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# Organizational Safety Culture and Quality Improvement Implementation among Radiology Staff of Hospitals in Southern Mindanao, Philippines

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*Abstract –High-risk radiology departments require adequate quality assurance and quality control measures to prevent exposure to unnecessary radiation, thereby minimizing radiation-induced effects such as cancer and cataract. Research into the determinants of successful quality management suggests that one crucial factor is organizational safety culture. However, investigations on corporate safety culture and quality improvement implementation are few and far between in the Philippine context. Hence, this study aimed to determine the relationship between organizational safety culture and quality improvement implementation from the viewpoint of radiology staff. In this descriptive-correlational study, all of the 247 radiology staff affiliated in six level-3 hospitals in Southern Mindanao, Philippines, were selected to answer the questionnaire composed of scales on organizational safety culture and quality improvement implementation. The data were analyzed using mean and Spearman rank-order correlation. The overall organization safety culture and its four variables, as well as the total quality improvement implementation and its three variables gained almost a similar mean score with a moderate verbal description. The organizational safety culture and all of its variables positively correlate with quality improvement implementation. The results of the study may help the health policy-makers and administrators in the formulation of quality measures in the high-risk radiology area by fostering practices that may improve the safety culture of the organization. Organizational commitment to safety practices, the involvement of management in the implementation of safety culture, and adequate reporting and reward systems, according to the study, may enhance the quality improvement implementation.*

*Keywords –Hospital management, Organizational safety culture, Philippines, Quality improvement management, Radiology department*

## INTRODUCTION

The rapid development of healthcare technology has fundamentally changed the nature of work in the hospital and has surged the intricacy of systems within a variety of medical institution departments [1], [2]. Among these complex systems are those commonly known as high-risk systems. Catastrophic breakdowns of these systems pose serious threats, not only for those within the organization but also for the surrounding public [3].

The radiology department is one of the high-risk areas in the hospital [4]. It encompasses a wide range of machines that emit radiation to diagnose and treat pathological conditions. While radiation is known for its medical applications, several studies reported that its unsafe use induced cancer, cataracts, life-span shortening, and genetic mutations [5]-[7]. To control

these daunting effects, quality specialists in the hospital formulated quality assurance and quality control measures. These measures ensure that radiological equipment is working within acceptable limits [8].

Despite the efforts to improve the quality of services, quality improvement initiatives during the past two decades have had varying success [9]. The present approaches to quality management are costly, incomplete, and time-consuming[10]. Moreover, the tasks required are data-intensive and voluminous. The study further revealed that the challenges were laid for the people and not for the machines. Due to fluctuating quality management practices, diagnostic errors in radiographic interpretations of plain radiographic, as well as computed tomography, magnetic resonance, ultrasound, and radionuclide images, hovered in the 30% range [11]. Moreover, some hospitals reported a

significantly higher repeat rate of radiographic films [12]-[16]. This repeat significantly increased the risk of radiation-induced effects on patients.

In the Philippines, inadequate healthcare quality initiatives led to the prevalence of medical errors. A retrospective chart review study conducted in the Philippine General Hospital reported a 97.8% prevalence of medication error in the Pediatric and Medicine departments [17]. This error accounts for one-third of preventable drug-related harm and is the eighth leading cause of death with more than 98,000 mortality annually, exceeded those from car accidents, breast cancer, or AIDS [18].

With these problems, quality improvement in the healthcare industry, especially in the radiology area, is worthwhile to investigate. Research into the determinants of successful practice of quality management suggests that one crucial factor is organizational safety culture [9], [19]. An understanding of the safety culture components is crucial in developing quality practices in primary care institutions [20]. In the same vein, safety culture helps healthcare organizations to evaluate areas for enhancement and analyze variations over time [21].

While a handful of previous studies linked organizational safety culture to quality improvement implementation, there is a lack of research which focuses on the radiology department of medical hospitals. Moreover, in the Philippines, particularly in Southern area, investigations on organizational safety culture and quality improvement implementation are few and far between. Hence, this study was geared towards knowing the relationship between organizational safety culture and quality improvement implementation among radiology staff in hospitals in Southern Mindanao, Philippines. The findings of the study may be used as a reference for policies to improve the overall safety and to offer quality patient care continually.

## OBJECTIVES OF THE STUDY

The present study examined the relationship between organizational safety culture and quality improvement implementation among radiology staff of hospitals in Southern Mindanao, Philippines.

Specifically, it aimed to describe the levels of organizational safety culture and quality improvement implementation among the respondents and to determine if there is a significant relationship between the variables of the study.

## MATERIALS AND METHODS

This study utilized a descriptive-correlational research design to determine the relationship between the independent variable, which is the organizational safety culture, and the dependent variable, which is the quality improvement implementation. The study was conducted among radiology departments of six level-3 hospitals in Southern Mindanao, Philippines. Hospitals A and B are public hospitals located at Davao Region, with an approximate bed capacity of 1,500, and 1,000, respectively. Hospitals C, D, E, and F are private hospitals located at Davao City, with an approximate bed capacity of 200, 250, 85, and 295, respectively. These hospitals were chosen as research settings because of its departmentalized organizational structure.

The researcher utilized a complete enumeration sampling technique because of the small population of radiology staff in Southern Mindanao, Philippines. The method was also used to increase the power of the hypotheses test. The respondents of the study were the 247 rank and file employees of the radiology departments of the target setting. The employees at the managerial level were excluded.

## Measures

The study utilized researcher-made and adapted questionnaire to gather data based on objective statements. The survey composed of two parts. The first part sought to know the level of the organizational safety culture of the respondents. This part consisted of 20 items that are used to elicit data on organizational commitment, management involvement, rewards system, and reporting system of the respondents. Each item was rated on a five-point Likert scale, with '5' being the highest and '1' being the lowest.

The second part of the questionnaire sought to determine the level of quality improvement implementation. This scale was an adaptation of the Quality Improvement Implementation Tool used by Shortell, O'Brien [22]. The leadership, employee quality planning involvement, and customer satisfaction scales had a Cronbach's alpha of 0.93, 0.87, and 0.87, respectively. This indicates that the scales have high internal consistency. To fit the particular departments, practice and terminology, minor modifications were made to the questionnaire. The 27-item survey was rated on a five-point Likert scale with '5' being the highest and '1' being the lowest.

The questionnaire was pilot tested to account for the internal consistency of the final instrument. The overall Cronbach's alpha for the scale was 0.96 (0.94

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for organizational safety culture and 0.93 for quality improvement implementation), which is deemed to be adequate [23].

Before the administration of the questionnaire, written informed consent was obtained from the respondents. Respondents were fully aware that the survey responses from the study will be usedexclusively for the results of the research. Furthermore, the respondents were given the autonomy to answer the items in the survey questionnaires.All of the responses and nameswere kept confidential.

## Data Analysis

Descriptive and inferential statistics were used to analyze the data. Mean was used to determine the level of organizational safety culture and quality improvement implementation of the respondents. Spearman rank-order correlation was used to determine if there is a significant relationship between the organizational safety culture and quality improvement implementation of the respondents after one of the assumptions for running a parametric test, which is normality, was not satisfied. A *p*-value <0.05 was considered as statistically significant. The data were analyzed using the trial SPSS version 23.0 software package. The given scale was used to interpret the result of the level of organizational safety culture and Quality Improvement Implementation: 4.20-5.00=Very High; 3.40-4.19=High; 2.60-3.39=Moderate; 1.80-2.59=Low; 1.00-1.79=Very Low

## RESULTS AND DISCUSSION

Table 1. Level of Organizational Safety Culture

| Variables | Mean | Verbal Description |
|---|---|---|
| 1. Organizational commitment | 2.97 | Moderate[a] |
| 2. Management involvement | 2.98 | Moderate[a] |
| 3. Rewards system | 3.00 | Moderate[a] |
| 4. Reporting system | 2.95 | Moderate[a] |
| Overall Mean | 2.97 | Moderate[a] |

Table 1 presents the mean and verbal description of organizational safety culture and its four variables. The safety culture within an organization refers to the engrained attitudes, values, opinions, and norms that a particular group of people share with respect to risk and safety.As seen, the overall organization safety cultureobtained a mean score of 2.97 with a moderate verbal description. Overall, this implies that the employees of the radiology departments sometimes observe safety culture.

In particular, the organizational commitment, management involvement, rewards system, and reporting system dimensionsobtained a mean score of 2.97, 2.98, 3.00, and 2.95, respectively, with a descriptive equivalent of moderate. This means that the employees of the radiology departments are sometimes committed to promoting the safety of all the operations in the department. This also implies that the management sometimes communicates their employees the safety practices as the guiding principle of the organization, andsometimes formulates rewards system for compliant employees.

Within the context of safety culture, organizational commitment is reflected by the effort put forth by the employees in guaranteeing that every aspect of its procedures, processes, and machinery, are regularly monitored, and properly controlled.Thus, a committed approach of the employees can lead to an increased drive to cause a change, to go above and beyond the call of duty for organizational safety, and to take the accountability of ensuring safety operations [24]. This is especially vital in radiology hospital departments as the employees deal with high-risk machines and operations and any uncommitted action to safety procedures may lead to an inadvertent exposure to radiation.

The involvement of management has emerged as a significant construct in researches about safety.Thus, it is reflected in the ability of the supervisors to consistently promote safety across all levels in the organization through conducting safety seminars and training, close monitoring of operations, and clear communication among safety issues within the organization. With this, safety activities are developed and well implemented. The leaders' monitoring of safety practices in the organization was positively related to employees' safety compliance [25]. Also, leaders' encouragement of safety-related learning was positively associated with employees' safety participation [26]. In relation to the present study, these findings imply that leaders' behavior towards safety has a positive influence on the performance of the employees in an organization. Thus, the leaders' empowerment could generate higher safety compliance behaviors even among highly risky workers in radiology departments of medical facilities.

Moreover, supervisors are significant drivers of safety compliance and safety participation among employees in the workplace. A previous report [27]found that employees observed safety procedures when their supervisors are perceived as fair and

submissive to the organization's rules on safety. In relation to the present study, this finding posited that the supervisors' behavior on the implementation of safety practices resonates a compliant behavior among the employees within the organization, especially in the frontline hospital workers such as those in the radiology department.

One measure an organization used to improve safety is the use of incentives. A handful of studies have been carried out linking the rewards system to the over-all safety culture of the organization. The companies with safety incentive program had low incidence of work-related injuries and experienced improvement in safety practices [28].

In a previousreport [29], bonus systems may be used to encourage employees to perform safety acts. Moreover, safety behaviors were observed as the incentives were linked to the overall safety performance. However, one finding showed that the rewards system's effect on safety behavior depends on system-employee factors. These factors include the different perceptions of employees to the bonus system, poor link between organization's deliverables and reward, and the lack of employees' possibilities to engage in the system created by the managing body. Nevertheless, rewards system was observed to greatly influence the safety practices of the employees. In the context of the present study, the respondents believed that the management sometimes formulates rewards system for compliant employees. An effective rewards system pertaining to safety act compliance among the employees in the radiology department isthus of paramount importance to increase safety performance, thereby, decreasing the rate of medical errors suchas but not limited to unnecessary radiation exposure to patients and workers, radiographing the wrong patient, and performing different radiographic procedures.

A reporting culture is one of the basic elements of a safety culture. In the study, the respondents believed that the organization sometimes adhere to the guidelines pertaining to monitoring and reporting unsafe actions and procedures in the radiology department. This in turn has significant drawback in the safety of the patients because an effective reporting system is the keystone to recognizing the vulnerability and weaknesses of a safety management program before an accident occurs. The system is critical especially in the healthcare organization, where patients are dealt with utmost care.

The medical organization uses incident reporting to disclose near misses and unintended injuries committed by a health professional or healthcare system [30].

Another report [31] found that event reporting was a significant predictor of patient safety culture. A qualitative study revealed that the managers of selected hospital institutions found incident reporting helpful in classifying problems related to patient safety, and had no intention to abandon the practice [32].In light of the risky nature of the radiology department, the incident reporting system is instrumental in the mitigation of radiation accidents and other untoward complications during any radiographic procedures.

Table 2. Level of Quality Improvement Implementation

| Variables | Mean | Verbal Description |
|---|---|---|
| 1. Leadership | 2.90 | Moderate[a] |
| 2. Employee quality planning involvement | 2.88 | Moderate[a] |
| 3. Customer satisfaction | 2.88 | Moderate[a] |
| Overall Mean | 2.89 | Moderate[a] |

Table 2 presents the mean and verbal description of quality improvement implementation and its three variables. The quality management program aims to mitigate or control the variability in both human and equipment factors within an organization. In the context of the radiology healthcare organization, the program is implemented to avoid subquality images and repeat exposures that may increase the patient dose [33].As seen, the overall quality improvement implementation obtained a mean score of 2.89 with a moderate verbal description. Overall, this implies that the employees of the radiology departments sometimesimplement quality improvement practices.

In particular, the leadership, employee quality planning involvement, and customer satisfaction dimensions obtained a mean score of 2.90, 2.88, and 2.88, respectively, with a descriptive equivalent of moderate. This means that the employees of the radiology departments sometimesbelieve that theirleaders are instrumental in improving the quality of services given to the customers. This also implies that the employees are sometimes involved in the quality planning process of the organization.

Based on the previous study [34], the change management concepts, which include leadership skills, facilitated quality improvement in an organization. Also, competent and passionate leadership is an essential and indispensable action of successful transformative efforts to enable quality management change in an organization [35]. This trait is especially true for the leaders in the healthcare industry, who work to achieve the highest quality patient care.

Table 3. Correlation Between Organizational Safety Culture and Quality Improvement Implementation

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Organizational commitment | - | | | | | | | | |
| 2. Management involvement | .67** | - | | | | | | | |
| 3. Rewards system | .70** | .70** | - | | | | | | |
| 4. Reporting system | .73** | .67** | .72** | - | | | | | |
| 5. Organizational safety culture | .84** | .82** | .87** | .84** | - | | | | |
| 6. Leadership | .70** | .68** | .68** | .72** | .70** | - | | | |
| 7. Employee quality planning involvement | .68** | .67** | .67** | .68** | .66** | .67** | - | | |
| 8. Customer satisfaction | .66** | .70** | .62** | .68** | .62** | .69** | .65** | - | |
| 9. Quality improvement implementation | .67** | .67** | .62** | .68** | .62** | .86** | .83** | .86** | - |

*\*\*p<0.01.*

Aside from these skills, long-term commitment of leaders in the implementation of quality improvement methods is critical in nourishing the quality management programs [36].

In the context of the hospital administration, especially in the radiology area, the support and engagement of senior management arethus the prime factors associated with high quality outcomes and the success of quality improvement programs.

Likewise, collective learning in the context of quality improvement required leadership that strengthens learning through behaviours and strategies that affect people [37]. These include building trust and coaching among members of the organization. In the context of the present study, leadership plays a vital role in upholding a supportive learning environment, thereby, fortifying the quality improvement practices among the employees in the radiology department where strict quality assurance and quality control protocols are followed.

The empowerment and involvement of employees are crucial to quality continuous improvement, since employees focused and involved in their job are in the best position to make decisions over processes development. Based on a survey [38], quality training and development, and employees' involvement are the key factors for the successful implementation of total quality management. On the other hand, lack of involvement, commitment and awareness of the employees was the primary barrier to total quality management practice in Turkey [39].Moreover, the employee involvement through employee training, empowerment, communication and recognition and rewards positively influenced the implementation of continuous quality improvement [40]. The extent to which employees of an organization are provided adequate training and education for quality improvement efforts, in turn, had a positive impact on the overall quality improvement implementation of the organization. Adoption of these policies in the radiology department is thus crucial in the attainment of high-qualityradiographic images with optimal diagnostic value.

Spearman rank-order correlation was applied to explore the strength of the relationship between organizational safety culture and quality improvement implementation. As shown in Table 3, organizational safety culture and all of its variables positively correlate with quality improvement implementation (*p*<0.01).Overall, there is a significant positive relationship between organizational safety culture and quality improvement implementation among the employees of the radiology departments. This implies that when the employees practice safety procedures in the radiology department, there would be an efficient implementation of quality improvementin the organization.

Congruent with the previous studies conducted in various healthcare and non-healthcare organizations [20], [41], organizational safety culture was positively related to quality improvement implementation. With the given result, one could argue that quality improvement implementation in the radiology department may likely increase if the staff practice a safe culture.

An understanding of the safety culture is significant in improving the erroneous attitudes and practices such as adverse events, miscommunication, and non-punitive response to mistakes, which can lead to the development of quality implementation in the primary care institutions [20]. Similarly, the safety culture measurement in primary care can aid in the identification of areas for improvement, which may cause adverse errors and events. This finding is also supported by a previous study [21], which reported that safety culture helps healthcare organizations to evaluate

areas for enhancement and analyze variations over time. In the radiology department where there is a continuous monitoring of the safe and unsafe practices among the employees especially during the conduct of medical procedures, a quality improvement implementation assessment in the form of customer satisfaction checklist is utilized as gauge for analyzing whether a specific practice is effective or not. When this reporting system is constantly implemented, the radiology department employees opt to practice safe procedures.

It is worthwhile to discuss that the four variables of organizational safety culture were significantly associated with quality improvement implementation. Congruent to the findings of a previous study [20], two of the variables of organizational safety culture used in this study, rewards system and reporting system, were significant in the development of quality implementation in the primary care institutions.This implies that adequate incentive system to employees who are compliant in performing safe procedures would result to effective and efficient implementation of quality assurance and quality control programs. Similarly, anadministration that observes proper channelling of incident reports and correct monitoring of medical errors, would substantially improve quality management.

It was noted in a previous report[41] that there are seven other dimensions of safety culture that greatly influenced the quality accreditation, apart from the four variables mentioned in the study. These are leadership skills in terms of safe practice support from the management, existing processes that enshrine patient safety, resources of protection such as training and staffing, organizationcollaboration, improving systems, staff characteristics, and awareness of patient safety.

A previous report [42] identified the most critical quality and safety culture drivers among Saudi Arabian hospital managers. The results concurred to the findings of the present study which showed that among the determinants, reporting system in the form of communication quality and error feedback had the strongest impact on fostering quality and safety culture. It can be gleaned that an effective reporting system is vital in the attainment of quality assurance checks in an organization especially those that are involved in risky operations such as the radiology department of hospital.

Results of the same study [41] also showed that because of fears for possible disciplinary responses to job errors, hospital employees were hesitant to report mistakes. The results imply that to achieve a sound healthcare quality culture, managers need to implement corrective actions to ensure relevant and prompt error feedback. It is also noteworthy to mention that clear and open communication, as well as continuous improvement of processes and systems, is essential in carrying out the whole quality improvement plan of the organization.

## CONCLUSION AND RECOMMENDATION

The study investigated the relationship between organizational safety culture and quality improvement implementation among radiology staff. The results revealed that the levels of organizational safety culture and quality improvement implementation were moderate. Moreover, a significant relationship existed among the dimensions of the two variables. The results of the study may help the health policy-makers and administrators in the formulation of quality measures in the high-risk radiology area by fostering practices that may improve the safety culture of the organization. Organizational commitment to safety practices, the involvement of management in the implementation of safety culture, and adequate reporting and reward systems, according to the study, may enhance the quality improvement implementation.

There are some limitations of the present study. First, this study was a cross-sectional study, and the results cannot generalize the behaviour of the respondents towards the studied variables over some time. A longitudinal study may be investigated in the future. Second, this study utilized a researcher-made questionnaire, and the findings were only limited to the respondents' perceptions of the items in the survey; hence, a qualitative exploration may be conducted to extract the themes based on the viewpoint of therespondents. Moreover, further studies may be conducted and include other hospitals in the Philippine regions to help validate the present findings.

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