

Knowledge, Compliance, and Performance of Sterilization Process In Needle- Guided Biopsy among Radiologictechnologists in Selected Hospitals in Las Pinas City

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Abstract

Sterilization processes are essential in ensuring patient safety and maintaining the quality of healthcare services, particularly in invasive procedures such as needle-guided biopsies. In radiologic practice, strict adherence to sterilization standards is necessary to minimize contamination risks and ensure procedural accuracy. However, variations in knowledge, compliance, and performance among radiologic technologists have been observed. This study examined the relationship between knowledge, compliance, and performance in infection control protocols among radiologic technologists in selected private hospitals in Las Piñas City. A descriptive-correlational research design was utilized, employing a validated researcher-made questionnaire. Data were analyzed using weighted mean and Pearson's correlation. Findings revealed that respondents demonstrated high levels of knowledge (3.47), compliance (3.55), and performance (3.50) in sterilization protocols. Correlation analysis indicated a moderate to high positive relationship between knowledge and compliance, and varying degrees of positive relationship between knowledge and performance, as well as compliance and performance. The study concludes that while radiologic technologists generally adhere to sterilization protocols, areas for improvement remain. Continuous training, regular monitoring, and reinforcement of standard protocols are recommended to further enhance compliance and performance in clinical practice.

Keywords: Knowledge, Compliance, Performance, Sterilization Process, Needle-Guided Biopsy, Radiologic Technologists

Introduction

Healthcare personnel are required to adhere to standardized protocols to prevent infection, ensure patient safety, and maintain a safe clinical environment. These protocols involve strict compliance with cleaning, disinfection, and sterilization procedures using methods such as steam, chemical, or gas sterilization. Global guidelines emphasize that effective infection prevention and control practices are essential in minimizing healthcare-associated infections among patients and healthcare workers (World Health Organization, 2025). In radiologic practice, particularly in invasive procedures such as needle-guided biopsy, maintaining

sterility is critical due to the increased risk of microorganism entry into sterile body sites (Centers for Disease and Prevention, 2024; Signore et al., 2021). Radiologic technologists play a vital role in ensuring sterile conditions, proper instrument handling, and adherence to aseptic techniques (Santos et al., 2024). Although such procedures generally demonstrate high success rates, complications such as infection may still occur, highlighting the need for strict procedural control (Sebelego & Horn-Lodewyk, 2025). This underscores the importance of consistent application of sterilization protocols, as even minor lapses in practice may compromise patient safety and clinical outcomes. In high-risk procedures like needle guided biopsy, where direct penetration of sterile tissues is involved, the margin for error is minimal. Thus, ensuring that radiologic technologists possess not only adequate knowledge, but also consistent compliance and high-level performance is critical in reducing preventable complications and improving quality of care. Existing literature indicates that compliance with sterilization protocols is influenced by knowledge, training, institutional policies, and workplace conditions (Rutala et al., 2024). Studies have shown that higher levels of knowledge improve adherence to infection control practices, while continuous education and institutional support enhance compliance (Amer, 2021). However, gaps remain as some healthcare professionals demonstrate only moderate understanding, which may affect proper implementation of sterilization procedures. Performance, defined as the actual execution of sterilization practice, is closely associated with both knowledge and compliance but may also be influenced by external factors such as workload and organizational support (Jimenez, et al., 2023). Despite advancements in sterilization technologies and updated global guidelines, variations in adherence and performance persist, particularly in private healthcare settings where resources, monitoring systems, and policy implementation may differ. Moreover, many studies focus primarily on general infection control awareness rather than the actual performance of radiologic technologists during invasive procedures. This creates a gap in understanding how knowledge translates into compliance and actual clinical practice, especially in specialized procedures such as needle-guided biopsy. This study was anchored on identifying competency gaps in radiologic technologists' knowledge, compliance, and performance regarding the sterilization process required for needle-guided biopsies. It examines how radiologic technologists adhere to hygiene practices, proper use of personal protective equipment (PPE), and equipment disinfection, while also evaluating their actual execution of sterilization steps during biopsy procedures. Furthermore, the study investigates the relationship among knowledge, compliance, and performance to determine how these variables influence one another. It also addresses broader concerns related to infection control, institutional readiness, and protocol standardization in selected private hospitals in Las Pinas City, where variations in resources and policy implementation may impact sterilization process. The significance of this study lies in its potential to provide evidence-based insights that can enhance infection control practices in radiologic settings. For radiologic technologists, the findings may serve as a basis for improving clinical competence and reinforcing adherence to sterilization protocols. For hospital administrators and policy makers, the study may inform the development of targeted training programs, stricter monitoring systems, and standardized institutional guidelines to ensure consistent and effective infection control practices. Ultimately, this study contributes to the broader goal of improving patient safety, reducing healthcare-associated infections, and strengthening the overall quality of healthcare delivery in invasive radiologic procedures.

Research Questions

The study aimed to determine areas of interest regarding radiologic technologists' knowledge, compliance, and performance in sterilization for needle-guided biopsy. The research focused on finding the answer to the following problems:

1. What is the radiologic technologists' level of knowledge in the sterilization process in needle-guided biopsy in terms of:
 - a. Procedural Knowledge
 - b. Infection Control Principles
 - c. Equipment/Material Knowledge
2. What is the radiologic technologists' level of compliance in the sterilization process in needle-guided biopsy in terms of:
 - a. Hygiene
 - b. Personal Protective Equipment
 - c. Equipment Disinfection
3. What is the radiologic technologists' level of performance in the sterilization process in needle-guided biopsy in terms of:
 - a. Preparation and Environment Readiness
 - b. Waste Disposal and Sharps Management
 - c. Overall Sterilization Performance Outcome
4. Is there a significant relationship between the level of knowledge and the level of compliance of radiologic technologists in the sterilization process in needle-guided biopsy?
5. Is there a significant relationship between the level of knowledge and the level of performance of radiologic technologists with the sterilization process in needle-guided biopsy?
6. Is there a significant relationship between the level of compliance and the level of performance of radiologic technologists in the sterilization process in needle-guided biopsy?
7. What intervention plans can be proposed to enhance the level of knowledge and improve the level of compliance and performance of radiologic technologists in the sterilization process in needle-guided biopsy?

Literature Review

Studies by Ablin et al. (2021), Alamer et al., (2022), and the World Health Organization (2025) emphasized the importance of infection prevention (IPC) in radiography and image-guided procedures, particularly in invasive interventions such as needle-guided biopsy. These studies highlight that adherence to aseptic techniques, proper sterilization, and safe waste management are essential in minimizing healthcare-associated infection (HAIs) and ensuring patient safety.

According to Alnahhal et al. (2023), Gareeballah et al. (2023), and Dihako et al. (2023), radiologic technologists generally possess moderate to high levels of knowledge in infection control. However, this knowledge does not consistently translate into compliance. Observational studies further reveal gaps between knowledge and actual practice, with inconsistencies noted in hand hygiene, PPE utilization, and equipment disinfection. (Lau et al., 2025; Khandaker et al., 2023; Awwad et al., 2023).

Bahegwa et al. (2024), Daba et al. (2023), and Chan et al. (2021) reported that infection control performance is influenced by factors such as resource availability, institutional policies, training, and workload. While compliance improved during the COVID-19 pandemic due to stricter enforcements were not consistently sustained post-pandemic. Additionally, improper waste segregation and sharps handling continue to pose risks (Adam et al., 2025; Janik-Karpinska et al., 2023).

Hagger & Hamilton (2025) and Kang & Bagaoisan (2024) implied that knowledge alone is insufficient to ensure compliance. Behavioral factors, attitudes, and institutional support significantly influence both compliance and performance. Educational interventions based on these frameworks have been shown to improve adherence to infection control protocols (Derakhshan et al., 2025).

Furthermore, Bhamidipati et al. (2021), Kühnel&Gühne(2024), Bellamy & Vickery (2024) and the Center for Disease Control and Prevention (2024) emphasized that effective sterilization relies on competent and accountable healthcare personnel. In radiologic procedures, particularly image-guided biopsies, strict adherence to sterilization and aseptic protocols is critical due to the invasive nature of infection and sample contamination (Graf et al., 2025; Planz & Galgano 2021; Rus et al., 2024).

Methodology

This study employed a quantitative descriptive-correlational design, a non-experimental approach used to describe variables that examine the relationships among them without manipulation. This design was appropriate as the study aimed to determine the levels of knowledge, compliance, and performance of radiologic technologists and examine the relationships among these variables in a real clinical setting. This descriptive component presented the current conditions, while the correlational component analyzed the associations among variables, providing a basis for evidence-based improvements in sterilization practices.

The researcher utilized primary data obtained from questionnaires completed by the respondents in the study, who were radiologic technologists currently employed at the selected hospitals in Las Piñas City. The total population was 50 and only 45 were included as the respondents of this study based on a soft calculator utilizing the 95% level of confidence and 5% margin of error. A Stratified Sampling technique was utilized to ensure participants had a direct experience relevant to the study variables. The targeted population for this study was 45 radiologic technologists currently employed in Las Piñas City.

The data-gathering instrument used in this study was a research-made questionnaire. The instrument consisted of (3) parts. Part 1, The Level of Knowledge of the sterilization process in needle-guided biopsy, Part 2, The Level of Compliance in the sterilization process in needle-guided biopsy, and the 3rd Part, The Level of Performance regarding the sterilization process in needle-guided biopsy. The self-developed questionnaires were validated by 3 experts to ensure the tool's effectiveness and trustworthiness in gathering meaningful data. These experts were comprised of a researcher, a statistician, a professor, and field expert, who scrutinized the questionnaire and suggested some modifications for its improvement. Moreover, to assess the instrument's reliability, a pilot study was conducted

for 25 respondents who met the study's inclusion criteria. Cronbach's alpha was used to test the internal consistency and reliability of the questions. The reliability of the instrument resulted in the following alpha values: (0.922) for Knowledge, (0.936) for Compliance, and (0.923) for Performance. These values indicate that the questionnaire achieved acceptable reliability, demonstrating strong internal consistency across its indicators. The printed survey questionnaires were distributed to the respondents face-to-face, and the results were treated with the utmost confidentiality. A total of 45 survey questionnaires were collected. The data was then collated, tabulated, and tallied before being given to the statistician for appropriate data analysis.

To understand the relationship between knowledge, compliance and performance, the following statistical tools were used in this study: (1) Weighted Mean was used to describe the a) Level of Knowledge of Radiologic Technologists, b) the Level of Compliance of Radiologic Technologists, and c) Level of Performance of Radiologic Technologists in the sterilization process in needle-guided biopsy and (2) Pearson r Moment Correlation Coefficient was used to determine the relationship between the a) Level of Knowledge and Level of Compliance of Radiologic Technologists, b) the Level of Knowledge and Performance of Radiologic Technologists, and c) Level of Compliance and Level of Performance of Radiologic Technologists in the sterilization process in needle-guided biopsy.

Results and Discussion

Level of Knowledge among Radiologic Technologists in Sterilization Process

Table 1

Level of Knowledge in Sterilization Process in terms of: Procedural Knowledge

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. The respondents' awareness of the correct sequence of preparing a sterile field prior to a needle-guided biopsy procedure is understood	3.56	Very High	6
2. The respondent knows when and how sterile gloves should be changed during needle-guided biopsy to maintain aseptic technique.	3.82	Very High	1.5
3. The respondent knows the proper method of assisting the radiologist while preserving sterility throughout the biopsy procedure.	3.67	Very High	4
4. The respondents' awareness of the appropriate post-procedure steps required to prevent contamination after completion of a needle-guided biopsy were understood.	3.60	Very High	5
5. The respondent knows how to identify and respond to a break in sterile technique during a needle-guided biopsy procedure.	3.22	High	10
6. The respondent knows how to properly organize sterile and non-sterile items on	3.78	Very High	3

the biopsy trays to prevent cross-contamination.

7. The respondent was aware of the appropriate course of action to take if sterility is compromised prior to patient contact during a needle-guided biopsy.	3.42	Very High	9
8. The respondent understood how to maintain sterility while adjusting equipment or imaging accessories during the biopsy procedure.	3.82	Very High	1.5
9. The respondent knows the correct steps for handling biopsy instruments when passing them between sterile and non-sterile team members.	3.53	Very High	7.5
10. The respondents' awareness of the proper workflow for completing sterilization-related tasks when multiple biopsy procedures are scheduled consecutively were maintained.	3.53	Very High	7.5
Average	3.46	Very High	

In table 1, it presented the level of knowledge of radiologic technologists in terms of procedural knowledge in the sterilization process during needle-guided biopsy procedures. The respondents demonstrated a very high level of procedural knowledge in several aspects of sterilization practices during needle-guided biopsy procedures. The highest-ranked indicators were knowing when and how to change sterile gloves to maintain aseptic technique (weighted mean 3.82; Rank 1.5) and maintaining sterility while adjusting imaging accessories during a biopsy procedure (weighted mean 3.82; Rank 1.5). This was followed by properly organizing sterile and non-sterile items on biopsy trays to prevent cross-contamination (weighted mean 3.78; Rank 3) and by understanding the proper method of assisting the radiologist while preserving sterility throughout the biopsy process (weighted mean 3.67; Rank 4). Additionally, respondents demonstrated very high knowledge in performing appropriate post-procedure steps to prevent contamination with an weighted mean of 3.60 (Rank 5), being aware of the correct sequence of preparing of a sterile field prior to the procedure with a weighted mean of 3.56 (Rank 6), and knowing the correct steps for handling biopsy instruments when transitioning between sterile and non-sterile team members with a weighted mean of 3.53 (Rank 7.5). Similarly, being aware of the proper workflow for completing sterilization-related tasks when multiple biopsy procedures were scheduled consecutively also yielded a weighted mean of 3.53 (Rank 7.5). Identifying the appropriate course of action when sterility was compromised prior to patient contact during the procedure ranked ninth with a weighted mean of 3.42 (Rank 9). Moreover, the lowest-ranked indicator was the statement that respondents do not know how to identify or respond to a break in sterile technique during a needle-guided biopsy procedure, with a weighted mean of 3.22 (Rank 10), although it was still verbally interpreted as "Very High". This result suggests that while respondents generally demonstrated strong procedural knowledge, they showed relatively lower competence in recognizing and managing breaches in sterile technique, a critical aspect of infection control.

The radiologic technologists' level of knowledge in sterilization in terms of procedural knowledge with an overall weighted mean of 3.46, verbally interpreted as "Very High", indicated that the respondents possess a very high level of procedural knowledge.

Table 2

Level of Knowledge in Sterilization Process in terms of: Infection Control Principles

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. The respondent comprehends the necessity of a rigorous aseptic technique during needle-guided biopsy.	3.58	Very High	7.5
2. The respondent comprehends the impact of hand hygiene technique and timing on the transmission of infections that are pertinent to needle-associated infections.	3.80	Very High	1
3. The respondent understood the routes of infection transmission relevant to needle-guided biopsy procedures.	3.71	Very High	4.5
4. The respondent understood how improper specimen handling can lead to healthcare-associated infections.	3.58	Very High	7.5
5. The respondent understood infection control principles that justify the use of sterile and single-use items during needle-guided biopsy.	3.51	Very High	9
6. The respondent understood how breaks in aseptic technique increase the risk of infection during invasive radiologic procedures.	3.40	Very High	10
7. The respondents understood the role of environmental cleanliness in preventing contamination during needle-guided biopsy procedures.	3.78	Very High	2.5
8. The respondent understands why invasive procedures require stricter infection control measures than routine imaging procedures.	3.78	Very High	2.5
9. The respondent understood how failure to follow infection control principles may affect patient outcomes following biopsy procedures.	3.71	Very High	4.5
10. The respondent comprehends the rationale behind institutional infection control policies that are implemented during needle-guided biopsy procedures.	3.60	Very High	6
Average	3.64	Very High	

As shown in table 2, it presents the level of knowledge of radiologic technologists in terms of infection control principles in the sterilization process during needle-guided biopsy procedures. The respondents demonstrated a very high level of knowledge of infection

control principles for needle-guided biopsy procedures. The highest-ranked indicator was comprehending the impact of hand hygiene technique and timing on the transmission of infections, with a weighted mean of 3.80 (Rank 1). This was followed by understanding the role of environmental cleanliness in preventing contamination with a weighted mean of 3.78 (Rank 2.5) and recognizing that invasive procedures require stricter infection control measures than routine imaging, also had the weighted mean of 3.78 (Rank 2.5). Additionally, respondents demonstrated very high knowledge of the routes of infection transmission relevant to needle-guided biopsy, with a weighted mean of 3.71 (Rank 4.5), and acknowledged that failure to follow infection control principles may affect patient outcomes, with the same weighted mean of 3.71 (Rank 4.5). They also demonstrated strong awareness of the rationale behind institutional infection control policies with a weighted mean of 3.60 (Rank 6), as well as the necessity of rigorous aseptic technique with a weighted mean of 3.58 (Rank 7.5) and the impact of improper specimen handling on healthcare-associated infections with the same weighted mean of 3.58 (Rank 7.5). Moreover, respondents indicated very high knowledge of infection control principles supporting the use of sterile and single-use items, with a weighted mean of 3.51 (Rank 9). However, the lowest-ranked indicator was understanding how breaks in aseptic technique increase the risk of infection during invasive radiologic procedures, with a weighted mean of 3.40 (Rank 10), although it remained verbally interpreted as "Very High."

The radiologic technologists' level of knowledge in sterilization in terms of infection control principles with the overall weighted mean of 3.64, verbally interpreted as "Very High", it indicated that the respondents possess a very high level of knowledge in terms of infection control principles, reflecting strong awareness of practices necessary to prevent infection and ensure patient safety.

Table 3

Level of Knowledge in Sterilization Process in terms of: Equipment/Material Knowledge

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. The respondent is knowledgeable of the biopsy instruments and accessories that must be sterile prior to patient contact.	3.31	Very High	7
2. The respondent knows the appropriate sterilization or high-level disinfection method for reusable biopsy equipment.	3.44	Very High	3.5
3. The respondent comprehends the necessity of verifying sterilization indicators before employing biopsy instruments.	3.40	Very High	5
4. The respondent knows the proper handling and opening technique for sterile biopsy packs to avoid contamination.	3.47	Very High	2
5. The respondent was familiar with which disinfectants or sterilization methods are appropriate for heat-sensitive biopsy equipment.	3.27	Very High	8
6. The respondent knows how to properly handle sterile biopsy instruments while	3.36	Very High	6

transferring them from storage to the procedure area.

7. The respondent knows the difference between cleaning, disinfection, and sterilization as applied to biopsy equipment and materials.	3.44	Very High	3.5
8. The respondent was knowledgeable that the sterility of sterile biopsy supplies can be compromised by improper storage.	3.62	Very High	1
9. The respondent knows the correct procedure for managing damaged or compromised sterile biopsy packing.	3.02	High	10
10. The respondent was knowledgeable about the impact of manufacturer instructions on the appropriate use and reprocessing of biopsy equipment and materials.	3.18	High	9
Average	3.35	Very High	

In table 3, it presented the level of knowledge of radiologic technologists in terms of equipment and material knowledge in the sterilization process during needle-guided biopsy procedures. The respondents demonstrated a very high level of knowledge in equipment and material handling related to needle-guided biopsy procedures. The highest-ranked indicator was knowledgeable that the sterility of biopsy supplies can be compromised by improper storage with a weighted mean of 3.62 (Rank 1). This was followed by knowing the proper handling and opening technique for sterile biopsy packs to avoid contamination with a weighted mean of 3.47 (Rank 2), and both knowing the appropriate sterilization or high-level disinfection method for reusable biopsy equipment with a weighted mean of 3.44 (Rank 3.5) and understanding the difference between cleaning, disinfection, and sterilization as applied to biopsy equipment and materials having the same weighted mean of 3.44 (Rank 3.5). Additionally, respondents demonstrated very high knowledge in comprehending the necessity of verifying sterilization indicators before using biopsy instruments with a weighted mean of 3.40 (Rank 5), properly handling sterile biopsy instruments when transferring them from storage to the procedure area with a weighted mean of 3.36 (Rank 6), and being knowledgeable about which biopsy instruments and accessories must be sterile prior to patient contact with a weighted mean of 3.31 (Rank 7). They also showed very high knowledge in identifying appropriate disinfectants or sterilization methods for heat-sensitive biopsy equipment, with a weighted mean of 3.27 (Rank 8). However, two indicators were verbally interpreted as "High" including knowledge of the impact of manufacturer instructions on the proper use and reprocessing of biopsy equipment and materials with a weighted mean of 3.18 (Rank 9) and knowledge of the correct procedure for managing damaged or compromised sterile biopsy packaging having a weighted mean of 3.02 (Rank 10), with the latter being the lowest-ranked indicator. Although these results still reflect a generally high level of knowledge, they suggest a lower level of familiarity with specific technical guidelines and contingency procedures related to equipment management.

The radiologic technologists' level of knowledge in sterilization in terms of equipment/material knowledge with an overall weighted mean of 3.35, interpreted as "Very High". It indicated that the radiologic technologists possess a very high level of knowledge regarding the proper use, handling, and sterilization of biopsy equipment and materials.

Table 4

Summary Table for the Radiologic Technologists' Level of Knowledge in Sterilization Process in Needle-Guided Biopsy

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. Procedural Knowledge	3.60	Very High	2
2. Infection Control Principles	3.64	Very High	1
3. Equipment/Material Knowledge	3.35	Very High	3
Overall Weighted Mean	3.47	Very High	

in table 4, among the three indicators, infection control principles obtained the highest weighted mean of 3.64 and ranked first, indicating that respondents demonstrate the strongest knowledge in understanding infection transmission, hand hygiene, environmental cleanliness, and adherence to infection control protocols. This is followed by procedural knowledge, which obtained a weighted mean of 3.60 and ranked second, reflecting a very high level of competence in performing proper sterilization procedures, maintaining sterile technique, and assisting during biopsy procedures while preserving aseptic conditions. Lastly, equipment and material knowledge, with a weighted mean of 3.35 and ranked third, also falls under the "Very High" category, indicating that respondents are knowledgeable in the proper handling, storage, sterilization, and management of biopsy instruments and materials, although comparatively lower than the other domains.

The radiologic technologists' level of knowledge in sterilization in needle-guided biopsy with an overall weighted mean of 3.47 verbally interpreted as "Very High," indicated that the radiologic technologists demonstrated a consistently very high level of knowledge across all domains of sterilization in needle-guided biopsy procedures, particularly in infection control principles.

Level of Compliance among Radiologic Technologists in Sterilization Process

Table 5

Level of Compliance in Sterilization Process in terms of: Hygiene

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. The respondent performs hand hygiene before assisting in needle-guided biopsy procedures.	3.76	Very High	1
2. The respondent performs hand hygiene after handling biopsy instruments or having patient contact.	3.73	Very High	2.5
3. The respondent follows proper hand hygiene protocols even during high-workload situations involving biopsy procedures.	3.73	Very High	2.5
4. The respondent complies with institutional hand hygiene guidelines during needle-guided biopsy procedures.	3.69	Very High	4
5. The respondent ensures that my hands are free from accessories (e.g., rings, watches) when assisting in sterile procedures.	3.40	Very High	8

6. The respondent performs hand hygiene before donning gloves for needle-guided biopsy procedures.	3.51	Very High	5
7. The respondent repeats hand hygiene after accidental contact with non-sterile surfaces during biopsy procedures.	3.16	High	9
8. The respondent does proper hand hygiene when moving between clean and contaminated tasks during biopsy procedures.	3.44	Very High	6
9. The respondent performs proper hand hygiene between consecutive biopsy cases without omission.	3.42	Very High	7
10. The respondent performs hand hygiene even when gloves are worn throughout the biopsy procedure.	3.00	High	10
Average	3.48	Very High	

Intable 5, the level of compliance of radiologic technologists in terms of hygiene in the sterilization process during needle-guided biopsy procedures. The respondents demonstrated a very high level of compliance with hygiene practices during needle-guided biopsy procedures. The highest-ranked indicator was routinely practicing hand hygiene before assisting in biopsy procedures, with a weighted mean of 3.76 (Rank 1). This was followed by performing hand hygiene after handling biopsy instruments or patient contact, with a weighted mean of 3.73 (Rank 2.5), and following proper hand hygiene protocols even during high-workload situations, having the same weighted mean of 3.73 (Rank 2.5). Furthermore, respondents showed very high compliance with institutional hand hygiene guidelines, with a weighted mean of 3.69 (Rank 4), and with performing hand hygiene before donning gloves, with a weighted mean of 3.51 (Rank 5). They also demonstrated very high compliance in observing hand hygiene when transitioning between clean and contaminated tasks with a weighted mean of 3.44 (Rank 6), performing proper hand hygiene between consecutive biopsy cases with a weighted mean of 3.42 (Rank 7), and ensuring that jewelry and accessories are removed before assisting in sterile procedures with a weighted mean of 3.40 (Rank 8). However, two indicators were verbally interpreted as "High," including repeating hand hygiene after accidental contact with non-sterile surfaces having a weighted mean of 3.16 (Rank 9) and performing hand hygiene even when gloves are worn throughout the biopsy procedure with a weighted mean of 3.00 (Rank 10), with the latter being the lowest-ranked indicator. These findings suggested that while respondents generally demonstrated strong compliance with hygiene practices, there were slight inconsistencies in critical behaviors, particularly in recognizing the need for hand hygiene despite glove use and after unintended contamination.

The radiologic technologists' level of compliance in sterilization in terms hygiene with an overall weighted mean of 3.48, interpreted as "Very High," indicated that respondents demonstrate a very high level of compliance with hygiene-related practices, suggesting they consistently adhere to proper infection control measures to ensure patient safety and prevent contamination.

Table 6

Level of Compliance in Sterilization Process in terms of: Personal Protective Equipment

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. The respondent uses appropriate PPE (e.g., gloves, mask, gown) during needle-guided biopsy procedures.	3.69	Very High	3.5
2. The respondent properly dons and doffs PPE correctly according to infection-control guidelines.	3.67	Very High	5
3. The respondent replaces PPE immediately when it becomes contaminated during biopsy procedures.	3.64	Very High	6.5
4. The respondent follows institutional protocols regarding PPE use for invasive radiologic procedures.	3.62	Very High	8
5. The availability of PPE does not limit the respondent's compliance with sterilization protocols.	3.64	Very High	6.5
6. The respondent selects the appropriate type of PPE based on the level of exposure risk during the biopsy procedure.	3.58	Very High	9
7. The respondent ensures that PPE is worn correctly and remains intact throughout the biopsy procedure.	3.84	Very High	1
8. The respondent consistently removes and disposes of used PPE according to infection-control guidelines after completing the biopsy procedure.	3.47	Very High	10
9. The respondent avoids touching non-clinical surfaces while wearing PPE during biopsy assistance.	3.69	Very High	3.5
10. The respondent complies with PPE requirements even when assisting briefly in biopsy procedures.	3.71	Very High	2
Average	3.56	Very High	

in table 6, the level of compliance among radiologic technologists with personal protective equipment (PPE) during needle-guided biopsy procedures.

The respondents demonstrated a very high level of compliance with the use of personal protective equipment (PPE) during needle-guided biopsy procedures. The highest-ranked indicator was ensuring that PPE was worn correctly and remained intact throughout the procedure, with a weighted mean of 3.84 (Rank 1). This was followed by adhering to PPE requirements even when assisting briefly with a weighted mean of 3.71 (Rank 2), and both using appropriate PPE, such as gloves, masks, and gowns, with a weighted mean of 3.69 (Rank 3.5) and avoiding contact with non-clinical surfaces while wearing PPE, having the same weighted mean of 3.69 (Rank 3.5). Moreover, respondents showed very high compliance in properly donning and doffing PPE according to infection control guidelines with a weighted mean of 3.67 (Rank 5), immediately replacing contaminated PPE with a weighted mean of 3.64 (Rank 6.5), and ensuring that PPE availability did not limit compliance with sterilization

protocols with the same weighted mean of 3.64 (Rank 6.5). They also demonstrated very high compliance in following institutional PPE protocols for invasive radiologic procedures, with a weighted mean of 3.62 (Rank 8), and selecting appropriate PPE based on exposure risk, with a weighted mean of 3.58 (Rank 9). However, the lowest-ranked indicator was the statement that respondents do not consistently remove and dispose of used PPE according to infection control guidelines after completing the biopsy procedure, with a weighted mean of 3.47 (Rank 10), although it was still verbally interpreted as “Very High.” This finding suggested that while overall compliance with PPE use was very high, there were minor inconsistencies in post-procedure PPE disposal practices.

With an overall weighted mean of 3.56, which was interpreted as “Very High” indicating that the radiologic technologists’ level of compliance in sterilization in terms of personal protective equipment usage demonstrated a very high level of compliance with PPE-related infection control practices and a reflecting strong adherence to safety protocols in clinical settings.

Table 7

Level of Compliance in Sterilization Process in terms of: Equipment Disinfection

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. The respondent properly disinfects biopsy-related equipment before and after each procedure.	3.76	Very High	1
2. The respondent follows the correct disinfectant contact time when cleaning biopsy equipment.	3.58	Very High	7.5
3. The respondent ensures that reusable biopsy instruments are properly sent for sterilization immediately after use.	3.67	Very High	3
4. The respondent complies with institutional guidelines on cleaning and disinfection of imaging equipment used during biopsy.	3.56	Very High	9
5. The respondent reports equipment contaminations or disinfection issues to the appropriate personnel.	3.64	Very High	4.5
6. The respondent ensures that biopsy-related equipment is cleaned prior to disinfection as required by protocol.	3.58	Very High	7.5
7. The respondent handles disinfected equipment properly to prevent re-contamination before use.	3.69	Very High	2
8. The respondent follows designated workflows when transporting contaminated biopsy equipment for reprocessing.	3.29	Very High	10
9. The respondent complies with disinfection protocols for imaging accessories (e.g., probes, cables,	3.64	Very High	4.5

positioning aids) used during biopsy procedures.			
10. The respondent consistently follows equipment disinfection protocols even when procedures are delayed or rescheduled.	3.62	Very High	6
Average	3.56	Very High	

As shown in table 7, it presents the level of compliance of radiologic technologists in the sterilization process in terms of equipment disinfection during needle-guided biopsy procedures. The respondents demonstrated a very high level of compliance in equipment disinfection practices during needle-guided biopsy procedures. The highest-ranked indicator was properly disinfecting biopsy-related equipment before and after each procedure, with a weighted mean of 3.76 (Rank 1). This was followed by properly handling disinfected equipment to prevent re-contamination before use (weighted mean 3.69; Rank 2) and by ensuring that reusable biopsy instruments were sent for sterilization immediately after use (weighted mean 3.67; Rank 3). Additionally, respondents exhibited very high compliance in reporting equipment contamination or disinfection issues (weighted mean of 3.64; Rank 4.5) and in properly disinfecting imaging accessories such as probes, cables, and positioning aids (weighted mean of 3.64; Rank 4.5). They also demonstrated very high compliance in consistently following disinfection protocols even when procedures were delayed or rescheduled with a weighted mean of 3.62 (Rank 6), following the correct disinfectant contact time with a weighted mean of 3.58 (Rank 7.5), and ensuring that equipment was cleaned prior to disinfection as required by protocol having the same weighted mean of 3.58 (Rank 7.5). Moreover, respondents showed very high compliance with institutional guidelines for cleaning and disinfection of imaging equipment used during biopsies, with a weighted mean of 3.56 (Rank 9). However, the lowest-ranked indicator was the statement that respondents sometimes ignore designated workflows when transporting contaminated biopsy equipment for reprocessing, with a weighted mean of 3.29 (Rank 10), although it was still verbally interpreted as "Very High." This finding suggested that while overall compliance with equipment disinfection was very high, occasional lapses in strictly following transport workflows may still occur, potentially increasing the risk of contamination if not consistently addressed.

The radiologic technologists' level of compliance in sterilization in terms of equipment disinfection with an overall weighted mean of 3.60, interpreted as "Very High," indicated that radiologic technologists demonstrate a very high level of compliance with equipment disinfection protocols, reflecting strong adherence to infection control standards necessary to ensure patient safety and prevent contamination.

Table 8

Summary Table for the Radiologic Technologists' Level of Compliance in Sterilization Process in Needle-Guided Biopsy

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. Hygiene	3.48	Very High	3
2. Personal Protective Equipment	3.56	Very High	2
3. Equipment Disinfection	3.60	Very High	1
Overall Weighted Mean	3.55	Very High	

As shown in table 8, as it presents the summary of the radiologic technologists' level of compliance in the sterilization process in needle-guided biopsy procedures across the areas of hygiene, personal protective equipment, and equipment disinfection, among the three indicators, "Equipment Disinfection" obtained the highest weighted mean of 3.60 and ranked first, indicating that respondents are most compliant in properly cleaning, disinfecting, and handling biopsy-related equipment. This suggests strong adherence to protocols that prevent cross-contamination and ensure the sterility of instruments used during procedures. "Personal protective equipment (PPE)" ranked second with a weighted mean of 3.56, also interpreted as "Very High," demonstrating that respondents consistently comply with the proper use of protective barriers such as gloves, masks, and other PPE to reduce exposure to infectious agents. Meanwhile, "Hygiene" had the lowest weighted mean of 3.48, although it was still verbally interpreted as "Very High," indicating that respondents maintain a high level of compliance with hygiene practices such as hand hygiene and environmental cleanliness, albeit slightly lower than for the other indicators.

The radiologic technologists' level of compliance on sterilization in needle-guided biopsy with an overall weighted mean of 3.55, verbally interpreted as "Very High," indicated that the radiologic technologists in selected hospitals in Las Pinas City demonstrate a very high level of compliance with sterilization and infection control protocols, reflecting consistent adherence to practices that ensure patient safety and minimize the risk of contamination.

Level of Performance among Radiologic Technologists in Sterilization Process

Table 9

Level of Performance in Sterilization Process in terms of: Preparation and Environment Readiness

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. The respondent consistently prepares the biopsy area to ensure that all required sterile supplies are available before patient positioning.	3.80	Very High	1.5
2. The respondent performs hand hygiene at the appropriate time prior to setting up the sterile biopsy tray.	3.73	Very High	3
3. The respondent ensures that the field is properly established and protected from contamination throughout the setup process.	3.80	Very High	1.5
4. The respondent verifies the sterility status of biopsy instruments and materials before they are introduced into the procedure area.	3.58	Very High	5
5. The respondent immediately corrects or reports any observed break in environmental or procedural sterility before the biopsy begins.	3.31	Very High	9

6. The respondent organizes sterile and non-sterile items on the biopsy tray in a manner that prevents cross-contamination.	3.31	Very High	9
7. The respondent ensures that environmental surfaces within the biopsy area are clean before sterile setup begins.	3.69	Very High	4
8. During biopsy preparations, the respondent was consistent in maintaining a distinct separation between sterile and non-sterile zones.	3.31	Very High	9
9. The respondent adjusts to biopsy setups as needed to maintain sterility when equipment or patient positioning changes.	3.36	Very High	7
10. The respondent confirms that all required sterilization-related supplies are within reach before the biopsy procedure starts.	3.56	Very High	6
Average	3.54	Very High	

In table 9, it presents the level of performance of radiologic technologists in the sterilization process in terms of preparation and environmental readiness during needle-guided biopsy procedures. The radiologic technologists' level of performance in sterilization in terms of preparation and environment readiness with an overall weighted mean of 3.54, verbally interpreted as "Very High" indicated that the respondents demonstrate a very high level of performance in preparing the biopsy environment and ensuring readiness for sterile procedures. The highest-ranked indicators were consistently preparing the biopsy area to ensure all required sterile supplies were available before patient positioning, with a weighted mean of 3.80 (Rank 1.5), and ensuring that the sterile field was properly established and protected from contamination throughout the setup process, having the same weighted mean of 3.80 (Rank 1.5). This was followed by performing and verifying appropriate timing, prior to setting up the sterile biopsy tray with a weighted mean of 3.73 (Rank 3), and by ensuring that environmental surfaces within the biopsy area were clean before sterile setup began, with a weighted mean of 3.69 (Rank 4). Furthermore, respondents exhibited very high performance in verifying the sterility status of biopsy instruments and materials before introduction into the procedure area, with a weighted mean of 3.58 (Rank 5), and confirming that all required sterilization-related supplies were within reach before the procedure started, with a weighted mean of 3.56 (Rank 6). They also demonstrated very high performance in adjusting the biopsy setup as needed to maintain sterility during changes in equipment or patient positioning, with a weighted mean of 3.36 (Rank 7). However, the lowest-ranked indicators included immediately correcting or reporting any observed break in sterility before the biopsy began with a weighted mean of 3.31, (Rank 9), organizing sterile and non-sterile items to prevent cross-contamination having the same weighted mean of 3.31 (Rank 9), and the statement indicating that respondents sometimes failed to maintain consistent separation between sterile and non-sterile zones during preparation still having the same weighted mean of 3.31 (Rank 9). Although these indicators were still verbally interpreted as "Very High," the results suggested slight inconsistencies in maintaining strict sterile boundaries and promptly addressing sterility breaches.

This suggests that radiologic technologists were highly competent at maintaining a safe, sterile environment before and during biopsy procedures, which were essential for

preventing contamination and ensuring patient safety. The findings indicated that radiologic technologists demonstrated a very high level of performance in preparation and environmental readiness, particularly in ensuring the availability of supplies, maintaining a sterile field, and verifying equipment sterility. However, the relatively lower-ranked indicators highlighted the need for continuous reinforcement and monitoring to ensure consistent adherence to optimal sterilization practices.

Table 10

Level of Performance in Sterilization Process in terms of: Waste Disposal and Sharps Management

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. The respondents disposed of used biopsy needles and other sharps immediately after use in designated sharps containers.	3.73	Very High	3.5
2. The respondent segregates contaminated materials from non-contaminated waste according to infection control protocols.	3.69	Very High	6
3. The respondent avoids recapping or manipulating used biopsy needles to reduce the risk of sharps injury.	3.24	High	10
4. The respondent ensures that sharps containers are not overfilled during or after biopsy procedures.	3.76	Very High	2
5. The respondent follows proper procedures when handling and disposing of body-related waste to prevent cross-contamination.	3.71	Very High	5
6. The respondent dispose of sharps at the point of use without placing them on procedure surfaces.	3.27	Very High	9
7. The respondent ensures sharps containers were readily accessible during needle-guided biopsy procedures.	3.73	Very High	3.5
8. The respondent adheres to institutional protocols when managing accidental sharp exposure incidents.	3.36	Very High	8
9. The respondent secures and closes sharps containers properly when they reach the recommended level.	3.62	Very High	7
10. The respondent maintains proper hand hygiene immediately after handling sharps or contaminated waste.	3.84	Very High	1
Average	3.60	Very High	

The table 10 presents the level of performance of radiologic technologists in the sterilization process, specifically in waste disposal and sharps management, during needle-guided biopsy procedures. The respondents demonstrated a very high level of performance in waste disposal and sharps management during needle-guided biopsy procedures. The highest-ranked indicator was maintaining proper hand hygiene immediately after handling

sharp or contaminated waste with a weighted mean of 3.84 (Rank 1). This was followed by ensuring that sharps containers were not overfilled during or after procedures with a weighted mean of 3.76 (Rank 2), and both ensuring that sharps containers were readily accessible with a weighted mean of 3.73 (Rank 3.5) and disposing of used biopsy needles and sharps immediately after use in designated containers having the same weighted mean of 3.73 (Rank 3.5). Additionally, respondents exhibited very high performance in following proper procedures when handling and disposing of body-related waste to prevent cross-contamination with a weighted mean of 3.71 (Rank 5), segregating contaminated from non-contaminated waste according to infection control protocols with a weighted mean of 3.69 (Rank 6), and properly securing and closing sharps containers at the recommended fill level with a weighted mean of 3.62 (Rank 7). They also demonstrated very high performance in adhering to institutional protocols when managing accidental sharps exposure incidents, with a weighted mean of 3.36 (Rank 8), and in ensuring proper disposal of sharps at the point of use without placing them on procedural surfaces, with a weighted mean of 3.27 (Rank 9). However, the lowest-ranked indicator was avoiding recapping or manipulating used biopsy needles to reduce the risk of sharps injury, with a weighted mean of 3.24 (Rank 10), which was verbally interpreted as "High." This finding suggested that while respondents generally demonstrated strong performance in waste disposal and sharps management, there was relatively lower consistency in avoiding unsafe practices such as needle recapping, which remains a critical risk factor for occupational injury.

The radiologic technologists' level of performance in sterilization in terms of waste disposal and sharps management with an overall weighted mean of 3.60, interpreted as "Very High" indicated that respondents demonstrated a very high level of performance in properly managing waste and sharps, reflecting strong adherence to infection control protocols and patient safety standards. Proper handling and disposal of healthcare waste are critical in preventing infection and ensuring occupational safety.

Table 11

Level of Performance in Sterilization Process in terms of: Overall Sterilization Performance Outcome

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. The respondent consistently maintains aseptic technique throughout all phases of the needle-guided biopsy procedure.	3.62	Very High	1
2. The respondent could complete biopsy-related sterilization tasks without compromising the sterile field.	3.42	Very High	6
3. The respondent promptly recognizes and appropriately manages any breach in sterility during the procedure.	3.40	Very High	7
4. The respondent adheres to institutional sterilization and infection control protocols even during high workload or time-pressure situations.	3.58	Very High	2
5. The respondent's sterilization practices during the needle-guided biopsy met the	3.53	Very High	3.5

required standards for patient and staff safety.			
6. The respondent consistently completed all the required sterilization-related tasks according to the standard biopsy workflow.	3.49	Very High	5
7. The respondent maintains their sterile technique while coordinating with other team members during the biopsy procedure.	3.53	Very High	3.5
8. In the event of unforeseen circumstances, the respondent could modify their sterilization practices without compromising patient safety.	3.11	High	8
9. The respondent ensures that no contaminated equipment or materials remain in the procedure area after biopsy completion.	2.93	High	10
10. The respondent demonstrated consistent adherence to sterilization standards across repeated needle-guided biopsy procedures.	3.02	High	9
Average	3.36	Very High	

As shown in Table 11, the level of performance of radiologic technologists in the sterilization process in terms of overall sterilization performance outcome during needle-guided biopsy procedures. The highest-ranked indicator consistently maintains aseptic technique throughout all phases of the procedure with a weighted mean of 3.62 (Rank 1). This was followed by adhering to institutional sterilization and infection control protocols even during high workload situations with a weighted mean of 3.58 (Rank 2), and both ensuring that sterilization practices met required safety standards with a weighted mean of 3.53 (Rank 3.5) and maintaining sterile technique while coordinating with team members, having the same weighted mean of 3.53 (Rank 3.5). Additionally, respondents exhibited very high performance in consistently completing sterilization-related tasks according to standard workflow with a weighted mean of 3.49 (Rank 5), completing tasks without compromising the sterile field with a weighted mean of 3.42 (Rank 6), and promptly recognizing and managing breaches in sterility with a weighted mean of 3.40 (Rank 7). However, lower-ranked indicators were observed in the ability to modify sterilization practices during unforeseen circumstances without compromising safety with a weighted mean of 3.11 (Rank 8), demonstrating consistent adherence across repeated biopsy procedures with a weighted mean of 3.02 (Rank 9), and ensuring that no contaminated equipment or materials remained in the procedure area after completion with a weighted mean of 2.93 (Rank 10), with the latter being the lowest-ranked indicator. Although these were still interpreted as “High,” the results suggested slight inconsistencies in adaptability, post-procedure checks, and maintaining uniform adherence across repeated procedures.

The radiologic technologists’ level of performance in sterilization in terms of overall sterilization with an overall weighted mean of 3.36, verbally interpreted as “Very High” indicated that the respondents demonstrated a very high level of performance in maintaining sterilization standards, reflecting strong adherence to infection control protocols and safe clinical practices.

Table 12

Summary Table for the Radiologic Technologists' Level of Performance in Sterilization Process in Needle-Guided Biopsy

INDICATOR	WEIGHTED MEAN	VERBAL INTERPRETATION	RANK
1. Preparation and Environment Readiness	3.54	Very High	2
2. Waste Disposal and Sharps Management	3.60	Very High	1
3. Overall Sterilization Performance Outcome	3.36	Very High	3
Overall Weighted Mean	3.50	Very High	

In table 12, which presents the summary of the level of performance of radiologic technologists in the sterilization process during needle-guided biopsy procedures across three key indicators—preparation and environmental readiness, waste disposal and sharps management, and overall sterilization performance—each indicator was verbally interpreted as “Very High.” Among these, waste disposal and sharps management obtained the highest weighted mean with 3.60 (Rank 1), indicating excellent performance in handling, segregating, and disposing of sharp and contaminated waste in accordance with established safety protocols. This was followed by preparation and environmental readiness, with a weighted mean of 3.54 (Rank 2), suggesting that respondents were highly capable of preparing the clinical environment and ensuring readiness before performing needle-guided biopsy procedures. Meanwhile, the overall sterilization performance outcome obtained the lowest weighted mean of 3.36 (Rank 3), although it was interpreted as “Very High,” it indicated relatively lower performance compared to the other indicators, particularly in maintaining consistency and adaptability across varying procedural situations.

Overall, the radiologic technologists' level of performance in sterilization had an overall weighted mean of 3.50, interpreted as “Very High,” indicated that respondents consistently maintained high levels of adherence to sterilization standards, reflecting strong adherence to infection control protocols and safe clinical practices.

Relationship between the Radiologic Technologists' Level of Knowledge and the Level of Compliance in the Sterilization Process in Needle-Guided Biopsy

Table 13

Relationship between the Radiologic Technologists' Level of Knowledge and the Level of Compliance in the Sterilization Process in Needle-Guided Biopsy

KNOWLEDGE	COMPLIANCE			FINDINGS
	HYGIENE	PERSONAL PROTECTIVE EQUIPMENT	EQUIPMENT DISINFECTION	
PROCEDURAL KNOWLEDGE	r=0.408** Moderate Correlation p=0.005	r=0.701** Moderate Correlation p=0.000	r=0.757** Moderate Correlation p=0.000	SIGNIFICANT
INFECTION CONTROL PRINCIPLES	r=0.734** Moderate Correlation p=0.000	r=0.598** Moderate Correlation p=0.000	r=0.673** Moderate Correlation p=0.000	SIGNIFICANT
EQUIPMENT/MATERIAL KNOWLEDGE	r=0.699** Moderate Correlation p=0.000	r=0.659** Moderate Correlation p=0.000	r=0.702** Moderate Correlation p=0.000	SIGNIFICANT

**Significant @ 0.01

As shown in Table 13, the significant relationship between the radiologic technologists' level of knowledge and the level of compliance in the sterilization process in needle-guided biopsy resulted in an r value of 0.408 to 0.757, suggesting a moderate to high positive correlation strength with a statistically significant p-value of $0.000 < 0.05$ threshold level. Since the p-value is less than the 0.05 threshold level.

In addition, the strongest relationship was observed between radiologic technologists' knowledge and compliance in sterilization processes, as indicated by the correlation between procedural knowledge and equipment disinfection ($r=0.757$, $p=0.00$), which shows the highest positive correlation among all variables. Moreover, high correlations were also observed between infection control principles and hygiene ($r=0.734$) and equipment disinfection ($r=0.702$), both statistically significant at the 0.01 level.

Overall, the results imply a statistically significant relationship between radiologic technologists' level of knowledge and compliance with the sterilization process in needle-guided biopsy. This means that radiologic technologists with greater knowledge demonstrate higher compliance with sterilization protocols during needle-guided biopsy procedures.

Relationship between the Radiologic Technologists' Level of Knowledge and the Level of Performance in Sterilization Process in Needle-Guided Biopsy

Table 14

Relationship between the Radiologic Technologists' Level of Knowledge and the Level of Performance in Sterilization Process in Needle-Guided Biopsy

KNOWLEDGE	PERFORMANCE			FINDINGS
	PREPARATION AND ENVIRONMENT READINESS	WASTE DISPOSAL AND SHARPS MANAGEMENT	OVERALL STERILIZATION PERFORMANCE OUTCOME	
PROCEDURAL KNOWLEDGE	r=0.641** Moderate Correlation p=0.000	r=0.008 Negligible Correlation p=0.957	r=0.716* Moderate Correlation p=0.000	NOT SIGNIFICANT
INFECTION CONTROL PRINCIPLES	r=0.737** Moderate Correlation p=0.000	r=0.620** Moderate Correlation p=0.000	r=0.611** Moderate Correlation p=0.000	SIGNIFICANT
EQUIPMENT/MATERIAL KNOWLEDGE	r=0.685** Moderate Correlation p=0.000	r=0.443** Moderate Correlation p=0.000	r=0.719** Moderate Correlation p=0.000	SIGNIFICANT

**Significant @ 0.01

In table 14, the significant relationship between radiologic technologists' level of knowledge and performance in the needle-guided biopsy sterilization process resulted in an r value of 0.008 to 0.737, suggesting a negligible to high positive correlation, with p-values of 0.000 to 0.957.

In addition, the highest correlation was observed between equipment/material knowledge and overall sterilization performance ($r=0.719$, $p=0.000$), indicating a moderate but the strongest positive relationship among all variables. This result clearly indicated that technologists who were more knowledgeable about equipment and materials tended to achieve better overall sterilization during needle-guided biopsy.

Furthermore, the highest correlation was observed between infection control principles and preparation and environment readiness ($r=0.737$), and between procedural knowledge and overall performance ($r=0.716$), both statistically significant at the 0.01 level.

However, procedural knowledge shows a negligible, non-statistically significant relationship with waste disposal and sharps management ($r=0.008$, $p=0.957$), suggesting that performance may depend on factors beyond procedural understanding. This indicates that as knowledge levels increase, radiologic technologists' performance in needle biopsy sterilization also improves.

Relationship between the Radiologic Technologists' Level of Compliance and the Level of Performance in the Sterilization Process in Needle-Guided Biopsy

Table 15

Relationship between the Radiologic Technologists' Level of Compliance and the Level of Performance in the Sterilization Process in Needle-Guided Biopsy

COMPLIANCE	PERFORMANCE			FINDINGS
	PREPARATION AND ENVIRONMENT READINESS	WASTE DISPOSAL AND SHARPS MANAGEMENT	OVERALL STERILIZATION PERFORMANCE OUTCOME	
HYGIENE	$r=0.801^{**}$ High Correlation $p=0.000$	$r=0.382^{*}$ Low Correlation $p=0.010$	$r=0.656^{**}$ Moderate Correlation $p=0.000$	SIGNIFICANT
PERSONAL PROTECTIVE EQUIPMENT	$r=0.828^{**}$ High Correlation $p=0.000$	$r=0.281$ Low Correlation $p=0.062$	$r=0.771^{**}$ Moderate Correlation $p=0.000$	SIGNIFICANT
EQUIPMENT DISINFECTION	$r=0.875^{**}$ High Correlation $p=0.000$	$r=0.234$ Low Correlation $p=0.122$	$r=0.847^{**}$ Moderate Correlation $p=0.000$	NOT SIGNIFICANT

**Significant 0.01, *Significant @ 0.05

In table 15, the significant relationship between radiologic technologists' level of compliance and performance in the needle-guided biopsy sterilization process resulted in an r value of 0.234 to 0.875, suggesting a low to high positive correlation, with p -values of 0.000 to 0.122.

In addition, the strongest relationship was observed between equipment disinfection and preparation and environment readiness ($r = 0.875$, $p = 0.000$), indicating a high, statistically significant correlation. This clearly suggests that strict compliance with proper equipment disinfection is strongly associated with better performance in preparing and maintaining a sterile environment during needle-guided biopsy.

Similarly, personal protective equipment also shows a high correlation with preparation and environmental readiness ($r = 0.828$, $p = 0.000$), and hygiene shows a high

correlation ($r = 0.801$, $p = 0.000$), which supports the idea that adherence to key sterilization practices greatly enhances performance. Additionally, the equipment disinfection also has a high correlation with the overall performance outcome ($r = 0.847$, $p = 0.000$). However, the compliance shows a low, and in some cases not statistically significant, relationship with waste disposal and sharps management, suggesting that the aspects of performance were influenced by other factors. These results clearly suggest that strict compliance with proper equipment disinfection is strongly associated with better performance in preparing and maintaining a sterile environment during needle-guided biopsy. The findings suggest that improved compliance contributes to higher sterilization performance among radiologic technologists in needle-guided biopsy procedures.

Proposed Action Plan to sustain the level of knowledge, compliance, and performance of radiologic technologists in the sterilization process in needle-guided biopsy

RATIONALE: Based on the findings, which showed high levels of knowledge, compliance, and performance, there were varying strengths in their relationships. This indicates that, although these factors are significantly related, inconsistencies persist in practice. Therefore, interventions such as continuous education, protocol reinforcement, skills training, and regular monitoring are necessary to strengthen these variables and ensure consistent application of infection control practices. These efforts aim to enhance overall performance and promote safe and effective sterilization procedures.

Table 16

Action Plan to sustain the level of knowledge, compliance, and performance of radiologic technologists in the sterilization process in needle-guided biopsy

Objectives	Activities	Time Frame	Person Involved	Budget Allocation	Success Indicator
Knowledge Gaps and Need for Continuous Learning	Conduct seminars, workshops, and updates on sterilization and infection control practices to enhance knowledge and ensure updated competencies.	Chief Radiologic Technologist, Infection Control Nurse, Hospital Training Officer	Semi-Annual	₱20,000 – ₱30,000 per training	Increased in knowledge assessment scores; Training attendance rate 90%.
Inconsistent Compliance with Protocols	Implementation of standardized operating procedures, posting of visual reminders, and strict policy enforcement in all radiology areas	Department Head, Quality Assurance Officer	Continuous (with quarterly review)	₱5,000 (for printing materials)	Compliance audit results 95%; Reduced protocol violations.
Variability in Performance of Procedures	Hands-on training, return demonstrations, and periodic competency evaluations.	Senior Radiologic Technologist, Clinical Instructors	Annually	₱15,000 – ₱25,000	Competency scores 90%; Reduced procedural errors.

Conclusion

Based on the findings, radiologic technologists demonstrated high levels of knowledge, compliance and performance in sterilization process for needle-guided biopsy procedures, indicating adequate understanding, consistent adherence, and effective application of sterilization practices. The results further revealed that higher levels of knowledge were generally associated with increased compliance and improved performance, highlighting the important role of knowledge in promoting proper sterilization practices. However, the relationship between knowledge and performance, as well as compliance and performance, was not consistently significant across all areas, suggesting that factors beyond knowledge and compliance may also influence the execution of sterilization procedures. Overall, while compliance contributes to improved performance, it does not solely determine it. Therefore, the implementation of targeted intervention programs is recommended to further enhance the knowledge, compliance, and performance of radiologic technologists in sterilization practices.

References

- Ablin, C. L., Naim, S., & Borja, B. R. (2021). Knowledge, attitudes, and practices of radiographers towards aseptic techniques in emergency and trauma imaging. *DOAJ (DOAJ: Directory of Open Access Journals)*. <https://doi.org/10.5281/zenodo.5039651>
- Adam, A., Anyiam, F., Shube, M., Mohamed, H., Ahmed, H., & Osman, N. (2025). Assessment of medical waste segregation, disposal practices for infectious and sharps waste in healthcare facilities in Somalia: Implications for infection prevention and control. *Infection and Drug Resistance, Volume 18*, 3605–3615. <https://doi.org/10.2147/idr.s525134>
- Alamer, A., Alharbi, F., Aldhilan, A., Almushayti, Z., Alghofaily, K., Elbehiry, A., & Abalkhail, A. (2022). Healthcare-Associated Infections (HAIS): Challenges and measures taken by the Radiology Department to control infection transmission. *Vaccines, 10(12)*, 2060. <https://doi.org/10.3390/vaccines10122060>
- Amer, F. (2021). GUIDE TO INFECTION CONTROL IN THE HEALTHCARE SETTING. In *Infection Prevention and Control in the Radiology Department/Service*. https://isid.org/wp-content/uploads/2021/09/ISID_GUIDE_IPC-IN-THE-RADIOLOGY-DEPARTMENT.pdf
- Alnahhal, M., Mostafa, S. A., Mostafa, A. A., & Abu-Odah, H. (2023). Infection control knowledge and practices among radiographers at government hospitals in the Gaza Strip-Palestine: A cross-sectional study. *Radiography, 29(3)*, 509–513. <https://doi.org/10.1016/j.radi.2023.02.023>
- Awwad, D. A., Hill, S., Lewis, S., & Jimenez, Y. (2023b). Knowledge, attitudes and practice of infection prevention and control in the CT suite. *BMC Health Services Research, 23(1)*, 741. <https://doi.org/10.1186/s12913-023-09779-9>
- Bahegwa, R. P., Hokororo, J. C., Msigwa, Y. S., Ngowi, R. R., German, C. J., Marandu, L., Nasoro, O. A., Kinyenje, E. S., Degeh, M. M., Masuma, J. S., Lutkam, D. S., & Eliakimu, E. S. (2024). Infection prevention and control compliance during COVID-19 pandemic era: assessment of 26 regional referral hospitals in Tanzania. *Discover Health Systems, 3(1)*. <https://doi.org/10.1007/s44250-024-00078-6>
- Bellamy, D. & Vickery, K. (2025). Validation of performance qualification of ultrasound probe high-level disinfection devices in clinical settings. *Infection, Disease & Health, 31(1)*, 100387. <https://doi.org/10.1016/j.2025.08.004>

- Bhamidipati, D., Verma, A., Sui, D., Maru, D., Mathew, G., Lang, W., Posadas, J., Hein, J., Kopetz, S., Futreal, A., Wistuba, I. I., Gupta, S., Lee, J. J., Overman, M. J., & Tam, A. L. (2021). An analysis of research biopsy core variability from over 5000 prospectively collected core samples. *Npj Precision Oncology*, 5(1), 94. <https://doi.org/10.1038/s41698-021-00234-8>
- Chan, W. P., Yao, M., Lin, M., Chang, H., Kosik, R. O., & Lee, W. (2021). Management and infection control practices in a Taiwanese radiology department during the COVID-19 outbreak. *Journal of Microbiology Immunology and Infection*, 54(3), 349–358. <https://doi.org/10.1016/j.jmii.2021.03.012>
- Centers for Disease Control and Prevention. (2024). Core infection prevention and control practices for safe healthcare delivery in all settings. <https://www.cdc.gov/infection-control/hcp/core-practices/index.html>
- Daba, C., Atamo, A., Weldehanna, D. G., Oli, A., Debela, S. A., Luke, A. O., & Gebrehiwot, M. (2023). Infection prevention and control compliance of healthcare workers towards COVID-19 in conflict-affected public hospitals of Ethiopia. *BMJ Open*, 13(12), e074492. <https://doi.org/10.1136/bmjopen-2023-074492>
- Derakhshan, Z., Omidian, M. A., Rakhshani, T., Golab, F. G., & Jeihooni, A. K. (2025b). Investigating impact of theory of planned behavior-based educational intervention on HIV screening among healthcare staff. *BMC Health Services Research*, 25(1), 1170. <https://doi.org/10.1186/s12913-025-13401-5>
- Dihako, W., Amkongo, M., Karera, A., & Shilumba, M. (2023). Knowledge, attitude, and practices of infection prevention and control among radiographers in a resource constraint setting in Namibia. *Journal of Public Health in Africa*, 14(3), 6. <https://doi.org/10.4081/jphia.2023.2149>
- Gareeballah, A., Al-Sehli, S. M., Al-Mutairi, R. T., Gameraddin, M., Alsharif, W., Elzaki, M., Alshoabi, S. A., Alsultan, K. D., Alzain, A. F., Omer, A. M., & Hamd, Z. Y. (2023). Assessment of the Knowledge and Practice of Infection Control among Radiographers in Saudi Arabia: A Cross-Sectional Survey Study. *Healthcare*, 11(21), 2817. <https://doi.org/10.3390/healthcare11212817>
- Graf, M., Graf, C., Ziegelmayr, S., Marka, A. W., Makowski, M., Teumer, Y., Paprottka, P., Willemsen, N., & Nadjiri, J. (2025). Complications of image-guided liver biopsies: Results of a nationwide database analysis. *PLoS ONE*, 20(5), e0323695. <https://doi.org/10.1371/journal.pone.0323695>
- Hagger, M. S., & Hamilton, K. (2025). Progress on theory of planned behavior research: advances in research synthesis and agenda for future research. *Journal of Behavioral Medicine*, 48(1), 43–56. <https://doi.org/10.1007/s10865-024-00545-8>
- Janik-Karpinska, E., Brancaloni, R., Niemcewicz, M., Wojtas, W., Foco, M., Podogrocki, M., & Bijak, M. (2023). Healthcare Waste—A Serious Problem for Global Health. *Healthcare*, 11(2), 242. <https://doi.org/10.3390/healthcare11020242>
- Jimenez, Y. A., & Lewis, S. J. (2023). Infection prevention and control in the medical imaging environment: a scoping review. *Insights Into Imaging*, 14(1), 121. <https://doi.org/10.1186/s13244-023-01470-1>
- Jimenez, Y. A., Hill, S., & Lewis, S. J. (2023). Infection prevention and control in medical imaging surveys: The need to map to guidelines to address systemic issues? *Infection Disease & Health*, 28(2), 102–114. <https://doi.org/10.1016/j.idh.2023.01.001>

- Kang, K., & Bagaoisan, M. a. P. (2024b). Research status of the Knowledge-Attitude-Practice Theory Model in gastric cancer Prevention. *Cureus*, 16(7), e64960. <https://doi.org/10.7759/cureus.64960>
- Khandaker, M. U., Abuzaid, M. M., Mohamed, I. A., Yousef, M., Jastaniah, S., Alshammari, Q. T., Alghamdi, S. S., Osman, H., Ahmed, A. M., Musa, A., Medani, A. M. A., Lam, S., & Bradley, D. (2023). Investigation of the Radiographer's adherence and compliance with radiation protection and infection control practices during COVID-19 mobile radiography. *Radiation Physics and Chemistry*, 210, 111023. <https://doi.org/10.1016/j.radphyschem.2023.111023>
- Kühnel, C., & Gühne, F. (2024). Visualization of effectiveness: the use of a set of colored cleaning wipes for visible disinfection of ultrasound probes. *Hygiene*, 4(2), 189–196. <https://doi.org/10.3390/hygiene4020015>
- Lau, L. H. W., Tse, F. W. F., Suen, L. K. P., & Lam, S. C. (2025). Compliance with infection control practices among healthcare workers in radiology departments: a participant observation study and adenosine triphosphate assay evaluation of environmental cleanliness. *Infection Prevention in Practice*, 7(2), 100441. <https://doi.org/10.1016/j.infpip.2025.100441>
- Planz, V., & Galgano, S. J. (2021). Percutaneous biopsy and drainage of the pancreas. *Abdominal Radiology*, 47(8), 2584–2603. <https://doi.org/10.1007/s00261-021-03244-z>
- Rus, M., Popescu, M. I., Ardelean, I. A., Andronie-Cioară, F. L., Bonțea, M. G., Vicaș, R. M., & Bogdan, I. D. (2024). The role of fine-needle aspiration biopsy in the diagnosis of malignant tumors. *Romanian Journal of Morphology and Embryology*, 65(1), 81–87. <https://doi.org/10.47162/rjme.65.1.10>
- Rutala, W. A., Donskey, C. J., & Weber, D. J. (2023). Disinfection and Sterilization: New Technologies. *American Journal of Infection Control*, Volume 51, Issue 11, A13 – A21. [https://www.ajicjournal.org/article/S0196-6553\(23\)00004-4/fulltext](https://www.ajicjournal.org/article/S0196-6553(23)00004-4/fulltext)
- Sebelego, I., & Horn-Lodewyk, J. (2026). Radiographers' self-perceived knowledge regarding infection control in the Free State province during the COVID-19 pandemic. *Health SA Gesondheid*, 31, 3146. <https://doi.org/10.4102/hsag.v31i0.3146>
- Signore, A., Casali, M., & Lauri, C. (2021). An easy and practical guide for imaging infection/inflammation by [18F]FDG PET/CT. *Clinical and Translational Imaging*, 9(4), 283–297. <https://doi.org/10.1007/s40336-021-00435-y>
- World Health Organization: WHO. (2025). Infection prevention and control GLOBAL. https://www.who.int/health-topics/infection-prevention-and-control#tab=tab_1