INTERNATIONAL MULTIDISCIPLINARY JOURNAL OF RESEARCH FOR INNOVATION, SUSTAINABILITY AND EXCELLENCE (IMJRISE)
Online ISSN: 3028-032X | Print ISSN: 3028-0370
PUBLISHED BY: RISEJOURNALS.ORG
Volume 2, Issue no. 6 | 113

Quality Assurance in Radiologic Services

DOI: 10.5281/zenodo.15605623

Junry B. Quillano
Professor, Riverside College Incorporated, Philippines
https://orcid.org/0009-0008-9504-8328

Dr. Marianito M. Vito Jr.
Part-time Faculty, STI West Negros University, Philippines
https://orcid.org/0009-0003-6361-451X

Abstract:

This study investigated quality assurance in radiologic services in Central Philippines, examining equipment quality control, radiation safety and protection, and staff competency; the survey also sought to understand the respondents' profile in terms of age, sex, civil status, length of service, and highest educational attainment that influenced QA implementation. Using a descriptive-comparative design, data were gathered from 100 radiologic professionals in two ISO private hospitals and analyzed through statistical methods. Findings showed that quality assurance was consistently rated highly across all domains, with staff competency scoring the highest. No significant differences were found when results were grouped by profile variables, indicating uniform QA performance. The study highlights the effectiveness of standardized protocols and continuous training and recommends sustained investment in QA systems and further research on their impact on clinical outcomes.

Keywords: Radiologic Services: Equipment Quality Control; Radiation Safety and Protection; Staff Competency

Introduction:

Quality assurance (QA) in radiologic services is essential for ensuring accurate diagnostics and patient safety, especially in urban healthcare settings that rely heavily on medical imaging. However, maintaining consistent QA standards remains a challenge. The International Atomic Energy Agency (IAEA, 2021) stresses the importance of effective QA programs to ensure reliable imaging and minimize radiation exposure. In the Philippines, while many institutions follow core QA principles, inconsistencies in equipment maintenance, staff training, and adherence to global standards persist (Dimaano et al., 2021), highlighting the need for continuous professional development and standardized QA practices.

Globally, structured QA programs are gaining emphasis, with 91.7% of radiology units reporting established quality initiatives focusing on imaging appropriateness and personnel competency (Brady et al., 2021). In the Philippines, studies in Cavite and Laguna point to the importance of regular monitoring and staff training to maintain service quality (Dimaano et al., 2021). Regulatory bodies like the World Health Organization (WHO) and the Department of Health (DOH) offer frameworks to guide QA practices, but regional compliance—such as in Central Visayas—has not been thoroughly examined, indicating the need for localized assessments to address implementation gaps.

The researcher's extensive eight-year tenure as a licensed radiologic technologist at a leading hospital inspires this study. After encountering obstacles in sustaining QA standards, the researcher understands the importance of assessing and refining these existing methods. The research seeks to provide valuable recommendations by examining QA practices in radiologic services, which will assist healthcare administrators, technologists, and policymakers achieve better patient results in Central Visayas.

Current State of Knowledge

Quality assurance (QA) in radiologic services is a complex process that requires clear guidelines, interdisciplinary collaboration, and institutional support. Dick et al. (2021) found that while most countries surveyed had implemented basic quality initiatives like imaging appropriateness and disease registries, fewer had adopted advanced practices such as Lean/Kaizen methods and physician performance evaluations, highlighting the need for standardized international QA guidelines. Alanazi et al. (2022) demonstrated that a collaborative QA program at King Khaled General Hospital significantly improved image quality and patient satisfaction through teamwork across departments. Similarly, Kekana et al. (2019) emphasized challenges in South African public hospitals, including limited management support and staff training, underscoring the need for stronger institutional backing. Amurao et al. (2023) stressed the importance of distinguishing between quality management, assurance, and control to enhance radiologic practice standards. Collectively, these studies underscore the need for comprehensive frameworks, collaboration, and consistent implementation to ensure high-quality radiologic care globally.

INTERNATIONAL MULTIDISCIPLINARY JOURNAL OF RESEARCH FOR INNOVATION, SUSTAINABILITY AND EXCELLENCE (IMJRISE)
Online ISSN: 3028-032X | Print ISSN: 3028-0370
PUBLISHED BY: RISEJOURNALS.ORG
Volume 2, Issue no. 6 | 114

Echoing these international findings, several local studies in the Philippines highlight the multifaceted challenges and needs in implementing QA in radiologic services. Consejo et al. (2024) emphasized the importance of collaboration among radiologic staff and departments like biomedical engineering to ensure proper equipment maintenance and reduce imaging errors. Algara et al. (2016) reported inconsistencies in staff training and equipment upkeep in Cavite and Laguna, stressing the need for standardized procedures and continuous education. Faustino et al. (2020) noted a disconnect between QA knowledge and actual practice among technologists, while Nanquil et al. (2019) stressed strict compliance with safety protocols when using contrast media. These studies collectively reinforce the importance of interdepartmental cooperation, professional development, and adherence to QA standards in enhancing radiologic service quality in the Philippines.

Further emphasizing the technical and procedural dimensions of QA, international studies have identified critical components such as equipment quality control, radiation safety, and staff competency. Mora et al. (2021) showcased the benefits of remote and automated QA systems that allow for consistent oversight of imaging quality. The IAEA's 2023 *Handbook of Basic Quality Control Tests for Diagnostic Radiology* provides standardized methods for equipment evaluation, while the American College of Radiology (ACR) highlights the necessity of documented safety protocols and routine monitoring to reduce radiation risks. Amurao et al. (2023) further advocate for interdisciplinary collaboration and conceptual clarity in QA frameworks, aligning with the need for coordinated, comprehensive quality initiatives in radiology.

In the Philippine context, similar challenges and opportunities have been observed in key QA areas. Abelgas et al. (2018) identified gaps in the consistent application of technical inspections by radiologic technologists, despite general compliance with reporting malfunctions. Adriano et al. (2019) found that while CT departments had established safety policies, variations in emergency response and turnaround procedures suggested a lack of uniformity. These local findings parallel global concerns and highlight the pressing need for regular equipment maintenance, standardized safety protocols, and continuous staff training to ensure the reliability, accuracy, and safety of radiologic services across the country.

Theoretical Underpinnings

This research is grounded in W. Edwards Deming's Total Quality Management (TQM) theory, which emphasizes continuous improvement, systemic thinking, and collective responsibility for quality enhancement (Deming, 2014). Deming's approach views quality as an organization-wide commitment involving management leadership, employee participation, and regular evaluation of processes to achieve operational excellence and customer satisfaction. By fostering ongoing improvement and reducing errors, TQM supports more efficient and effective service delivery.

Deming's TQM framework is particularly relevant to quality assurance in radiologic services, where precision, safety, and reliability are essential. The theory's focus on teamwork, systemic coordination, and continuous improvement aligns with the multidisciplinary and complex nature of healthcare environments. As such, TQM offers a robust foundation for examining and strengthening QA practices in radiology, ultimately contributing to improved patient outcomes and service quality.

Objectives

This study aims to determine the level of quality assurance in radiologic services in the private hospitals, in a highly urbanized city in Central Philippines, for the 2nd quarter of the year 2025, as the basis for the development plan. Specifically, this study sought to answer the following questions: 1) determine the profile of the respondents in terms of age, sex, civil status, length of service, and highest educational attainment; 2) assess the level of quality assurance in radiologic services according to the following areas, particularly in Equipment Quality Control, Radiation Safety and Protection and Staff Competency; 3) determine whether or not significant differences exist in the level of quality assurance in radiologic services when grouped and compared according to variables.

Methodology

This section deals with the methodology employed in this study. It consists of five (5) subparts: research design, respondents, research instruments that include the validity and reliability of questionnaires, data gathering procedure, and statistical scheme used in analyzing data.

Research Design

This study employed the descriptive research design to determine the quality assurance in radiologic services in private hospitals in a highly urbanized city in Central Philippines, for the second quarter of 2025. According to Dudovskiy (2017), descriptive research design attempts to determine, describe, or identify characteristics within the field of investigation. The research design is most appropriate for this study as it aids in elaborating the data gathered and making professional judgments. It fits this study because it sought to provide the descriptive nature of the survey as it reports the summary data, such as the measure of central tendency, including mean, median, mode, deviance from the mean, variation, percentage, and correlation between variables.

Study Respondents

The study's respondents were the one hundred employees from the two hospitals. They included radiologic technologists, QA managers, hospital administrators, and other healthcare professionals involved in quality assurance from two private hospitals in a highly urbanized city in Central Philippines. A statistical technique called stratified random sampling was used to ensure that various subgroups within a community were represented. Based on comparable characteristics like age, gender, or region, the population is separated into several strata. Each stratum is then proportionally or substantially represented in a random sample. According to Triveni et al. (2024), this method improves the accuracy of the population estimates by reducing variance compared to ordinary random sampling, mainly when population subgroups differ significantly in their characteristics. Cochran's formula determined the required number of participants to ensure a statistically significant sample size.

Instruments

The survey instrument used to collect the needed data on the level of quality assurance in radiologic services is a self-made questionnaire. The questionnaire was divided into two parts. Part I of the research instrument contained the respondent's profile, which included the respondent's name, age, sex, civil status, length of service, and highest educational attainment. Part II consisted of a questionnaire assessing the level of quality assurance in radiologic services. The 30-item test was based on equipment quality control, radiation safety and protection, and staff competency. To assess the level of quality assurance, each area was given five numerical ratings, 5 being the highest and 1 being the lowest, with 5 interpreted as "always," 4 as "sometimes," 3 as "often," 2 as "rarely," and 1 as "almost never." The average rating of the three jurors was used as basis for the validity of the instrument. The validation average is 4.22, interpreted as "excellent". This showed that the research instrument was "Valid". And the reliability result was 0.764 which signifies that said instrument is reliable.

Data Gathering Procedure

After confirming the validity and reliability of the instrument, the researcher printed enough copies to provide for study participants. A survey questionnaire was used to gather the quantitative data for this investigation. Ruel et al. (2020) claim that questionnaires are frequently employed in quantitative research because they make it easier to collect data from a large sample methodically, typically in a consistent format. They are adaptable and effective in gathering subjective and objective data since they are available in various media, such as paper, online, and interviews. In this study, the researcher sought consent from two private hospitals to distribute questionnaires to the respondents. Upon receiving approval, the researcher distributed it to the intended respondents. Moreover, the respondents' responses served as the basis for determining the level of quality assurance in radiologic services.

Data Analysis and Statistical Treatment

Objective No. 1 aimed to determine the respondents' profiles regarding age, sex, civil status, length of service, and highest educational attainment; the researcher used a descriptive-analytical scheme and a frequency and percentage distributions for statistical tools.

Objective No. 2 utilized a descriptive-analytical scheme and mean to determine the level of quality assurance in radiologic services in equipment quality control, radiation safety and protection, and staff competency.

Objective No. 3 utilized a descriptive-analytical scheme to determine the level of quality assurance in radiologic services when grouped according to the variables.

Objective No. 4 used a comparative analytical scheme and Mann-Whitney U test to determine whether significant differences exist in the level of quality assurance in radiologic services when grouped and compared according to the aforementioned variables.

Ethical Consideration

There is a set of principles that guide research designs and practices. Human research goals include understanding real-life phenomena, studying effective treatments, investigating behaviors, and improving lives in other ways. What a researcher decides to research and how they conduct that research involves key ethical considerations, and it works to protect the rights of the participants, enhance research validity, and maintain scientific integrity (Bhandari, 2021). The identity of participants must be kept confidential or anonymous, and the assurances extend beyond protecting their names to avoid using self-identifying statements and information. Anonymity and confidentiality are important because they protect the privacy of those who voluntarily agree to participate in research. The research design must

INTERNATIONAL MULTIDISCIPLINARY JOURNAL OF RESEARCH FOR INNOVATION, SUSTAINABILITY AND EXCELLENCE (IMJRISE)
Online ISSN: 3028-032X | Print ISSN: 3028-0370
PUBLISHED BY: RISEJOURNALS.ORG
Volume 2, Issue no. 6

consider the potential harm to the participants, the researcher, the wider community, and the institution. The harm can range from physical resource loss (including time) to emotional and reputational distress, embarrassment, and anxiety, which are difficult to either predict or control (Fleming et al., 2018).

Results and Discussion:

This section is focused on the presentation and analysis of the study's data, which includes the following: respondents' profiles in terms of age, sex, civil status, length of service, and highest educational attainment in equipment quality control, radiation safety and protection, and staff competency.

Profile of the Respondents in Terms of Variables Age, Sex, Civil Status, Length of Service, and Highest Educational Attainment

Table 1
Profile of the Respondents

Variables	Categories	Frequency	Percentage
Age	Younger (less than 32 years old)	57	57.00
	Older (32 years old and above)	43	43.00
	Total	**100**	**100**
Sex	Male	75	75.00
	Female	25	25.00
	Total	**100**	**100**
Civil Status	Single	44	44.00
	Married	56	56.00
	Total	**100**	**100**
Length of Service	Shorter (less than 5 years)	57	57.00
	Longer (5 years and above)	43	43.00
	Total	**100**	**100**
Highest Educational Attainment	Lower (College Graduate)	56	56.00
	Higher (Post-Gra Level)	44	44.00
	Total	**100**	**100**

The demographic profile of respondents provides the numerical and percentage-based breakdown of the 100 respondents according to their age, sex, civil status, length of service, and highest educational attainment. 57% of the respondents were under 32, while the remaining 43% were 32 years and above, indicating a relatively young workforce. This study is male dominated; respondents were 75% male, with females only comprising 25% of the sample. A slight increase in the proportion of married respondents, 56%, compared to those who were single, at 44%, could indicate their stability and sense of responsibility. Regarding length of service, 57% of respondents have less than 5 years in the profession, whereas 43% have served for half a decade or more, suggesting a new workforce. Regarding the highest educational attainment, 56% of 100 were undergraduates. However, a good % of the respondents, 44%, enrolled and pursued postgraduate studies as proof of career growth and interest in advanced qualifications.

Level of Quality Assurance in Radiologic Services in Equipment Quality Control, Radiation Safety and Protection, and Staff Competency

Table 2
Level of Quality Assurance in Radiologic Services in Equipment Quality Control

Area **A. Equipment Quality Control**	**Mean**	**Interpretation**
As an employee, I…		
1. strictly follow the regulatory guidelines that diagnostic X-ray equipment undergoes regular quality control tests (e.g., accuracy, focal spot size, radiation leakage).	4.36	High Level
2. always ensure that calibration certificates for radiation survey meters and other monitoring devices are valid and updated.	4.10	High Level
3. consistently check that equipment performance parameters (e.g., kilovoltage peak, milliamperage, time, filtration) are within acceptable tolerance limits.	4.49	High Level

INTERNATIONAL MULTIDISCIPLINARY JOURNAL OF RESEARCH FOR INNOVATION, SUSTAINABILITY AND EXCELLENCE (IMJRISE)
Online ISSN: 3028-032X | Print ISSN: 3028-0370
PUBLISHED BY: RISEJOURNALS.ORG
Volume 2, Issue no. 6 | 117

4. have properly documented maintenance records for repairs and replacements in a logbook, which is always accessible.	3.92	High Level
5. used phantom and test objects regularly to assess image quality and detector performance.	4.41	High Level
6. constantly check the focal spot size and filtration system to ensure compliance with safety standards.	3.75	High Level
7. monitored that leakage radiation from the tube housing is controlled.	4.30	High Level
8. adhere to the standardized test objects' image quality evaluation (e.g., low-contrast phantoms).	3.70	High Level
9. carefully assess functionality and safety through essential testing after repairs or suspected issues.	4.04	High Level
10. verify that newly acquired equipment has passed safety evaluations and performance checks to detect any defects that could pose risks before it is used in clinical practice.	4.20	High Level
Overall Mean	**4.13**	**High Level**

Table 2 presents the "Level of Quality Assurance in Radiologic Services in Equipment Quality Control," based on self-reported practices. It provides insights into how radiology staff perceive their adherence to quality control measures. The highest mean of 4.49, interpreted as high level, reflects strong adherence to consistently ensuring that equipment performance parameters (e.g., kilovoltage peak, milliamperage, time, filtration) are within acceptable tolerance limits, highlighting the emphasis on compliance with performance standards. This suggests a consistent effort to maintain equipment accuracy, essential for reliable diagnoses and minimizing patient radiation exposure. Conversely, the lowest mean of 3.70, interpreted as high level, relates to adherence to the standardized test objects' image quality evaluation (e.g., low-contrast phantoms), suggesting a potential area for improvement. This may indicate that while routine equipment checks are performed, a more detailed image quality assessment using phantoms might be less emphasized. This observation is supported by Inyang et al. (2016), who noted that while regulatory compliance is often high, nuanced aspects like phantom testing are less consistently performed due to resource and training limitations, indicating that more specialized QC methods may be lacking in some facilities. The lower emphasis on this aspect could compromise the ability to detect subtle degradations in image quality, which are crucial for accurate diagnoses. Thus, while overall quality assurance is high, targeted improvements in training and resource allocation may be needed to ensure comprehensive quality control, particularly in specialized image quality assessment techniques.

Table 3

Level of Quality Assurance in Radiologic Services in Radiation Safety and Protection

Area **B. Radiation Safety and Protection**	**Mean**	**Interpretation**
As an employee, I…		
1. follow optimized protocols to minimize patients' radiation exposure (e.g., As Low as Reasonably Achievable principle).	4.00	High Level
2. observe proper use of personal protective equipment (PPE), distance, shielding, and time during procedures.	3.90	High Level
3. follow a strict schedule, monitoring radiation leakage from the tube housing and collimation systems to ensure it is controlled.	4.08	High Level
4. adhere to the standard of practice that emergency procedures for radiation incidents are communicated.	3.84	High Level
5. strictly follow radiation safety protocols (e.g., lead gown, OSL, TLD) to minimize exposure during fluoroscopic and interventional radiology and other diagnostic procedures.	4.22	High Level
6. implement patient dose monitoring systems to track cumulative doses for all staff.	3.91	High Level
7. participate in radiation safety training programs conducted for all staff.	4.29	High Level
8. allow radiation surveys to be performed in areas adjacent to X-ray facilities.	3.76	High Level
9. observe proper display of signage indicating radiation-controlled areas.	4.11	High Level
10. constantly audit trails for radiation incidents to be maintained and reviewed.	4.04	High Level
Overall Mean	**4.02**	**High Level**

Table 3 shows the data collected on the level of quality assurance in radiologic services in radiation safety and protection. The highest mean score of 4.29 is interpreted as high-level, and it is in area number 7, "Participate in the radiation safety training programs conducted for all staff". Furthermore, the lowest mean score is on area number 8, "Allow radiation surveys to be performed in areas adjacent to X-ray facilities", which is interpreted as a high level at 3.76. Although still considered high-level, this result may indicate a slight gap in environmental monitoring or administrative enforcement, suggesting a potential area for improvement in comprehensive facility-wide safety

INTERNATIONAL MULTIDISCIPLINARY JOURNAL OF RESEARCH FOR INNOVATION, SUSTAINABILITY AND EXCELLENCE (IMJRISE)
Online ISSN: 3028-032X | Print ISSN: 3028-0370
PUBLISHED BY: RISEJOURNALS.ORG

measures. These findings align with the position of the International Commission on Radiological Protection (ICRP, 2020), which emphasizes that "the success of any radiation safety program lies in proper education, monitoring, and adherence to recommended guidelines." Furthermore, as noted by Bushong (2020) in Radiologic Science for Technologists, radiation safety is not solely a matter of technical operation but also professional accountability, requiring the active participation of all imaging personnel in maintaining protective environments.

Table 4
Level of Quality Assurance in Radiologic Services in Staff Competency

Area C. Staff Competency	**Mean**	**Interpretation**
As an employee, I…		
1. demonstrate proficiency in operating equipment and troubleshooting issues.	3.83	High Level
2. regularly attend training programs for radiation safety and quality assurance protocols.	3.98	High Level
3. adhere to the radiologists' and technologists' standardized reporting guidelines.	4.35	High Level
4. demonstrate the correlation between diagnostic modalities parameters, patient dose, and image quality.	4.12	High Level
5. prioritize continuing education on advancements in radiologic technology.	3.82	High Level
6. am trained to perform quality control tests independently.	4.16	High Level
7. communicate effectively with patients to reduce anxiety during procedures.	4.01	High Level
8. utilize optimized exam protocols for clinical decision support systems.	4.30	High Level
9. follow protocols for repeat studies to avoid unnecessary radiation exposure.	4.38	High Level
10. conduct peer reviews of radiologic reports to ensure accuracy.	4.00	High Level
Overall Mean	**4.10**	**High Level**

Table 4 presents the quality assurance level of radiologic services regarding staff competency. The highest mean score of 4.38, interpreted as a high level, is in area number 9, "Pertains to following protocols for repeat studies to avoid unnecessary radiation exposure." On the other hand, the lowest mean score of 3.82, interpreted as a high level, is in area number 5, "Prioritize continuing education on advancements in radiologic technology." Suggests that while most staff are technically capable and value lifelong learning, there is room for improvement in encouraging ongoing training and independent problem-solving. These results were supported by Carroll's (2019) study on radiation protection in diagnostic X-ray imaging, which states that "quality assurance begins with competent personnel who are continually trained to maintain high levels of performance and safety. Similarly, Seeram (2019) emphasizes in Digital Radiography: Physical Principles and Quality Control that staff competency encompasses technical skills and quality-focused behaviors foundational to ensuring consistent, high-quality imaging services.

Comparative Analysis in the Level of Quality Assurance in Radiologic Services in Equipment Quality Control, Radiation Safety and Protection, and Staff Competency when grouped according to Variables Age, Sex, Civil Status, Length of Service, and Highest Educational Attainment

Table 5
Difference in the Level of Quality Assurance in Radiologic Services in Equipment Quality Control when grouped and compared according to the aforementioned variables

Variable	**Category**	**N**	**Mean Rank**	**Mann-Whitney U**	***p*-value**	***Sig. level***	**Interpretation**
Age	Younger	57	50.36	1217.500	0.955	0.05	Not Significant
	Older	43	50.69				
Sex	Male	75	51.21	884.000	0.668		Not Significant
	Female	25	48.36				
Civil Status	Single	44	54.15	1071.500	0.262		Not Significant
	Married	56	47.63				
Length of Service	Shorter	57	46.23	982.000	0.088		Not Significant
	Longer	43	56.16				
Highest Educational Attainment	Lower	56	46.36	1000.000	0.105		Not Significant
	Higher	44	55.77				

Table 5 presents the analysis of differences in the level of quality in assurance radiologic services, specifically in equipment quality control, when compared across various demographic and professional variables. The statistical analysis employs the Mann-Whitney U test, a non-parametric method appropriate for comparing two independent groups. The first variable examined is age, wherein respondents were categorized as either younger (N=57) or older

(N=43). The analysis yielded a Mann-Whitney U value of 1217.500 with a corresponding p-value of 0.955, substantially exceeding the 0.05 significance threshold. Consequently, the null hypothesis stating no significant difference in quality assurance levels between younger and older radiologic professionals is accepted. This finding suggests that age does not influence how radiologic professionals implement quality assurance measures for equipment control. Regarding sex differences, comparing female (N=25) and male (N=75) respondents produced a Mann-Whitney U value of 884.000 with a p-value of 0.668. This result, being well above the 0.05 significance level, leads to the acceptance of the null hypothesis that there exists no significant difference in quality assurance practices between male and female professionals in radiologic services. This indicates that gender does not play a determinative role in equipment quality control standards or implementation. The analysis of civil status compared married (N=56) and single (N=44) respondents, yielding a Mann-Whitney U value of 1071.500 with a p-value of 0.262. As this p-value exceeds the 0.05 significance threshold, the null hypothesis proposing no significant difference between married and single professionals regarding quality assurance levels is accepted. This result suggests that marital status does not significantly impact professional radiologic equipment quality control practices. For length of service, professionals with shorter service (N=57) were compared with those having longer service (N=43), resulting in a Mann-Whitney U value of 982.000 and a p-value of 0.088. This p-value approaches the 0.05 significance level more closely than other variables examined but remains above the threshold. Therefore, the null hypothesis, suggesting no significant difference in quality assurance levels between professionals with varying lengths of service, is accepted. However, the relatively lower p-value might indicate a trend worth investigating with larger sample sizes in future research. The final variable analyzed was the highest educational attainment, comparing professionals with lower (N=56) versus higher (N=44) academic qualifications. This comparison produced a Mann-Whitney U value of 1000.000 with a p-value of 0.105. As this exceeds the 0.05 significance threshold, the null hypothesis stating no significant difference exists between professionals with different educational levels regarding quality assurance practices is accepted. The findings reveal that none of the demographic or professional variables examined- age, sex, civil status, length of service, or highest educational attainment demonstrated statistically significant differences in the level of quality assurance in radiologic services, specifically concerning equipment quality control. These findings suggest that quality assurance practices in radiologic equipment control may be more influenced by standardized protocols, institutional policies, or regulatory requirements rather than the personnel's demographic or professional characteristics.

Table 6
Difference in the Level of Quality Assurance in Radiologic Services in Radiation Safety and Protection when grouped and compared according to the aforementioned variables

Variable	Category	N	Mean Rank	Mann Whitney U	*p*-value	*Sig. level*	Interpretation
Age	Younger	57	53.76	1039.500	0.192	0.05	Not Significant
	Older	43	46.17				
Sex	Male	75	50.77	917.500	0.873		Not Significant
	Female	25	49.70				
Civil Status	Single	44	54.08	1074.500	0.271		Not Significant
	Married	56	47.69				
Length of Service	Shorter	57	51.32	1179.000	0.745		Not Significant
	Longer	43	49.42				
Highest Educational Attainment	Lower	56	54.18	1026.000	0.150		Not Significant
	Higher	44	45.82				

Table 6 presents the analysis of differences in the level of quality assurance in radiologic services, specifically in radiation safety and protection, when grouped and compared according to various demographic variables. The Mann-Whitney U test was employed to determine whether statistically significant differences existed between the groups for each variable. Respondents were divided into younger (N=57) and older (N=43) categories for the age variable. The Mann-Whitney U value was 1039.500 with a p-value of 0.192. Since this p-value is greater than the significance level of 0.05, the result is interpreted as not significant. Thus, the null hypothesis stating that there is no significant difference in the level of quality assurance in radiation safety and protection between younger and older respondents is accepted. Regarding sex, comparing male (N=75) and female (N=25) respondents yielded a Mann-Whitney U value of 917.500 and a p-value of 0.873. This value is also well above the 0.05 threshold, indicating no significant difference in the level of quality assurance in radiation safety and protection between male and female radiologic professionals. Therefore, the null hypothesis for this variable is likewise accepted. The analysis of civil status compared single (N=44) and married (N=56) respondents, resulting in a Mann-Whitney U value of 1074.500 and a p-value of 0.271. As the p-value exceeds the significance level, the result is not significant, and the null hypothesis that there is no difference in quality assurance levels between single and married respondents is accepted. For length of service, those with shorter service (N=57) were compared to those with longer service (N=43). The Mann-Whitney U value was 1179.000 with a p-value of 0.745. This result is insignificant, indicating that the length of professional service does not significantly affect the level of quality assurance in radiation safety and protection. Lastly, comparing

INTERNATIONAL MULTIDISCIPLINARY JOURNAL OF RESEARCH FOR INNOVATION, SUSTAINABILITY AND EXCELLENCE (IMJRISE)
Online ISSN: 3028-032X | Print ISSN: 3028-0370
PUBLISHED BY: RISEJOURNALS.ORG

respondents with lower (N=56) and higher (N=44) educational attainment, the Mann-Whitney U value was 1026.000 and the p-value was 0.150. As with the other variables, this p-value is greater than 0.05, and thus, the null hypothesis is accepted, indicating no significant difference in quality assurance levels based on educational attainment. The findings demonstrate that none of the demographic or professional variables examined- age, sex, civil status, length of service, or highest educational attainment showed statistically significant differences in the level of quality assurance in radiologic services in radiation safety and protection. These findings suggest that the implementation of radiation safety and protection measures is consistent across the sample's different demographic and professional groups. This consistency may reflect the effectiveness of standardized protocols and regulatory guidelines that govern radiation safety practices in radiologic services, regardless of individual characteristics.

Table 7
Difference in the Level of Quality Assurance in Radiologic Services in Staff Competency when grouped and compared according to the aforementioned variables

Variable	Category	N	Mean Rank	Mann-Whitney U	*p*-value	*Sig. level*	Interpretation
Age	Younger	57	54.03	1024.500	0.158	0.05	Not Significant
	Older	43	45.83				
Sex	Male	75	49.05	828.500	0.381		Not Significant
	Female	25	54.86				
Civil Status	Single	44	53.93	1081.000	0.290		Not Significant
	Married	56	47.80				
Length of Service	Shorter	57	51.96	1142.000	0.558		Not Significant
	Longer	43	48.56				
Highest Educational Attainment	Lower	56	53.40	1069.500	0.255		Not Significant
	Higher	44	46.81				

Table 7 presents the analysis of the difference in the level of quality assurance in radiologic services regarding staff competency when grouped and compared according to various demographic and professional variables. The Mann-Whitney U test, a non-parametric test suitable for comparing differences between two independent groups, was utilized to determine whether significant differences existed for each variable. For the variable of age, respondents were classified as either younger (N=57, Mean Rank=54.03) or older (N=43, Mean Rank=45.83). The Mann-Whitney U value was 1024.500 with a p-value of 0.158. The result is interpreted as insignificant since this p-value is greater than the 0.05 significance level. Therefore, the null hypothesis stating no significant difference in staff competency between younger and older radiologic professionals is accepted. Regarding sex, the comparison between male (N=75, Mean Rank=49.05) and female (N=25, Mean Rank=54.86) respondents yielded a Mann-Whitney U value of 828.500 and a p-value of 0.381. As this p-value exceeds the 0.05 threshold, the null hypothesis is accepted, indicating no significant difference in staff competency between male and female respondents. For civil status, single (N=44, Mean Rank=53.93) and married (N=56, Mean Rank=47.80) respondents were compared, resulting in a Mann-Whitney U value of 1081.000 and a p-value of 0.290. This result is not significant; thus, the null hypothesis that there is no difference in staff competency based on civil status is accepted. The analysis of length of service compared those with shorter (N=57, Mean Rank=51.96) and longer (N=43, Mean Rank=48.56) service, yielding a Mann-Whitney U of 1142.000 and p-value of 0.558. Since the p-value is greater than 0.05, the null hypothesis is again accepted, indicating that the length of service does not significantly affect staff competency in radiologic services. Finally, the comparison is based on the highest educational attainment between lower (N=56, Mean Rank=53.40) and higher (N=44, Mean Rank=46.81) educational levels, resulting in a Mann-Whitney U value of 1069.500 and a p-value of 0.255. As with the other variables, this p-value is not significant, and the null hypothesis is accepted, suggesting no significant difference in staff competency based on educational attainment. The findings demonstrate that none of the demographic or professional variables examined- age, sex, civil status, length of service, or highest educational attainment showed statistically significant differences in the level of quality assurance in radiologic services regarding staff competency. These findings imply that staff competency in radiologic services is maintained consistently across the sample's different demographic and professional groups. This consistency may be attributed to standardized training, institutional protocols, and regulatory requirements that ensure uniform competency among radiologic staff, regardless of individual characteristics.

Conclusions

The study found that the implementation of quality assurance (QA) practices in radiologic services was consistently rated at a high level across all key areas—technical accuracy, safety protocols, and professional standards—regardless of staff demographics such as age, sex, civil status, length of service, or education. Statistical analysis using the Mann-Whitney U test confirmed no significant differences among respondent groups, indicating that standardized institutional policies, regular training, and regulatory compliance have led to a uniformly strong QA culture. These findings highlight the effectiveness of organizational systems over individual characteristics in maintaining QA standards. Based on this, the study recommends sustaining regular staff training, continuing rigorous policy implementation and review, enhancing internal audits and feedback systems, promoting peer collaboration, recognizing outstanding performance, and maintaining open communication to ensure continued excellence and uniformity in radiologic QA practices.

Acknowledgment

The researcher expresses sincere gratitude to all who generously shared their time, knowledge, and expertise in the completion of this study. Appreciation is extended to the research adviser for valuable guidance and support throughout the process, as well as to the oral defense panel for their thoughtful feedback and constructive suggestions that significantly improved the quality of the research. Thanks, are also due to the academic leadership for their encouragement and approval to undertake this study. Most importantly, the researcher is deeply thankful to the respondents, whose cooperation and insights provided essential data for the research.

References:

Amurao, M., Gress, D. A., Keenan, M. A., Halvorsen, P. H., Nye, J. A., & Mahesh, M. (2023). Quality management, quality assurance, and quality control in medical physics. *Journal of Applied Clinical Medical Physics, 24*(1), e13885.

Amurao, M., & Mahadevappa, M. (2023). Quality assurance in radiology: Current practices and future directions. *Journal of Medical Imaging and Radiation Sciences, 54*(1), 5-12.

Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM). (2023). Guidelines for quality assurance programs in general X-ray imaging. *Australasian Physical & Engineering Sciences in Medicine*. Retrieved from https://www.acpsem.org.au

Brady, A. P., Bello, J. A., Derchi, L. E., Fuchsjäger, M., Goergen, S., Koh, D. M., & van Ginneken, B. (2020). Radiology in the era of value-based healthcare: A multi-society expert statement from the ACR, ESR, and IS3R. *Journal of the American College of Radiology, 17*(7), 915-927. [https://doi.org/10.1016/j.jacr.2020.03.011](https://doi.o)

Brady, A. P., Bello, J. A., Derchi, L. E., Fuchsjäger, M., Goergen, S., Krestin, G. P., & van Gijn, J. (2020). Radiology department quality management systems: A survey of European practice. *Insights into Imaging, 11*(1), 1-8. [https://doi.org/10.1186/s13244-020-00856-9](https://doi.o)

Cmradiology. (2023). Quality assurance in radiology: A comprehensive guide to optimal imaging performance. Retrieved from https://about.cmrad.com/articles/quality-assurance-in-radiology-a-comprehensive-guide-to-optimal-imaging-performance

Department of Health (DOH). (2020). Administrative Order No. 2020-0035: Guidelines on quality assurance for radiologic services. Retrieved from https://www.fda.gov.ph

Department of Health (DOH). (2021). Philippine radiologic standards for hospital-based diagnostic imaging centers. DOH Administrative Order No. 2021-0002.

Dimaano, M. N., Dimaano, R. Q., & Dimaano, R. P. (2020). Quality assurance and quality control practices in radiology departments of selected hospitals in Cavite and Laguna. *Green Prints, 115*. Retrieved from https://greenprints.dlshsi.edu.ph/bsrt/115

Dimaano, M. N., Dimaano, R. Q., & Dimaano, R. P. (2022). Quality assurance and quality control practices in radiology departments of selected hospitals in Cavite and Laguna. *Greenprints*. Retrieved from https://greenprints.dlshsi.edu.ph

Dimaano, M. N., Matsumoto, M., & Akimoto, K. (2020). Challenges in implementing quality assurance programs in radiology departments in the Philippines. *Radiological Physics and Technology, 13*(4), 375-382. [https://doi.org/10.1007/s12194-020-00571-9](https://doi.o)

GE Healthcare. (2023). AI in X-ray: Increasing quality assurance and workflow efficiencies. Retrieved from https://www.gehealthcare.com/insights/article/ai-in-xray-increasing-quality-assurance-and-workflow-efficiencies

Greenprints. (2021). Ergonomic factors and efficiency in radiology departments. *Medical Ergonomics Journal*. Retrieved from https://greenprints.dlshsi.edu.ph

HealthManagement.org. (2023). Successful quality management system in a radiology department. Retrieved from https://healthmanagement.org

International Atomic Energy Agency (IAEA). (2021). Handbook of basic quality control tests for diagnostic radiology. Retrieved from https://www-pub.iaea.org/MTCD/Publications/PDF/PUB2021_web.pdf

International Atomic Energy Agency (IAEA). (2022). Handbook for quality assurance in radiologic imaging. *Human Health Reports*. Retrieved from https://humanhealth.iaea.org

International Atomic Energy Agency (IAEA). (2023). Advanced tools for quality and dosimetry of digital imaging in radiology. Retrieved from https://www.iaea.org

International Atomic Energy Agency. (2021). Radiation protection and safety of radiation sources: International basic safety standards. *IAEA Safety Standards Series No. GSR Part 3*. Retrieved from https://www.iaea.org/publications/8930

Kruskal, J. B., Eisenberg, R., Sosna, J., & Kruskal, J. D. (2020). Strategies for radiology departments to thrive in the value-based care era. *Radiology, 294*(3), 462-470. [https://doi.org/10.1148/radiol.2019191910](https://doi.o)

Kruskal, J. B., Eisenberg, R., Sosna, J., Yam, C. S., Kruskal, J. D., & Boiselle, P. M. (2020). Quality improvement in radiology: Basic principles and tools required to achieve success. *RadioGraphics, 31*(6), 1499–1509. [https://doi.org/10.1148/rg.316115501](https://doi.o)

Ma, J. ., Mananap, W. J. ., & Bautista, M. . (2024). Marketing Strategies for a Medical Device Companies. International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence (IMJRISE), 1(11), 40-49. https://risejournals.org/index.php/imjrise/article/view/827

Philippine Health Insurance Corporation (PhilHealth). (2022). Circular No. 2022-0027: Accreditation standards for hospitals providing radiologic services. Retrieved from https://www.philhealth.gov.ph

Professional Regulation Commission (PRC). (2023). Regulation of radiologic technology. Retrieved from https://www.prc.gov.ph

Puissant. (2023). Quality assurance challenges in Philippine hospitals. *Philippine Journal of Medical Imaging*. Retrieved from https://puissant.stepacademic.net

Paolicchi, F., et al. (2016). Radiation protection in diagnostic radiology: Knowledge, attitude, and practice. European Journal of Radiology, 85(9), 1539–1544.

StepAcademic.net. (2023). Exploring QA practices in radiologic services in a private hospital in Quezon City. Retrieved from https://puissant.stepacademic.net

Studocu. (2023). QA/QC summary in radiology: Ergonomic interventions in public tertiary hospitals. Retrieved from https://www.studocu.com

U.S. Food and Drug Administration. (2023). Mammography Quality Standards Act (MQSA). Retrieved from https://www.fda.gov

World Health Organization (WHO). (2021). Quality assurance workbook for radiographers and radiological technologists. Retrieved from https://www.who.int/publications/i/item/9241546425

Alhasan, H., et al. (2021). Quality control in diagnostic radiology: A review. Journal of Radiological Protection, 41(2), 345–356.

Okeji, M. C., et al. (2020). Equipment quality control in radiology departments: Current practices and challenges. Radiography, 26(3), 198–204.

World Health Organization. (2016). Quality assurance in diagnostic radiology.