workers' efficiency is influenced by more than just the idea of unionization [10].

The current situation of radiation safety with regards to the activities by the labor unions remains vague and insufficient. According to most of the collective bargaining agreements of the different hospitals, a small amount of money is given per month to employees working in areas deemed to be hazardous by their institution. Included in these areas are the radiation-exposed areas of the hospitals.

There is a huge discrepancy in the matter of compensation provided by public and private institutions to workers exposed in radiation areas. In public hospitals, additional compensation is given based on percentile, unlike in private hospitals wherein the compensation is a fixed amount which does not adequately justify the hazard encountered by the worker. Though some institutions have provisions in their collective bargaining agreements about the importance of the promotion of health and safety, majority does not include specific provision on compensation for employees exposed in areas of hazard [11-14].

In line with these issues on radiation safety, the study focuses on the influence of the existence of unions to the hospitals' compliance to radiation safety principles from the IAEA. The research investigates the perspective of the employees working in radiation-exposed areas of unionized hospitals and non-unionized hospitals to find out any differences in the treatment of radiation safety. Also, the research compares the status of hospitals without a labor union and of hospitals with one to determine if there are differences on the compliance of radiation safety. The study also provides a detailed view of how the employees view their respective institutions in terms of radiation safety. The results of the study are therefore beneficial to union officers, hospital administrators, and workers so as to improve the welfare of every radiation-exposed individual [15-18]. The study is also a reference to future studies concerning the formulation of policies for hazard allowances in all private medical centers in the Philippines. Generally, the study contributes to the betterment of policies on occupational radiation safety and occupational safety.

## Research Impedements

There were factors encountered that proved as hindrances in obtaining the necessary data. Initially, there is the hesitancy of the institutions to release sensitive information such as the responses of the employees with regards to radiation safety [19,20].

Moreover, the respondents are conscious in answering the questions. Since the respondents are employees of the hospital, they had fears from their employers for responses not on the latter's favor. Even though there is an assurance that the data and identity of the respondents will be treated with utmost confidentiality, there is still encountered reluctance from them. Furthermore, because the questionnaires given to the respondents contain principles mentioned in the IAEA, some employees encountered difficulty in understanding the items. The principles were explained upon retrieval of the questionnaire, but maintained objectivity to eliminate any bias.

Due to the scarcity of non-unionized private tertiary center in Metro Manila with a bed capacity of 150 or more, the sample size of the research is relatively low. Also, since the study is centered on radiation safety, only employees directly affected by the hazards of radiation are the focus, consequently decreasing the sample size to be interviewed per hospital [21-25].

## Subjects and Study Site

Data was obtained from four (4) unionized and three (3) non-unionized private tertiary medical institutions with a bed capacity of 150 beds and above located in Metro Manila. The study used purposive sampling in selecting the three unionized hospitals. For the non-unionized subjects, the researcher considered all available hospitals fit in the category since their number is small. Considerations in choosing the hospitals include proximity, availability of results, presence of a duly recognized labor union by the DOLE, and completeness of medical equipment emitting ionizing radiation: X-rays, CT scans, cardiac catheterization laboratories and mammography units. Only private tertiary medical centers in the National Capital Region were the targets for the study. Also, all hospitals included in the study agreed to participate. Ten respondents were interviewed from each hospital. The respondents were radiologic technologists employed and working in the radiology departments of the hospitals. These respondents were chosen as they are working at least one year in radiation areas, ensuring the adequacy of knowledge when it comes to radiation safety. Moreover, the respondents were informed that the results of the study will be used for the continued improvement of occupational radiation safety of the entire hospital [26-28].

## Data Gathering Procedure

The study utilized a researcher-made questionnaire based on the basic safety guidelines of the IAEA and the Magna Carta of Public Health Care Workers. Follow-up questions on certain items of the questionnaire were asked by the researcher to supplement information on certain topics upon retrieval. The questions on the questionnaire were based on the standards recommended by the IAEA in its Fundamental Safety Principles handbook for standards concerning safety. In terms of legalities and compensation, the researcher used excerpts from the Labor Code of the Philippines and the Magna Carta of Public Health Care Workers [29].

A pilot test was done on a private medical center in Quezon City to determine the reliability and validity of the questionnaires. The researcher validated the items that needed translation for the ease of understanding of the respondents. A Cronbach's alpha of 0.9146 was computed.

## Ethical Consideration

Permission was asked from both the management and the employees to conduct the study, and an informed consent duly understood by all

parties involved was made. The study did not reveal the names of the institutions and employees who participated in the study to ensure the confidentiality promised before the start of the data collection process [30]. The researcher instead used aliases throughout the study upon the request of the involved parties. Furthermore, for ethical and formality purposes, the researcher contacted the IAEA for permission to use the general safety principles in the research instrument of the study. The researcher, however, received no response from the agency.

## Data Analysis

A Likert scale with a scale of 1-4 (4 being the highest) was used to determine the average response of respondents regarding radiation safety and compliance with standards of the institutions that they are affiliated with. The Likert scale determined the degree in which union representatives perceive how the institution they are currently affiliated with complies with the international and local standards for radiation protection and the degree of hazard compensation to the constituents. The research used the arithmetic mean to determine the level of compliance for the six categories used by the researcher in the questionnaire. The level of compliance was assessed through the Likert scale.

In order to determine the statistical dependence and the relationship of unionization to radiation safety compliance, the study used the t-test for the independent variable. According to Lee (2013), the t-test compares the average values of a characteristic measured on a continuous scale between two subgroups of a categorical variable. The t-crit value used for the study is 1.994. This means that a higher t value would denote a level of significance in the relationship of variables. The p-value reference used is less than 0.05. A lower p-value would denote significance.

## Results

### Responsibility of safety

In the first part of the questionnaire, the items asked about the

	Unionized	Non-unionized
The institution establishes and maintains the necessary competencies in running a radiation facility	3.64	3.72
The institution provides adequate training and information on advancements and new techniques on the usage of the machines (trainings, seminars, visits from the manufacturers, demonstrations)	3.34	3.4
The institution establishes procedures and arrangements to maintain safety in all conditions	3.55	3.64
The institution verifies appropriate design and the adequate quality of facilities and activities and of their associated equipment	3.51	3.48
The institution ensures the safe control of all radioactive material that is used, produced, stored or transported	3.51	3.52
The institution ensures the safe control of all radioactive waste that is generated if applicable	3.34	3.64

**Table 1:** Perception on Institutions' Responsibility of Safety.

	Mean (sd)	t value	p value	Interpretation
Unionized	20.89 (3)	-0.76	0.453	Not significant
Non-unionized	21.4 (2.04)			

Note: L=0.05 t crit.=1.994; p=0.000 be significant

**Table 2:** Summary of Respondents' Perception on Institutions'. Responsibility of Safety.

responsibility of safety of the respective institutions of the respondents with regards to radiation.

In the Table 1, both the unionized and non-unionized group scored the highest mean in item number one (3.64 and 3.72 respectively) which states that: The institution establishes and maintains the necessary competencies in running a radiation facility. Both groups of respondents (unionized and non-unionized) verbalized that the institutions they work for only accept employees with licenses to perform duties of their specific profession. The Department of Health also mandated that licenses must be asked for employees in the medical industry; thus, justifying the high score for the particular item in the questionnaire.

Item number two got the lowest scores from both group of respondents (3.34 for unionized and 3.4 for non-unionized). The item deals with the provision of adequate trainings and information on advancement concerning radiation safety by the institution. Some respondents verbalized that although their institutions conduct trainings, consistency is not duly met. The same respondents explained that the lack of budget and time is the primary reason for the inconsistencies in trainings and information advancement in their institutions.

Table 2 suggests that the mean of the responses from the non-unionized group (21.4) is higher than the responses from the unionized group (20.89). The t value and p value (-0.76 and 0.453 respectively) place far enough from the reference point to denote any significance. Therefore, the result shows that the unions have no significant influence in the responsibilities for safety in radiation hazards. The respondents pointed out that the unions are not really that focused in the aspect of occupational safety; thus, supporting the conclusion of insignificance in the influence of labor unions in the responsibilities for safety in radiation-hazard areas.

A number of complaints were encountered specifically from the respondents for the unionized group while conducting the survey. Most of the workers expressed dissatisfaction with the efforts of their unions. On another note, the respondents for the non-unionized group showed contentment with what management is giving them.

The non-unionized group gave higher rating of approval for their company in terms of responsibility of safety, since verbalized dissatisfaction was seen in the unionized group. From the unstructured interviews that the researcher conducted, the non-unionized group felt more secured in their employers' initiative on their safety with regards to radiation. The researcher also observed a more collective response from the non-unionized group despite their various affiliations. The scenario was opposite in the unionized group. Respondents from this group claimed that the labor union in their institutions does not do anything for their safety. The initiative of the union officials for the constituents' safety was also questioned.

According to the fundamental safety principles of the IAEA, the prime responsibility of safety must rest with the person or organization responsible for facilities and activities that gives rise to radiation hazards, in this case the hospital management.

### Leadership and management of safety

The second part of the questionnaire deals with the leadership and management of safety. The principles of the IAEA state that the management for safety and effective leadership are necessary for facilities and organizations that have radiation risks.

	Unionized	Non-unionized
“There is individual and collective commitment to safety on the part of the leadership, the management and personnel at all levels” (policies regarding radiation safety is promulgated throughout the institution)	3.38	3.4
“There is accountability of organizations and of individuals at all levels for safety” (point persons for emergency situation like spills, radiation leaks, power failures, etc.)	3.26	3.56
“The institution encourages a questioning and learning attitude and to discourage complacency with regard to safety.” (open communication with management on improvements of radiation safety for the personnel as well as for the patient)	3.26	3.24

**Table 3:** Perception on Institutions' Leadership and Management of Safety.

	Mean (sd)	t value	p value	Interpretation
Unionized	9.89 (1.53)	-0.75	0.456	Not significant
Non-unionized	10.2 (1.71)			

**Table 4:** Summary of Respondents' Perception on Institutions'. Leadership and Management of Safety.

Note: L=0.05 t crit.=1.994; p=0.000 be significant.

	Unionized	Non-unionized
There is a strong clinical judgment of the institution for the usage of radiation for patients whether for diagnostic or therapeutic intent (proper assessment of the benefit and the risk of radiation exposure)	3.40	3.48

**Table 5a:** Perception on Institutions' Justification of Facilities and Activities.

	Mean (sd)	t value	p value	Interpretation
Unionized	3.4 (.59)	-0.47	0.639	Not significant
Non-unionized	3.48 (.68)			

**Table 5b:** Summary of Respondents' Perception on Institutions'. Justification of Facilities and Activities.

Note: L=0.05 t crit.=1.994; p=0.000 be significant

	Unionized	Non-unionized
“The institution provides the highest level of safety that can reasonably be achieved throughout the lifetime of the facility or activity, without unduly limiting its utilization.”	3.34	3.24
“The institution periodically assesses if there is radiation risk through the facility”	3.28	3.36

**Table 6a:** Perception on Institutions' Optimization of Protection.

Principles included in this part are collective and individual commitment to safety, accountability and development of a learning attitude in regards to radiation safety.

Table 3 denotes the means of the respondents for each question in the category. The unionized group had the highest mean in item number one (3.38) about the presence of a collective and individual commitment for safety. From the unstructured interviews, the researcher found out that the respondents from the unionized group felt their unions gave out some sense of social responsibility to foster commitment, although consistency was still an issue. The union members felt that the officials were not that committed in the promulgation of safety.

The non-unionized group, on the other hand, got the highest score for item number two (3.56) – accountability for all levels of safety. The respondents from the non-unionized group verbalized that their institutions have an organized system of point persons for emergency

situations. The unionized group asserted that the same is true for their institutions.

On questioning or a learning attitude in regards to safety, both parties showed a low score (3.26 for unionized and 3.24 for non-unionized). Both groups felt that their institutions do not want them to question and complain about their existing policies.

Table 4 indicates that the mean of the responses from the non-unionized group (10.2) is higher as compared with the unionized group (9.89). It is also shown that the t value and p value (-0.75 and 0.456 respectively) are very far from the reference point to denote any significance. Thus, the unions have no significant influence in leadership and management of safety.

### Justification of facilities and activities

The third part of the questionnaire deals with the activities of the institution in the usage of radiation. All concerned parties must have an overall benefit from the usage of radiation.

The principle included in this part is the capability of the institution to deliver radiation with the best intent and overall greater benefit to the patient.

It is seen in Tables 5a and 5b that the mean of the responses from the non-unionized group (3.48) is higher as compared to the unionized group (3.4). The t value and p value (-0.47 and 0.639) are very far from the reference point to denote any significance. Hence, the unions have no significant influence in the justification of facilities and activities for radiation safety. A reason why unions seem to have no significant influence in aspects of radiation safety is the fact that some of the officials are not that knowledgeable in the principles of the correct and proper usage of radiation in the hospital.

The non-unionized group still maintained a higher score in this category. The non-unionized group verbalized in the unstructured interviews that their institutions do practice policies on optimization of radiation exposure. Collimation and shielding are performed in their institutions for protection from radiation exposure. The unionized group practices the same. The disparity of scores despite having similar perceptions on optimization of radiation usage can be attributed to the dissatisfaction of employees with their unions.

### Optimization of protection

The sixth part of the questionnaire discusses the monetary and non-monetary compensation of workers exposed in radiation areas as recommended by the Magna Carta of Public Health Care Workers and the Labor Code of the Philippines.

Included in this part are questions regarding medical benefits and assistance for workers exposed, additional compensation and proper education.

Table's 6a-6e shows that the lowest score for both unionized and non-unionized groups was in item number one (2.53 and 2.76 respectively). This question tackles the adequacy of monetary compensation to radiation workers. All respondents argued and verbalized that their hazard pay and compensation is low given their type of work.

The highest score for the unionized group was obtained for item number six (3.11) which deals with the institutions regularly updating their safety principles. The respondents from this particular group were aware of the safety updates although the time line and interval of these updates were not clear (Table 6e).

	Mean (sd)	t value	p value	Interpretation
Unionized	6.62 (1.26)	0.057	0.995	Not significant
Non-unionized	6.6 (1.118)			

**Table 6b:** Summary of Respondents' Perception on Institutions' Optimization of Protection.

Note: L=0.05 t crit.=1.994; p=0.000 be significant.

	Unionized	Non-unionized
"The institution has initiatives to prevent the occurrence of failures or abnormal conditions (including breaches of security) that could lead to such a loss of control"	3.47	3.28
"The institution has initiatives to prevent the escalation of any such failures or abnormal conditions that do occur"	3.40	3.28
"The institution has initiatives to prevent the loss of, or the loss of control over, a radioactive source or other source of radiation"	3.30	3.28

**Table 6c:** Perception on Institutions' Prevention of Accidents.

	Mean (sd)	t value	p value	Interpretation
Unionized	10.17 (1.749)	0.763	0.488	Not significant
Non-unionized	9.84 (1.748)			

**Table 6d:** Summary of Respondents' Perception on Institutions'. Prevention of Accidents.

Note: L=0.05 t crit.=1.994; p=0.000 be significant

	Unionized	Non-unionized
Additional compensation is adequate for the radiation workers	2.53	2.76
Provision of medical assistance for radiation workers is adequate	2.91	2.96
Medical personnel for radiation workers are visible and utilized	3.09	3.24
Appropriate regulatory laws are followed by the company	3.00	3.48
Adequacy of safety programs of the institution	3.09	3.32
Institution regularly updates the safety principles for radiation	3.11	3.36

**Table 6e:** Perception on Institutions' Compensation and Benefits of Workers.

	Mean (sd)	t value	p value	Interpretation
Unionized	17.72 (3.49)	-1.511	0.135	Not significant
Non-unionized	19.12 (4.17)			

**Table 7:** Summary of Respondents' Perception on Institutions'. Compensation and Benefits of Workers

Note: L=0.05 t crit.=1.994; p=0.000 be significant

The non-unionized group scored highest in item number four (3.48) about the adherence of the institution to regulatory laws. They said that it is their highest because their institutions adhere to the laws quite effectively since they regularly obtain licenses to operate. The unionized also verbalized this but their scores are lower (Table 6e).

The summary of the mean obtained by the two groups shows that the non-unionized group (19.12) scored higher than the unionized group (17.72). It is also shown that the t value and p value (-1.511 and 0.135) are very far from the reference point to denote any significance. Hence, the unions have no significant influence in the compensation and benefits of workers (Table 7).

Many of the respondents from the unionized group expressed collective discontent with their respective labor unions while answering the last part of the survey. This provides justification on the low scores given by the respondents from the unionized group. The respondents

were dissatisfied with what the unions gave them. They even narrated their complaints to the researcher.

The non-unionized group, however, showed to be more supportive to their institutions. The respondents from this group verbalized little complaints despite having no labor union for representation.

With regards to compensation, both groups of respondents expressed a need for an increase in monetary compensation. Furthermore, all respondents agreed that there should be a standardized system for it.

### Summary of results

Table 8 shows a summary of all items answered by the respondents. However, given the statistical determinants earlier stated in the study (L=0.05 t crit.=1.994; p=0.000 be significant), the data show that no aspect of compliance has a significant influence on the presence of labor unions.

The data showed that out of the six categories the researcher used for determining radiation safety compliance, the non-unionized group scored higher in four categories, namely: Responsibility of Safety (21.4), Leadership and Management of Safety (10.2), Justification of Facilities and Activities (3.48), and Compensation and Benefits of Workers (19.12) (Table 8).

The data also revealed that in comparison with non-unionized institutions, the presence of a labor union does not have any direct effect on radiation safety and compliance. This result is quite contradictory to the researcher's original hypothesis that unions have a greater and positive effect in terms of radiation safety.

### Summary

The research sought to determine the influence of having labor unions in medical institutions to their compliance to radiation safety principles. The study based the principles from the handbook of the IAEA. Given from the results of the data gathered from the survey to four unionized and three unionized hospitals in the Metro Manila area with bed capacity of 150 and above, the study found that the non-unionized group scored higher in four principles of compliance, namely: Responsibility for Safety, Leadership and Management of Safety, Justification of Facilities and Activities, and Compensation and Benefits of Workers. The unionized group, on the other hand, scored higher in the two remaining categories: Optimization of Protection and Prevention of Accidents. The statistical treatment of the data obtained from the survey showed that there was no computed evidence of any significance with the presence of a labor union with regards to an institution's compliance to radiation safety following the principles of the IEAE [31,32].

Categories	Unionized Mean (sd)	Non-unionized Mean (sd)	t value	p value
Responsibility for Safety	20.89 (3)	21.4 (2.04)	-0.76	0.453
Leadership and Management of Safety	9.89 (1.53)	10.2 (1.71)	-0.75	0.456
Justification of Facilities and Activities	3.4 (0.59)	3.48 (0.68)	-0.47	0.639
Optimization of Protection	6.62 (1.26)	6.6 (1.118)	0.057	0.995
Prevention of Accidents	10.17 (1.749)	9.84 (1.748)	0.763	0.488
Compensation and Benefits of Workers	17.72 (3.49)	19.12 (4.17)	-1.511	0.135

**Table 8:** Comparison of Respondents' Perceptions on Six Principles of Radiation Safety.

Note: L=0.05 t crit.=1.994; p=0.000 be significant.

## Conclusion

Based on the data obtained by the researcher, the existence of labor unions does not have a direct influence on the compliance of medical institutions to radiation safety principles. The unionized group scored higher in only two out of six categories, leaving the majority of the items to the non-unionized group. In terms of responsibility of safety, leadership and management of safety, justification of activities and facilities, and compensation and benefits of workers, the non-unionized group has higher satisfaction.

Dissatisfaction existed in the unionized group evident in the answers of respondents while answering the questionnaire. This has greatly affected the assessment of the respondents of their institution's labor unions negatively.

## Recommendations

### For radiation safety

The results of the study should serve as a wake-up call for hospital managements and unions. For the management of medical establishments, the effort for the promotion of safety and its implementation must be continued and improved periodically to ensure maximum safety for all concerned. For the labor unions, a more proactive approach on safety is needed. The visibility of programs for safety promotion as well as a better understanding of radiation hazards is expected by the members from the unions. Moreover, unions should understand that promotion of safety for the employees is as much priority as clamoring for additional compensation and benefits [25].

Since one of the lowest scores in the questionnaire for both the unionized and the non-unionized is about training and education on technological advancements, union officials can collaborate with the management and with the radiation health safety officers to institute educational programs for the workers. Seminars or workshops on how to maximize radiation usage and protection can be a program of the union to instill a culture of safety to those exposed in these areas.

Another low score in the questionnaire is the one about the monetary compensation of the workers exposed in these areas. Unions greatly aid in this aspect through arranging collaborations with the administration to increase the value given to workers exposed in radiation areas. Proper explanation of the risks and hazards faced by the workers can help increase the value received by the workers.

### For future studies

The focus of this study is primarily on the hazards of radiation exposure of those working in the hospital. Other hazards such as biological hazards are not part of the study. If future researchers would do a similar type of study, a different tool would be recommended if they are to examine other aspects of occupational hazards. Due to the sensitivity of the nature of the topic, the researcher encountered a lot of hindrances in the collection of data. As stated in the research impediments of the study, some hospitals declined to participate and respondents were hesitant in answering. For future researchers, a higher number of respondents and hospitals will be of more value and could produce more pronounced results. Inclusion of areas with more advanced and specialized use for radiation such as cardiac catheterization labs, linear accelerator or cobalt facilities and nuclear medicine may be included so as to increase the sample size of the research. Furthermore, this study focused on private institutions. Other researchers may include public hospitals to determine the status of radiation safety in those institutions [29,30].

## References

1. DiBenedetto DV (1995) Occupational Hazards of the Health Care Industry: Protecting Health Care Workers. *AAOHN Journal* 43: 3.
2. William Patterson MDDC (1985) Occupational Hazard to Hospital Personnel. *Annals of Internal Medicine*.
3. International Atomic Energy Agency (2012) Nuclear Safety and Security.
4. (2012) World Health Organization.
5. Anita Marie Slechta MR (2008) An Examination of Factors Related To Radiation Protection Practices. *Radiologic Technology*.
6. Friberg EG, AW (2011) Level of Compliance with the Radiation Protection Regulation - A survey Among Norwegian Hospitals and X-ray Institutes. *Radiation Protection Dosimetry*.
7. Frege jg (2013) labor unions, alternative forms of representation, and the exercise of authority relations in u.s. workplaces. Cornell university.
8. Kwan Hyung Yi, Hm Hak Cho, Jiyun Kim (2011) An Empirical Analysis on Labor Unions and Occupational Safety and Health Committees' Activity, and Their Relation to the Changes in Occupational Injury and Illness Rate. *Safety and Health at Work*.
9. Prentice EM (2010) Did lower unionization in the united states result in more flexible industries? *Industrial and Labor Relations Review*.
10. Abolade DA (2012) Impact of Unionisation and Non-Unionisation of Workers on Organisational Efficiency in Work Organisations in Southwestern Nigeria.
11. (1976) US Industries VS Director: Claim vs. Condition in the Analysis of Worker's Compensation Cases American. *Journal of Law and Medicine*.
12. (2002) IAEA Safety Standards Series. International Atomic Energy Agency.
13. (2010) Governmental, legal and regulatory framework for safety. International atomic energy agency.
14. Tsalafoutas AP (2006) Excessive leakage radiation measured on two mobile X-ray units due to the methodology used by the manufacturer to calculate and specify the required tube shielding. *The British Journal of Radiology*.
15. Almen LA (1988) Absorbed Dos to Technicians Working at Accelerators for Radiation Therapy. Department of Radiation Physics Malmo.
16. Agency IA (2006) IAEA Safety Standards for protecting people and the environment; Fundamental Safety Principles.
17. Bertam D Likert Scales are the Meaning of Life.
18. Castano MC, Retirement Plans of Educational Institutions in the University Belt - Manila.
19. Center for Disease Control and Prevention - Workplace safety and Health Topics.
20. Cherie Dewar B (2013) Occupational Radiation Safety. ASRT Essential Education.
21. Eugene CLM (2010) Radiation Risk from Medical Imaging. *Mayo Clinic Proceedings* 85: 1142-1146.
22. Gidotti AY (1990) Occupational Health Services for Hospital Workers: Who Does it Best? 3: 20-22.
23. Janet Thompson Reagan PA (2010) Factors Related to Radiation Safety Practices in California. *Radiologic technology*.
24. Jean E Cromie VR (2003) Physical Therapists Who Claimed Workers' Compensation: A Qualitative Study. *Physical Therapy*.
25. Johnson B (2008) Educational research: Quantitative, qualitative.
26. Kanchan P, Adhikari LJ (2012) Status of radiation protection at different hospitals in Nepal. *Journal of Medical Physics* 37: 240.
27. Kristin Shrader-Frechette P (2007) Trimming Exposure Data, Putting Radiation Workers at Risk: Improving Disclosure and Consent Through a National Radiation Dose-Registry. *American Journal of Public Health*.
28. Marianne Parker Brown M (1979) Hazards in the Hospital: Educating the Workforce through its Union. *American Journal of Public Health*.

29. Morantz A (2013) *Coal Mine Safety: Do Unions Make a Difference*. Cornell University.
30. Patricia M, Shields, NR (2013) *A Playbook for Research Methods: Integrating Conceptual Frameworks and Project Management*. New Forums Press.
31. Aleksanin NS (2011) How cytogenetical methods help victims prove radiation exposure and claim right for social support: NCERM experience.
32. Sean E, Rogers AE (2013) *Effects of Unionization on Graduate Student Employees: Faculty Student Relations, Academic Freedom and Pay*. Cornell University.