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Radiation Protection in Computed Tomography: Knowledge, Attitudes, and Practices of Radiologic Technology Interns at Academic Institutions in Calamba, Laguna

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Index Terms:

radiation protection, computed tomography, radiologic technology, interns, knowledge, attitudes, practices, KAP, descriptive-correlational, Laguna

Abstract. This study aimed to determine the levels of knowledge, attitudes, and practices of radiologic technology interns regarding radiation protection in Computed Tomography (CT) at academic institutions in Calamba, Laguna. To achieve this, the study adopted a quantitative descriptive-correlational approach using total sampling among sixty-five (65) radiologic technology interns from three academic institutions. Data were gathered through a validated self-structured questionnaire with a Cronbach's Alpha of 0.933, and analyzed using frequency and percentage distribution, weighted mean, chi-square test of independence, and Spearman's rank correlation. Based on the study's findings, most respondents were female and had acquired 81–120 clinical internship hours in CT. The interns demonstrated a high level of knowledge in ionizing radiation, CT applications, and fundamental principles of radiation protection. Furthermore, the interns showed a high positive level attitude on their justification of clinical procedures, willingness to optimize radiation exposure, and values on radiation dose limits. Similarly, the interns displayed a high level of practices on radiation safety in terms of clinical procedures, dose optimization, and adherence to dose limits. The researchers also established a significant relationship between acquired clinical internship hours in CT and the interns' level of attitudes. Moreover, the results indicated that there is no significant relationship between the interns' level of knowledge to their levels of attitudes and practices in CT. Overall, these findings suggested that a high level of knowledge does not inherently correspond to high positive attitudes and a high level of practices, indicating that other variables may influence the interns' KAP levels on radiation protection in CT.

Introduction

Computed tomography (CT) is a widely utilized medical imaging modality in healthcare that generates detailed cross-sectional images for diagnostic and therapeutic purposes (National Institute of Biomedical Imaging and Bioengineering, 2025). As CT relies on ionizing radiation, its application in clinical settings demands strict protocols to radiation protection. GP Voice (2024) asserted that the ionizing radiation emitted during CT examinations presents potential, albeit relatively low, non-zero risks to both patients and healthcare professionals. Consequently, Smith et al. (2021) advocated for the need of standardized, evidence-based radiation protection practices among radiologic technologists and interns to reduce the risks of ionizing radiation.

A comprehensive understanding of radiation protection is fundamental to ensuring safety, as adequate theoretical knowledge enables clinicians to justify medical exposures and correctly implement safety principles, a factor Al-Amery et al. (2025) identified as critical for proper clinical implementation. Furthermore, a research by Shafiee et al. (2020) highlights that grounding safety protocols in scientific data allows medical professionals to make precise, objective decisions for the protection of patients and the public. Beyond theory, fostering positive attitudes is crucial for a sustainable radiation safety culture; Naji et al. (2026) revealed that these professional perspectives directly enhance staff performance, compliance in dose optimization, and accountability to consistently prioritize radiation protection measures. Ultimately, the effectiveness of any radiation safety protocols is measured by actual clinical practices, as Tefera et al. (2020) emphasized that consistent adherence to standardized protocols is essential to avoid unnecessary radiation exposure and prevent biological harm to practitioners, co-workers, and patients.

While existing studies provided a baseline of information on the knowledge, attitudes, and practices of interns and medical professionals in radiation protection, most have examined these variables individually or in limited relational contexts, leaving an evident gap in understanding how these variables relate to each other simultaneously. Moreover, localized studies focusing on radiologic technology interns in academic institutions are scarce, particularly in the context of radiation protection in CT. Considering the well-established significance of radiation protection in CT within clinical practice, the persistent gaps mentioned demand a closer analysis of it.

In light of aforementioned gaps, the researchers determined the levels of knowledge, attitudes, and practices among radiologic technology interns in radiation protection in CT. Moreover, this explored how the interns' level of knowledge related to their levels of attitudes and practices in radiation protection, while also examining the extent to which demographic profiles influenced these relationships. By determining the interns' KAP levels on radiation protection in CT, an empirical assessment of the interns' ability to fulfill the significant responsibility of a professional is established, providing a definitive measure of their readiness to integrate these in the clinical setting. Finally, analyzing how these three domains functioned in relation to one another, identified specific areas for improvement and ensured that clinical knowledge, attitudes, and practices remained aligned with evolving radiation protection standards in CT.

Statement of the Problem

Considering the aforementioned gaps, this study aimed to assess the levels of knowledge, attitudes, and practices of radiologic technology interns towards radiation protection in CT from the academic institutions in Calamba, Laguna. Furthermore, the researchers answered the following questions:

1. What is the demographic profile of the radiologic technology interns in terms of:
    1. Gender
    2. Internship Hours in CT
2. What is the level of knowledge of radiologic technology interns towards radiation protection in CT, in terms of:
    1. Ionizing Radiation
    2. Radiation Protection
    3. Fundamental Principles of Radiation Protection
3. What is the level of attitudes of radiologic technology interns towards radiation protection in CT, in terms of:
    1. Justification of Clinical Procedures
    2. Willingness to Optimize Radiation Exposure
    3. Values Placed on Radiation Dose Limits
4. What is the level of practices of radiologic technology interns towards radiation protection in CT, in terms of:
    1. Evaluation of Clinical Procedures
    2. Optimization of Radiation Exposure
    3. Adherence to Established Dose Limits
5. Is there a significant relationship between the demographic profile and knowledge of radiologic technology interns towards radiation protection in CT?
6. Is there a significant relationship between the demographic profile and attitudes of radiologic technology interns towards radiation protection in CT?
7. Is there a significant relationship between the demographic profile and practices of radiologic technology interns towards radiation protection in CT?
8. Is there a significant relationship between the knowledge and attitudes of radiologic technology interns towards radiation protection in CT?
9. Is there a significant relationship between the knowledge and practices of radiologic technology interns towards radiation protection in CT?

Null Hypotheses

To ensure statistical accuracy, the following null hypotheses were tested at a 0.05 level of significance. These statements facilitate a structured correlation analysis, allowing the study to determine whether significant relationships exist between the interns' demographic profiles and their levels of knowledge, attitudes, and practices:

1. H_o: There is no significant relationship between the demographic profile and knowledge of radiologic technology interns towards radiation protection in CT.
2. H_o: There is no significant relationship between the demographic profile and attitudes of radiologic technology interns towards radiation protection in CT.
3. H_o: There is no significant relationship between the demographic profile and practices of radiologic technology interns towards radiation protection in CT.
4. H_o: There is no significant relationship between the knowledge and attitudes of radiologic technology interns towards radiation protection in CT.
5. H_o: There is no significant relationship between the knowledge and practices of radiologic technology interns towards radiation protection in CT.

Methodology

Research Design

This study employed a quantitative research design, specifically a descriptive–correlational approach, to statistically interpret the variables and examine their relationships. The descriptive component of this study determined interns' levels of knowledge, attitudes, and practices (KAP) in radiation protection in computed tomography (CT), and the-demographic profile of the interns. Meanwhile, the correlational aspect highlighted the relationship between the KAP means and the interns' demographic profile. Furthermore, the correlation between the levels of knowledge and attitudes, as well as between the levels of knowledge and practices of the radiologic technology interns in radiation protection in CT, was examined.

Participants of the Study

The participants of this study were sixty-seven (67) fourth-year radiologic technology interns enrolled during the second semester of A.Y. 2025–2026 at academic institutions in Calamba, Laguna. These institutions specifically included Calamba Doctors' College, University of Perpetual Help System DALTA–Calamba Campus, and Lyceum of the Philippines University–Laguna, all of which have radiologic technology interns actively completing their clinical internship.

The distribution of the total population consisted of forty-three (43) interns from Calamba Doctors' College, twenty-one (21) from Lyceum of the Philippines University–Laguna, and three (3) from the University of Perpetual Help System DALTA–Calamba Campus. Out of the sixty-seven (67) total interns, sixty-five (65) provided informed consent and completed the questionnaire. This resulted in a 97.01% response rate, ensuring the data collected was highly representative of the target group.

Sampling Procedure

In accordance with the objectives of the study, total population sampling technique was employed. Considering the limited number of interns across the three academic institutions, the entire population of eligible radiologic technology interns was included to ensure generalizability and analytical depth. Therefore, this sampling strategy is especially appropriate for a KAP study focused on radiation protection in computed tomography (CT), as it ensured that all respondents possessed the required clinical hours. As a result, this established the collection of relevant and valid data that accurately reflected the interns' level of knowledge, attitude, and practices towards radiation protection in CT.

Research Instrument

In evaluating the levels of knowledge, attitudes, and practices of radiologic technology interns regarding radiation protection in computed tomography (CT), this study employed a self-structured questionnaire that was directly disseminated by the researchers to the interns.

The self-structured questionnaire was divided into four sections: Part I acquired the interns' demographic profile, Part II assessed their level of knowledge, Part III evaluated their level of attitudes, and Part III examined the interns' level of practices related to radiation protection in CT.

Initially, the questionnaire obtained the interns' demographic data, specifically focusing on gender and total clinical internship hours in CT, which were categorized into 40-hour intervals to reflect progressive levels of clinical exposure. Following this, the second part assessed theoretical knowledge through closed-ended, multiple-choice questions; these were scored dichotomously, awarding one point for correct answers and zero for incorrect ones.

Range	Verbal Interpretation
1.00 – 0.81	Very High
0.80 – 0.61	High
0.60 – 0.41	Average
0.40 – 0.21	Low
0.20 – 0.00	Very Low

Table 1. Verbal Interpretation for the Interns' Level of Knowledge on Radiation Protection in CT

Meanwhile, the third part measured the interns' level of attitudes, specifically their sense of justification, willingness to optimize technical factors, and values regarding dose limits, using a four-point Likert scale of agreement ranging from "Strongly Disagree" to "Strongly Agree."

Scale	Range	Categorical Description	Verbal Interpretation
4	3.26 – 4.00	Strongly Agree	High Positive
3	2.51 – 3.25	Agree	Moderate Positive
2	1.76 – 2.50	Disagree	Moderate Negative
1	1.00 – 1.75	Strongly Disagree	High Negative

Table 2. Likert Scale of Agreement for the Interns' Level of Attitudes on Radiation Protection in CT

Finally, the fourth part examined the frequency of their radiation protection practices in clinical settings. This section utilized a four-point Likert scale of frequency, ranging from "Never" to "Always," in determining how consistently interns applied safety protocols, such as evaluating procedures, optimizing technical factors, and adherence to established dose limits.

Scale	Range	Categorical Description	Verbal Interpretation
4	3.26 – 4.00	Always	Very High
3	2.51 – 3.25	Often	High
2	1.76 – 2.50	Sometimes	Low
1	1.00 – 1.75	Never	Very Low

Table 3. Likert Scale of Frequency for the Interns' Level of Practices on Radiation Protection in CT

Data Gathering Procedure

The data gathering process involved administering validated, self-structured questionnaires to radiologic technology interns following formal institutional approval and informed consent. To ensure standardization and a high response rate, the researchers personally disseminated the instruments during scheduled sessions, allowing respondents twenty (20) minutes for completion while providing immediate procedural clarifications. This controlled approach maintained uniformity across all participating institutions. Collected questionnaires were then screened for completeness, with the raw data systematically tabulated in Google Sheets for subsequent statistical analysis.

Statistical Treatment of Data

To determine the interns' demographic profile and categorize responses for levels of knowledge, attitudes, and practices (KAP), frequency and percentage distribution were utilized. The weighted mean was then applied to determine the average scores for each variable, serving as a measure of central tendency and the basis for subsequent correlation analyses. Moreover, to evaluate whether demographic factors, specifically gender and clinical internship hours, significantly influence KAP levels, the Chi-square test of independence was employed as the primary mechanism for hypothesis testing. Finally, Spearman's rank correlation was utilized to examine the relationships between the interns' level of knowledge and the corresponding levels of attitudes and practices. This non-parametric approach was specifically chosen to handle the ordinal nature of the Likert-scale data and ranked knowledge scores, ensuring an analysis of how these variables correlate within the study.

Results and Discussion

This section presents the findings derived from the data collected among radiologic technology interns regarding their levels of knowledge, attitudes, and practices related to radiation protection in computed tomography (CT). The results are organized in tabular form and analyzed using frequency distribution, percentage, weighted mean, the chi-square test of independence, and Spearman's rank correlation. These analyses are subsequently interpreted in alignment with the study's objectives.

Demographic Profile of Radiologic Technology Interns in Terms of Gender

Table 4 shows the frequency and percentage distribution of the sixty-five (65) radiologic technology interns according to gender.

Indicator	Frequency	Percentage
Female	39	60
Male	26	40
Total	**65**	**100**

Table 4. Distribution of Respondents According to Gender

Of the total sixty-five (65) respondents, 39 (60%) are female, and 26 (40%) are male. With thirteen (13) more female interns than male interns, this distribution demonstrated that female interns made up the majority of respondents.

This finding directly aligns with the observations of Astaca-an (2023) regarding the increasing female representation within radiologic technology programs in the Philippines. This gender distribution is indicative of the broader demographic shift reported by the World Bank (2025), as cited by the Helgi Library (2025), which noted that female tertiary enrollment in the Philippines reached 53.3% in 2024, highlighting the increasing participation of women in healthcare fields. Consequently, this predominantly female group of interns serves as a representative sample for analyzing how current gender trends in radiologic technology education influence the level of knowledge, attitudes, and practices in radiation protection during clinical training.

Demographic Profile of Radiologic Technology Interns in Terms of Obtained Clinical Internship Hours in CT

Table 5 illustrates the frequency and percentage distribution of the sixty-five (65) radiologic technology interns based on the number of internship hours they completed in CT.

Indicator	Frequency	Percentage
Below 40 hours	10	15.38
41 hours – 80 hours	10	15.38
81 hours – 120 hours	23	35.38
121 hours and above	22	33.86
Total	**65**	**100**

Table 5. Obtained Clinical Internship Hours in CT

Among the respondents, 23 (35.38%) accomplished 81–120 hours of internship training, whereas 22 (33.86%) completed 121 hours and above. Meanwhile, 10 (15.38%) reported completing fewer than 40 hours of internship training in handling the CT modality, and another 10 interns (15.38%) accomplished 41–80 hours. These findings indicate that nearly 70% of the participants achieved average to high exposure in handling the CT modality, exceeding the baseline expectations for specialized modality rotations.

This high level of participation directly aligns with the mandates of CHED Memorandum Order No. 7, Series of 2018, which requires radiologic technology students to undergo a minimum of 48 hours of hospital duty per week. By surpassing these weekly minimums in their specific CT rotations, the majority of the interns in this study reached adequate practical exposure necessary for clinical competency. Furthermore, this trend supports the educational theory of Bobok (2021), who asserted that learning outcomes are significantly enhanced when internships extend beyond 40 hours per week or last longer than 10 weeks. Consequently, a study by Hung (2025) et al. established that there is a variance in the level of knowledge among internship hours, from below 90 hours to 399 hours.

Level of Knowledge on Radiation Protection in CT

Table 6 provides a comprehensive summary of the radiologic technology interns' level of knowledge in radiation protection in CT.

Indicator	Weighted Mean	Interpretation
Ionizing Radiation	0.73	High
Radiation Protection in CT	0.72	High
Fundamental Principles in Radiation Protection	0.70	High
Average Weighted Mean	**0.72**	**High**

Table 6. Radiologic Technology Interns' Level of Knowledge on Radiation Protection in CT

The data revealed that the highest weighted mean of 0.73 was obtained from the interns' knowledge on ionizing radiation. This was closely followed by radiation protection in CT, which yielded a weighted mean of 0.72. Lastly, a weighted mean of 0.70 was obtained from the fundamental principles of radiation protection. Despite the variation in rankings, a high level of knowledge was consistently observed across every indicator. Overall, an average weighted mean of 0.72 was obtained, signifying that the interns possess a high level of knowledge in radiation protection in CT clinical procedures.

The high level of knowledge observed among the interns in terms of ionizing radiation, radiation protection in CT, and fundamental principles suggests that they have a sufficient understanding of radiation protection measures in CT. These findings are consistent with the aforementioned study of Alamoudi et al. (2025), where radiologic technology interns demonstrated the highest level of knowledge in their understanding of radiation physics principles, followed by their high level of knowledge of radiation protection strategies, and the high level of knowledge in the formal guidelines for safe ionizing radiation use being slightly lower. This is further supported by Khalilia (2025), whose research demonstrated that medical imaging students generally exhibit an adequate and comprehensive understanding of radiation safety. Ultimately, this affirms that while proficiency levels may slightly differ across specific technical indicators, a high level of collective knowledge in radiation protection in CT remains a consistent standard among the interns.

Level of Attitudes on Radiation Protection in CT

Table 7 illustrates a general overview of the radiologic technology interns' level of attitudes toward radiation protection in CT.

Indicator	Weighted Mean	Interpretation
Sense of Justification in Clinical Procedures	3.75	High Positive
Willingness to Optimize Radiation Exposure	3.78	High Positive
Values Placed on Radiation Dose Limits	3.77	High Positive
Average Weighted Mean	**3.77**	**High Positive**

Table 7. Radiologic Technology Interns' Level of Attitudes on Radiation Protection in CT

The findings showed that the highest weighted mean of 0.78 was obtained from the interns' willingness to optimize radiation exposure. This was closely followed by values placed on radiation dose limits, which yielded a weighted mean of 3.77. Lastly, a slightly lower weighted mean of 3.75 was obtained from the fundamental principles of radiation protection. Despite the variation in rankings, a high positive attitude was consistently observed in every indicator. In summary, an average weighted mean of 3.77 was obtained, signifying that the interns possess a high positive attitude in radiation protection in CT clinical procedures. The consistently high positive attitude across all indicators suggests that radiologic technology interns are deeply dedicated to radiation protection in CT. This aligns with findings by Bolpat and Sawardekar (2023), who asserted that radiologic technologists exhibited excellent scores in attitudes towards radiation protection. Ultimately, this positive attitude is evidenced by the interns' proactive commitment to clinical justification, dose optimization, and strict adherence to regulatory dose limits during CT examinations

Level of Practices on Radiation Protection in CT

Table 8 shows a comprehensive summary of the radiologic technology interns' level of practices regarding radiation protection in CT.

Indicator	Weighted Mean	Interpretation
Evaluation of Clinical Procedures	3.66	Very High
Optimization of Radiation Dose	3.73	Very High
Adherence to Established Dose Limits	3.60	Very High
Average Weighted Mean	**3.66**	**Very High**

Table 8. Radiologic Technology Interns' Level of Practices on Radiation Protection in CT

Based on the results of the study, the highest weighted mean of 3.73 was achieved in the interns' optimization of radiation dose. This was followed by their evaluation of clinical procedures, which yielded a weighted mean of 3.66. Lastly, a slightly lower weighted mean of 3.60 was recorded for the interns' adherence to established radiation dose limits. Despite these variations in ranking, the interns showed a very high level of practice in performing every measure considered part of radiation protection in CT. In summary, an overall average weighted mean of 3.66 was obtained, signifying that the interns maintain a very high level of practices in the implementation of radiation protection procedures in CT.

In general, the findings indicate that radiologic technology interns are effectively engaged in active clinical practices, demonstrating consistent hands-on application of radiation protection in CT. In relation to this, Bulauitan et al. (2025) observed a high level of radiation protection practice among radiologic technology interns, characterized by strict adherence to radiation safety protocols. Moreover, Estira (2024) reported that most radiologic technology interns routinely used lead aprons during clinical practices in the radiology department. Overall, these results signify that the interns have consistently practiced the evaluation of clinical procedures, dose optimization, and adherence to established radiation dose limits in the standard application of radiation protection in CT.

Correlation Analysis

Relationship between the Gender and the Level of Knowledge of Radiologic Technology Interns on CT Radiation Protection

Table 9 presents the chi-square test of independence of the gender and the level of knowledge of radiologic technology interns towards radiation protection in CT.

Independent Variable	Dependent Variable	x^2	df	p-value	Interpretation
Level of Knowledge	Gender	0.576	4	0.966	No Significant Relationship

(correlation is significant at less than the 0.05 level)

Table 9. Relationship between the Gender and the Level of Knowledge of Radiologic Technology Interns on CT Radiation Protection

To find out if a significant relationship existed between the independent and dependent variables, the chi-square test of independence was utilized. In relation to the interns' level of knowledge in radiation protection in CT, the gender indicator showed a computed chi-square value of 0.576 with a p-value of 0.966 ($p>0.05$). Since the p-value of 0.966 exceeds the demarcation criteria of the 0.05 level of significance, this result suggests that the gender of interns has no significant relationship to their level of knowledge. Consequently, this indicated that the researchers failed to reject the null hypothesis. Accordingly, this implied that gender is not a determining factor of the interns' level of knowledge of radiation protection in CT. These findings suggested that the level of knowledge is likely influenced by external factors rather than demographic gender differences.

In line with these findings, Maharjan et al. (2022) established that gender does not significantly influence the interns' level of knowledge in radiation protection. Furthermore, Aldahery et al. (2025) also found that the gender of healthcare workers was not significantly related to their level of knowledge in radiation protection. Correspondingly, the level of knowledge among the interns appeared to be constant, suggesting that they have a consistent foundation in radiation protection in CT, whether they are male or female.

Relationship between the Obtained Clinical Internship Hours and the Level of Knowledge of Radiologic Technology Interns on CT Radiation Protection

Table 10 shows the chi-square test of independence of the acquired clinical internship hours in CT and the level of knowledge of radiologic technology interns towards radiation protection in CT.

Independent Variable	Dependent Variable	x^2	df	p-value	Interpretation
Level of Knowledge	Obtained Clinical Internship Hours in CT	10.572	12	0.566	No Significant Relationship

(correlation is significant at less than the 0.05 level)

Table 10. Relationship between the Obtained Clinical Internship Hours and the Level of Knowledge of Radiologic Technology Interns on CT Radiation Protection

To find out if a significant relationship existed between the independent and dependent variables, the chi-square test of independence was employed. In relation to the interns' level of knowledge in radiation protection in CT, the interns' total clinical internship hours yielded a computed chi-square value of 10.572 with a p-value of 0.566 (p>0.05). Since the p-value of 0.566 is greater than the 0.05 level of significance, this result implied that the total clinical internship hours in CT of interns has no significant relationship to their level of knowledge. Correspondingly, this indicated that the researchers failed to reject the null hypothesis. Thus, this signified that the duration of clinical internship does not significantly dictate the interns' level of comprehension of CT radiation protection, implying that their knowledge is likely shaped by variables other than time spent in a clinical environment.

In line with these findings, Elzaki et al. (2024) stated that the experience of both radiography professionals and interns had no significant impact on their knowledge regarding radiation protection and dose levels. Similarly, Maharjan et al. (2022) asserted that the length of experience does not significantly influence the interns' level of knowledge in radiation protection. In light of this, the results suggested that the core understanding of radiation protection principles in CT is well-established, showing that the interns' level of knowledge in radiation safety principles does not change based on their varying levels of internship experience in CT.

Relationship between the Gender and the Level of Attitudes of Radiologic Technology Interns on CT Radiation Protection

Table 11 shows the chi-square test of independence of gender and the level of attitudes of radiologic technology interns towards radiation protection in CT.

Independent Variable	Dependent Variable	x^2	Df	p-value	Interpretation
Level of Attitude	Gender	0.903	3	0.825	No Significant Relationship

(correlation is significant at less than the 0.05 level)

Table 10. Relationship between the Gender and the Level of Attitudes of Radiologic Technology Interns on CT Radiation Protection

To determine if a significant relationship existed between the independent and dependent variables, the chi-square test of independence was used. Relative to the interns' level of attitudes in radiation protection in CT, the gender indicator had a computed chi-square value of 0.903 with a p-value of 0.825 (p>0.05). Since the p-value of 0.825 exceeds the demarcation criteria of the 0.05 level of significance, this result suggested that the gender of interns has no significant relationship to their level of attitudes. Accordingly, this indicated that the researchers failed to reject the null hypothesis. Therefore, this implied that the interns' gender does not influence the level of attitudes they have towards radiation protection in CT. Moreover, other potential factors beyond gender may have an influence in shaping the interns' level of attitudes.

Considering these findings, a study by Gringco-Llegue (2025) established that the gender of radiography professionals had a weak significant relationship with their attitudes toward radiation safety. Moreover, Kyei et al. (2025) also demonstrated that gender does not influence the level of attitudes of radiographers in radiation protection. Correspondingly, the level of attitudes among the interns appears to be consistent, suggesting that, regardless of the interns' gender, a positive level of attitudes towards radiation protection in CT is observed.

Relationship between the Obtained Clinical Internship Hours and the Level of Attitudes of Radiologic Technology Interns on CT Radiation Protection

Table 12 summarizes the chi-square test of independence of the obtained clinical internship hours in CT and the level of attitudes of radiologic technology interns towards radiation protection in CT.

Independent Variable	Dependent Variable	x^2	df	p-value	Interpretation
Level of Attitude	Obtained Clinical Internship Hours in CT	17.729	9	0.038	Significant Relationship

(correlation is significant at less than the 0.05 level)

Table 12. Relationship between the Obtained Clinical Internship Hours and the Level of Attitudes of Radiologic Technology Interns on CT Radiation Protection

To determine if a significant relationship existed between the independent and dependent variables, the chi-square test of independence was used. Relative to the interns' level of attitudes in radiation protection in CT, a computed chi-square value of 17.729 with a p-value of 0.038 (p<0.05) was obtained from their acquired clinical internship hours in CT. Since the p-value of 0.038 is less than the 0.05 significance threshold, this result suggests that there is a significant relationship between the interns' obtained clinical internship hours in CT and their level of attitudes. Accordingly, this indicated that the researchers rejected the null hypothesis. Consequently, this implied that the clinical internship hours the interns had acquired in CT had an influence on the level of attitudes they have towards radiation protection in CT. These findings suggested that the duration of practical exposure during clinical internship directly shapes an intern's perspective on radiation protection and safety. This also implies that as interns spend more clinical internship hours in the CT department, the constant repetition and observation of radiation safety protocols foster a more proactive level of attitude toward radiation protection in CT.

Similarly, a study by Gringco-Llegue (2025) found that the duration of professional experience significantly correlates with attitudes toward radiation protection. These findings suggested that while the relatively brief period of a clinical internship may be insufficient to fundamentally affect an intern's level of attitude, long-term professional engagement fosters a deeper psychological commitment to radiation safety measures in CT.

Relationship between the Gender and the Level of Practices of Radiologic Technology Interns on CT Radiation Protection

Table 13 illustrates the chi-square test of independence of the gender and the level of practices of radiologic technology interns towards radiation protection in CT.

Independent Variable	Dependent Variable	x^2	df	p-value	Interpretation
Level of Practices	Gender	0.573	9	0.999	No Significant Relationship

(significant at the 0.05 level)

Table 13. Relationship between the Gender and the Level of Practices of Radiologic Technology Interns on CT Radiation Protection

To establish if a significant relationship exists between the independent and dependent variables, the chi-square test of independence was employed. In relation to the interns' level of knowledge in radiation protection in CT, the gender indicator showed a computed chi-square value of 0.027 with a p-value of 0.999 ($p>0.05$). Since the p-value of 0.999 is significantly higher than the 0.05 threshold, this result suggests that the interns' gender and level of practices in radiation protection in CT have no significant relationship. Hence, this indicated that the researchers failed to reject the null hypothesis. Correspondingly, this suggested that the interns' gender does not influence their level of practice in radiation protection in CT. This also implied the possibility that other variables, rather than gender, may affect the interns' level of practice in adhering to radiation safety protocols in CT.

Aligned with these findings, Ali et al. (2025) reported that the gender of undergraduate medical students has no significant relationship with their practices toward radiation safety measures. In general, the findings entail that the practical application of radiation protection protocols in CT is a standardized practice among interns, regardless of their gender. This suggested that the clinical environment and the radiation safety standards enforced within CT are still highly practiced by the interns.

Relationship between the Obtained Clinical Internship Hours and the Level of Practices of Radiologic Technology Interns on CT Radiation Protection

Table 14 displays the chi-square test of independence of the obtained clinical internship hours in CT and the level of practices of radiologic technology interns in radiation protection in CT.

Independent Variable	Dependent Variable	x^2	df	p-value	Interpretation
Level of Practices	Obtained Clinical Internship Hours in CT	0.573	9	1.000	Significant Relationship

(correlation is significant at less than the 0.05 level)

Table 14. Relationship between the Obtained Clinical Internship Hours and the Level of Practices of Radiologic Technology Interns on CT Radiation Protection

To establish if a significant relationship exists between the independent and dependent variables, the chi-square test of independence was utilized. Relative to the interns' level of practices in radiation protection in CT, a computed chi-square value of 0.573 with a p-value of 1.000 ($p<0.05$) was obtained from their clinical internship hours in CT. Since the p-value of

1.000 is significantly greater than the 0.05 significance level, this result suggests that the interns' clinical internship hours in CT and the level of practices in radiation protection in CT have no significant relationship. Consequently, this indicated that the researchers failed to reject the null hypothesis. Furthermore, this suggests that the hours of clinical internship the interns obtained do not influence their level of practice in radiation protection in CT, and that it may be influenced by factors other than the interns' cumulative time spent in the clinical setting.

In alignment with these results, a study by Aghajany et al. (2025) claimed that the length of experience of radiographers was not significantly associated with their level of practice. Correspondingly, this suggests that the interns' performance is governed by a standardized approach to radiation protection in CT, where it is still highly practiced regardless of the extent of their clinical experience in CT.

Relationship between the Levels of Knowledge and Attitudes of Radiologic Technology Interns on Radiation Protection in CT

Table 15 displays the relationship between the level of knowledge and the level of attitudes of radiologic technology interns regarding radiation protection in CT.

Independent Variables	x^2	p-value	Remarks	Interpretation
Level of Knowledge and Level of Attitudes	44882	0.019	Accept H_o	No Significant Relationship

(correlation is significant at less than the 0.005 level)

Table 15. Relationship between the Levels of Knowledge and Attitudes of Radiologic Technology Interns on Radiation Protection in CT

To determine whether a significant relationship existed between the knowledge and attitude variables, the data were analyzed using Spearman's rho. A computed ρ-value of 0.019 was observed between the knowledge and attitudes of the interns, which is greater than the significance level of 0.005. Therefore, the analysis suggested that there is no significant relationship between the levels of knowledge and attitudes of radiologic technology interns regarding radiation protection in CT. Consequently, the researchers failed to reject the null hypothesis. This lack of correlation implied that academic proficiency exists independently of an intern's level of attitudes toward radiation safety protocols in CT. Furthermore, the findings indicated that knowing the radiation protection in CT does not automatically lead to the interns valuing them, nor does a positive view of radiation protection necessarily translate into a higher level of knowledge.

In relation to these results, Alkhayal et al. (2023) found no significant relationship between medical professionals' knowledge and attitudes toward radiation protection. Accordingly, the findings showed a gap between the levels of knowledge and attitudes of radiologic technology interns in radiation protection in CT.

Relationship between the Levels of Knowledge and Practices of Radiologic Technology Interns on Radiation Protection in CT

Table 16 illustrates the relationship between the level of knowledge and the level of practices of radiologic technology interns regarding radiation protection in CT.

Independent Variables	x^2	p-value	Remarks	Interpretation
Level of Knowledge and Level of Practices	48246.25	- 0.054	Accept H_o	No Significant Relationship

(correlation is significant at less than the 0.005 level)

Table 16. Relationship between the Levels of Knowledge and Practices of Radiologic Technology Interns on Radiation Protection in CT

To determine whether a significant relationship existed between the knowledge and practice variables, the data were analyzed using Spearman's rho. The Spearman's rho analysis revealed a computed ρ-value of -0.054, which exceeds the established significance threshold of 0.005. Accordingly, the results indicated that no statistically significant correlation exists between the interns' knowledge levels and their practices toward radiation protection in CT. Based on these findings, the researchers failed to reject the null hypothesis. Consequently, this lack of correlation suggests that the interns' level of knowledge in radiation protection in CT does not guarantee its consistent execution in a clinical setting.

In line with these results, Fiagbedzi et al. (2022) illustrated a disconnect between knowledge and practice among radiographers, demonstrating a high level of knowledge but a low level of practice. This suggested that radiation safety practices are not shaped by knowledge alone. Similarly, Bolpat and Sawardekar (2023) found that the knowledge and practices of radiologic technologists implied no significant relationship, which indicated that neither shaped the other.

Considering these findings, a theory-practice gap among radiologic technology interns, where knowledge and clinical practice in radiation protection in CT function as distinct, unrelated variables. Ultimately, the results revealed that having theoretical knowledge in radiation protection in CT does not directly manifest in high levels of clinical practice, just as consistent adherence to safety protocols does not necessarily reflect an intern's level of knowledge.

Conclusion and Recommendations

The findings of this study revealed that the majority of radiologic technology interns at academic institutions in Calamba, Laguna, were female, and most had completed between 81 and 120 hours of clinical internship in computed tomography (CT).

Based on the analyzed data, the interns demonstrated a high level of knowledge of radiation protection in CT, suggesting that their academic preparation has effectively equipped them with the theoretical foundation necessary to understand ionizing radiation, CT applications, and the fundamental principles of radiation protection. Furthermore, high positive attitudes were observed among interns, reflecting their strong commitment towards the justification of clinical procedures, willingness to optimize radiation exposure, and values placed on radiation dose limits. Similarly, the interns displayed consistent practice of the evaluation of clinical procedures, the optimization of radiation dose, and adherence to established dose limits in radiation protection in CT. This implies that beyond theoretical knowledge and positive attitudes, they are capable of translating radiation protection principles in CT into reliable clinical practices.

This study also established that there was no significant relationship between the demographic profile of the interns, specifically their gender and the number of clinical internship hours in CT, and their levels of knowledge, attitudes, and practices in radiation protection in CT. However, a significant relationship was observed between the internship hours and the interns' level of attitudes toward radiation protection in CT, suggesting that the duration of clinical exposure influences the attitudes of the interns. Ultimately, the analysis found that the interns' level of knowledge in radiation protection in CT showed no significant relationship with either their levels of attitudes or practices. This indicates that knowledge alone did not directly influence or determine how interns approached radiation protection attitudes and practices in the clinical setting.

Overall, the study demonstrated that radiologic technology interns in Calamba, Laguna, possess a high level of knowledge, a high positive level of attitudes, and a very high level of practices in radiation protection in CT. While demographic factors such as gender and internship hours showed no significant relationship with levels of knowledge and practices, acquired clinical internship hours influenced the interns' level of attitudes toward radiation protection in CT. Significantly, the interns' level of knowledge did not directly influence their levels of attitudes and practices, indicating that an understanding of radiation protection principles does not automatically translate into positive attitudes and consistent practice in radiation protection in CT.

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Competing Interests Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Data Availability Statement

The data used in this research can be accessed through a formal request to the author of the study.

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Appendices

No appendices are attached to this study.