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Laboratory Staff Competence and Workplace Challenges in Preventing Percutaneous Injuries in Community-Based Laboratories

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***Abstract*—** Percutaneous injuries remain an important occupational hazard among laboratory personnel who routinely handle needles, sharps, and potentially contaminated specimens. This study assessed laboratory staff competence and workplace challenges in preventing percutaneous injuries in community-based laboratories in Albay, Philippines. A descriptive and correlational design was used among 41 Medical Technologists and Laboratory Technicians from 18 Rural Health Units (RHUs) and City Health Units (CHUs), selected through purposive sampling. Data were gathered using a validated structured questionnaire and analyzed using descriptive statistics and the Mann–Whitney U test. Laboratory staff demonstrated very high competence in skills (M = 4.79), knowledge (M = 4.78), and attitude (M = 4.91). Despite this, workplace challenges remained evident, with improper sharps disposal obtaining the highest mean (M = 4.48), followed by insufficient training and inadequate safety devices (both M = 4.27). A significant difference was observed between RHU and CHU personnel in knowledge (p = 0.022), while no significant differences were found in skills (p = 0.211) and attitude (p = 0.715). The findings indicate that high individual competence should be complemented by continuous training, adequate safety resources, effective reporting and monitoring systems, and sustained institutional and local government support.

***Keywords*—** percutaneous injuries; laboratory staff; occupational safety; competence; community-based laboratories.

I. INTRODUCTION

Percutaneous injuries remain an important occupational safety concern among healthcare personnel who routinely handle needles, sharps, contaminated instruments, and biological specimens. Laboratory staff are particularly vulnerable because specimen collection, processing, preparation, and disposal frequently require direct contact with equipment capable of penetrating the skin. Such injuries are clinically significant because they can expose healthcare workers to bloodborne pathogens and other infectious materials.

The thesis identifies percutaneous injuries as a common occupational hazard and emphasizes their potential association with bloodborne infections, making effective prevention essential to a safe laboratory environment. It further frames prevention as a multidimensional issue involving not only the availability of safety procedures but also the competence of the personnel responsible for implementing them.

The occupational burden associated with percutaneous injuries extends across healthcare settings. The manuscript cites Bouya et al. (2020), who reported that a substantial proportion of health workers worldwide have experienced percutaneous injuries and identified limited training, experience, and working conditions as contributing factors. Sahebi et al. (2025) similarly identified fatigue, stress, and unpredictable working environments as factors associated with these injuries, while emphasizing the role of training and safer equipment in reducing their occurrence. These observations demonstrate that percutaneous injuries are not solely the consequence of individual error. They may arise from the interaction of staff capability, workload, environmental pressures, access to safety devices, and institutional systems. Consequently, effective prevention requires both competent healthcare workers and organizational conditions that enable them to perform safely.

Competence is particularly important in laboratory safety because the prevention of percutaneous injuries

requires the integration of technical performance, relevant knowledge, and appropriate professional attitudes. In the manuscript, competence is operationalized through three domains: skills, knowledge, and attitude. Skills refer to the ability to perform procedures such as safe needle and sharps handling, appropriate disposal, use of personal protective equipment, adherence to standard precautions, and response to accidental exposure. Knowledge pertains to understanding percutaneous injuries, infection-transmission risks, institutional policies, safe disposal procedures, and post-exposure management. Attitude reflects professional responsibility, commitment to safety protocols, willingness to participate in training, personal accountability, and recognition of the importance of injury reporting. These dimensions emphasize that laboratory safety requires not merely knowing what should be done, but also being able and willing to implement preventive measures consistently.

Previous studies cited in the manuscript support the importance of competency development in occupational injury prevention. Jackson et al. (2020) reported that the use of safety devices can significantly reduce injuries among healthcare workers. Huynh et al. (2022), Mohamud et al. (2023), and Al-Abhar et al. (2020) further found that healthcare workers who receive biosafety education and training demonstrate improved awareness and safer practices, thereby reducing occupational risks. Access to biosafety manuals was likewise associated with a reduced risk of occupational injury. Collectively, these findings indicate that technical competence must be continually reinforced through structured education, safety resources, and institutional support rather than assumed to remain constant after initial professional training.

Professional and workplace characteristics may also shape vulnerability to percutaneous injuries and the ability to prevent them. Cao et al. (2020), Ferrario et al. (2021), and Moran Gonzalez et al. (2023), as cited in the thesis, reported that younger healthcare workers, personnel with less professional experience, and those exposed to high-pressure environments may be more vulnerable to occupational injuries. Liao likewise identified associations involving profession, age, recapping practices, and injury occurrence among healthcare workers in Rural Health Units. Such findings suggest that competence should be interpreted within the context in which personnel work. Differences in clinical experience, exposure to laboratory procedures, training opportunities, staffing conditions, and the type of health facility may influence knowledge and safety performance.

The behavioral dimension of occupational safety is equally important. Even when personnel have adequate knowledge, safety outcomes depend on whether preventive measures are consistently translated into practice. The theoretical framework of the manuscript incorporates the Health Belief Model, Self-Efficacy Theory, and the Knowledge-Attitude-Practice perspective to explain this relationship. The Health Belief Model emphasizes how perceived susceptibility, severity, benefits, and barriers can influence safety-related behavior. Self-efficacy highlights confidence in one's ability to correctly perform preventive practices, including needle and sharps handling, even under challenging working conditions. The Knowledge-Attitude-Practice perspective links understanding and awareness with attitudes and subsequent behavior. Together, these perspectives support the view that competence in percutaneous injury prevention is influenced by what laboratory personnel know, their confidence in applying that knowledge, their attitudes toward occupational safety, and the contextual barriers they experience.

However, competent personnel may still face workplace conditions that impede consistent implementation of safety practices. The literature incorporated into the thesis identifies several such challenges. Sependi et al. (2023), Tawiah et al. (2020), Kaweti et al. (2024), and Liao identified inadequate training, shift-related factors, workload pressure, and non-compliance with safety precautions as contributors to occupational injuries. Hosseinipalangi et al. (2021), Mohamud et al. (2023), and Al Qadire et al. (2021) further emphasized sharps-related procedures and disposal practices as important sources of injury. These findings are relevant to laboratory

environments where personnel repeatedly handle needles and sharp devices and where even highly competent staff may be placed at risk when equipment, workload, or disposal systems are inadequate.

Incident reporting and post-exposure management constitute another critical component of occupational safety. Percutaneous injuries that are not promptly reported may delay appropriate post-exposure assessment and reduce opportunities for institutions to identify recurring safety hazards. The thesis notes that Ditching et al. (2020) reported generally positive attitudes toward reporting among participants, including perceptions of behavioral control and social support. Nevertheless, the manuscript also cites Nkosi et al. (2025), Alsabaani et al. (2022), and Zalameda Reyes in relation to failures to report occupational injuries, while Al Qadire et al. (2021) is cited regarding limited or delayed post-exposure responses. These findings demonstrate that the existence of reporting procedures does not necessarily ensure that exposures are documented and appropriately managed. Continuous reinforcement of reporting protocols, surveillance systems, and post-exposure procedures is therefore necessary.

Institutional support is central to addressing these concerns. Safety-engineered devices, personal protective equipment, appropriate sharps containers, adequate training, supervision, reporting systems, and manageable working conditions provide the organizational infrastructure through which individual competence can be translated into safer practice. The thesis notes that hazardous workplace conditions may adversely affect healthcare worker safety when preventive measures are poorly implemented, as discussed by Bazie (2020), while Elfatih et al. (2023) linked poor awareness of laboratory safety procedures with unsafe practices. Liao (2020) also reported under-reporting of percutaneous injuries among RHU healthcare workers in association with the absence of Occupational Safety and Health committees and poor compliance with safety guidelines. These findings support a systems-oriented approach in which prevention depends simultaneously on staff competence and the institutional environment.

This issue is particularly relevant to community-based laboratories, where resources, workforce capacity, infrastructure, supervision, and access to continuing professional development may vary across facilities. Rural Health Units and City Health Units constitute important components of primary healthcare delivery, yet their operating environments may differ in terms of patient volume, resources, exposure to laboratory procedures, staffing arrangements, and institutional support. The manuscript consequently considers place of assignment as a potentially relevant context for laboratory safety. It further recognizes that differences between RHU and CHU settings may influence knowledge of infection prevention and occupational safety even when personnel share comparable professional roles and responsibilities. Understanding such differences is important because interventions that assume identical needs across all community laboratories may fail to address setting-specific gaps.

In the Philippine context, occupational safety measures are supported in the manuscript through references to national policies and regulatory frameworks, including Republic Act No. 11058 and Department of Health infection-prevention and control policies. These frameworks emphasize safe working conditions, occupational protection, training, and adherence to infection-control standards. Nevertheless, the manuscript cites Zamudio (2022) and Mishra et al. in noting that percutaneous injuries may continue to occur despite awareness of existing safety protocols and programs. This distinction between awareness and implementation is critical: policies establish expectations, but their preventive value ultimately depends on the availability of resources, organizational enforcement, personnel competence, and routine compliance in actual laboratory practice.

The study addresses a specific research gap within this broader occupational-safety problem. According to the manuscript, existing studies have predominantly focused on doctors and nurses, while laboratory staff working in community-based health facilities have received comparatively limited attention. This gap is important because laboratory personnel regularly perform specimen collection and other procedures that

involve direct contact with needles, sharps, and potentially infectious materials. Within Albay Province, Medical Technologists and Laboratory Technicians assigned to Rural Health Units and City Health Units serve as frontline laboratory personnel across local government health facilities. Yet limited evidence specifically characterizes their competence in percutaneous injury prevention together with the workplace conditions that may facilitate or hinder safe practice. The study therefore situates the problem not simply as whether laboratory personnel know appropriate preventive measures, but whether their skills, knowledge, and attitudes are accompanied by workplace environments capable of supporting consistent occupational safety.

Accordingly, this study aimed to assess laboratory staff competence and workplace challenges in preventing percutaneous injuries in community-based laboratories. Specifically, it sought to determine the level of competence of laboratory staff in terms of skills, knowledge, and attitude; identify workplace challenges that may affect the prevention of percutaneous injuries; compare competence between personnel assigned to Rural Health Units and City Health Units; and propose evidence-based approaches to strengthen laboratory staff competence and address workplace barriers to injury prevention. Through these objectives, the study sought to generate evidence that may inform competency development, resource allocation, safety monitoring, institutional support, and occupational injury-prevention strategies in community-based laboratory settings.

II. METHODOLOGY

The study employed a descriptive and correlational research design to assess laboratory staff competence and workplace challenges related to the prevention of percutaneous injuries in community-based laboratories. The descriptive component was used to characterize the respondents and determine their competence in terms of skills, knowledge, and attitude, as well as the challenges they encountered in preventing percutaneous injuries. The correlational component was intended to examine whether selected personal and professional characteristics were associated with competence. The manuscript also describes the study as using a convergent mixed-methods design in which quantitative and qualitative data were to be collected simultaneously. The study was conducted in Albay Province, Philippines, among laboratory personnel working in Rural Health Units (RHUs) and City Health Units (CHUs).

Purposive sampling was used to select Medical Technologists and Laboratory Technicians from 18 health units in Albay. A total of 41 laboratory staff participated, consisting of 22 personnel from RHUs and 19 from CHUs; non-laboratory personnel were excluded. Data were collected using a researcher-developed structured questionnaire based on literature cited in the manuscript, including Tayaben (2015), and the instrument underwent validation for reliability, clarity, and appropriateness. The questionnaire gathered information on respondents' professional profiles and assessed competence in preventing percutaneous injuries across the domains of skills, knowledge, and attitude, together with workplace challenges. Competence was measured using a five-point Likert scale ranging from 1 (Very Low Competence) to 5 (Very High Competence), while workplace challenges were rated from 1 (Strongly Disagree) to 5 (Strongly Agree).

Permission to conduct the study was sought from the relevant local authorities and health units, after which eligible laboratory personnel were approached, informed about the study, and asked to provide consent before participation. Data collection began in February 2026 using the structured modified questionnaire. Completed questionnaires were organized and analyzed using the Statistical Package for the Social Sciences (SPSS). Frequency counts, percentages, and weighted means were used for descriptive analysis, while the manuscript specifies the Kruskal–Wallis H test and Mann–Whitney U test for comparative analyses; the reported RHU–CHU results in the article use the Mann–Whitney U test. Ethical safeguards included informed consent, voluntary participation, confidentiality, protection of participants' rights and welfare, restricted access to respondent identities, and use of collected information solely for research purposes. The manuscript further states that the study protocol, procedures, and consent

forms underwent ethics review and approval prior to implementation.

III. RESULTS

Level of competence of laboratory staff in preventing percutaneous injuries in terms of skills, knowledge, and attitude

Table 1 shows that laboratory staff demonstrated very high competence in all skill-related indicators for preventing percutaneous injuries, with an overall mean of 4.79. Proper techniques in handling needles and sharps obtained the highest overall mean of 4.88, followed by proper disposal of used needles and sharps at 4.83 and adherence to standard precautions during specimen processing at 4.80. Correct use of personal protective equipment and proper response to accidental percutaneous injuries obtained the lowest means, both at 4.71, although these remained within the very high competence category. These results indicate that laboratory staff generally possess the technical ability required to perform procedures involving needles, sharps, specimens, and other potentially hazardous materials safely.

Table 1. *Laboratory Staff Competence in Preventing Percutaneous Injuries in Terms of Skills (N = 41)*

Skills Indicator	RHU Mean	CHU Mean	Overall Mean	Interpretation
Proper techniques when handling needles and sharps	4.82	4.95	4.88	Very High Competence
Proper disposal of used needles and sharps	4.77	4.89	4.83	Very High Competence
Following standard precautions when processing specimens	4.77	4.84	4.80	Very High Competence
Correct use of PPE during laboratory procedures	4.68	4.74	4.71	Very High Competence
Proper response to accidental percutaneous injuries	4.59	4.84	4.71	Very High Competence
Overall	4.73	4.85	4.79	Very High Competence

The high level of skills may reflect the respondents' familiarity with routine laboratory procedures and their adherence to established safety practices. Proper handling and immediate disposal of sharps are particularly important because laboratory personnel routinely perform procedures that place them at risk of accidental puncture or exposure to blood and other potentially infectious materials. Although all indicators were rated highly, the comparatively lower scores for PPE use and response to accidental injury suggest areas in which competence should continue to be reinforced. High perceived competence should therefore be sustained through practical competency assessments, refresher training, and continued monitoring of compliance with standard precautions.

The findings are consistent with studies cited in the manuscript. Dogan et al. (2023) emphasized that needlestick and sharps injuries remain occupational hazards but may be prevented through adequate competence and adherence to safety measures. Tayaben et al. (2015) similarly reported that greater adherence to safe procedures and protocols was associated with lower odds of sharps injuries among Filipino healthcare personnel. In contrast, Ibuna and Jabonete (2018) reported a greater occurrence of needlestick and sharps injuries among personnel with lower technical skills. These findings support the importance of maintaining proficiency in sharps handling, PPE use, standard precautions, and appropriate responses to occupational exposure.

Table 2 demonstrates a very high level of knowledge among laboratory staff, with an overall mean of 4.78. Awareness of diseases transmitted through percutaneous injuries obtained the highest mean of 4.98, while knowledge of proper procedures for handling and disposing of sharps followed at 4.88. In comparison, familiarity with post-exposure management protocols obtained the lowest mean of 4.63, although it remained classified as very high competence. The findings suggest that respondents possess substantial awareness of the risks associated with percutaneous injuries and of the preventive procedures required in laboratory practice.

Table 2. *Laboratory Staff Competence in Preventing Percutaneous Injuries in Terms of Knowledge (N = 41)*

Knowledge Indicator	RHU Mean	CHU Mean	Overall Mean	Interpretation
Knowledge of what constitutes a percutaneous injury	4.64	4.84	4.73	Very High Competence
Knowledge of proper sharps handling and disposal procedures	4.82	4.95	4.88	Very High Competence
Awareness of diseases transmitted through percutaneous injuries	4.95	5.00	4.98	Very High Competence
Knowledge of institutional injury-prevention policies	4.50	4.84	4.66	Very High Competence
Familiarity with post-exposure management protocols	4.50	4.79	4.63	Very High Competence
Overall	4.68	4.88	4.78	Very High Competence

The particularly high awareness of disease transmission is important because percutaneous injuries can expose healthcare workers to bloodborne infections. Knowledge of the potential consequences of exposure may encourage personnel to observe standard precautions and practice safe handling and disposal of needles and sharps. Nevertheless, the comparatively lower rating for post-exposure management is relevant because preventing injury is only one component of occupational safety. Laboratory staff must also know what actions to take immediately following an exposure, including reporting the incident and following appropriate institutional post-exposure procedures.

The findings are consistent with the literature reviewed in the manuscript but also demonstrate why knowledge alone cannot guarantee safe practice. Liao (2020) reported that awareness of occupational safety and health policies did not necessarily eliminate gaps in implementation and compliance among RHU healthcare workers. Zamudio (2022) similarly emphasized the need to translate information into actual practice, while Blanco (2023) identified gaps in awareness of some occupational safety and health guidelines among LGU healthcare workers. Al-Khalidi and Nasir (2020) also reported high understanding of percutaneous injury prevention while noting continuing gaps in practice. These studies reinforce the need for continuing education, particularly regarding institutional policies and post-exposure management.

Table 3 indicates that laboratory staff demonstrated very high competence in attitude toward percutaneous injury prevention, with an overall mean of 4.91, the highest among the three competence domains. Taking personal responsibility for preventing injuries received the highest mean of 4.95. Following safety protocols despite heavy workload and willingness to attend safety training each obtained a mean of 4.93. Belief in injury prevention as a professional responsibility and recognition of the importance of reporting injuries both obtained means of 4.88. These results

demonstrate strong personal accountability and commitment toward occupational safety.

A positive safety attitude is important because laboratory safety does not depend exclusively on technical knowledge or procedural ability. Personnel must also be willing to apply safety measures consistently, even under demanding working conditions.

The high rating for compliance during heavy workload suggests that respondents recognize that safety procedures should remain a priority despite time pressure. Their willingness to attend training also indicates openness to continuous professional development. Similarly, acknowledging the importance of reporting percutaneous injuries contributes to an organizational safety culture in which occupational exposures can be documented, managed, and used to identify areas requiring corrective action.

The findings are supported by studies cited in the manuscript. Faller et al. (2018) identified workload, PPE availability, and supervisory assistance as factors affecting compliance with safety protocols among Filipino healthcare professionals.

Anil et al. (2022) found that positive attitudes toward biosafety practices and regular PPE use were associated with fewer sharps injuries.

Conversely, Bashir et al. (2026) associated negative attitudes, including underestimation of workplace risks and non-reporting of percutaneous injuries, with a greater risk of needlestick injuries.

Thus, the positive attitudes demonstrated by the respondents represent an important component of injury prevention, although favorable attitudes must continue to be supported by appropriate resources, supervision, and institutional systems.

Table 3. *Laboratory Staff Competence in Preventing Percutaneous Injuries in Terms of Attitude (N = 41)*

Attitude Indicator	RHU Mean	CHU Mean	Overall Mean	Interpretation
Belief that preventing percutaneous injuries is a professional responsibility	4.82	4.95	4.88	Very High Competence
Following safety protocols even during heavy workload	4.91	4.95	4.93	Very High Competence
Willingness to attend safety training	4.95	4.89	4.93	Very High Competence
Taking personal responsibility for preventing injuries	5.00	4.89	4.95	Very High Competence
Recognition of the importance of reporting injuries	4.95	4.79	4.88	Very High Competence
Overall	4.93	4.89	4.91	Very High Competence

Workplace challenges encountered by laboratory staff that may affect the prevention of percutaneous injuries in community-based laboratories

Table 4 reveals that laboratory staff continued to encounter substantial workplace challenges despite their very high competence in knowledge, skills, and attitude. The overall mean for workplace challenges was 4.15, interpreted as Agree. Improper disposal of sharps emerged as the highest-rated challenge at 4.48, followed by lack of sufficient training and inadequate supply of safety devices, both with means of 4.27.

Heavy workload and time pressure, fatigue and long working hours, and lack of institutional support each obtained a mean of 4.17. Lack of supervision received the lowest mean of 3.71 but was still regarded as a workplace challenge.

Table 4. Workplace Challenges Affecting Percutaneous Injury Prevention (N = 41)

Workplace Challenge	RHU Mean	CHU Mean	Overall Mean	Interpretation
Improper disposal of sharps	4.59	4.26	4.48	Strongly Agree
Lack of sufficient training	4.23	4.32	4.27	Strongly Agree
Inadequate supply of safety devices	4.45	4.05	4.27	Strongly Agree
Heavy workload and time pressure	4.14	4.21	4.17	Agree
Fatigue and long working hours	4.23	4.11	4.17	Agree
Lack of institutional support	4.27	4.05	4.17	Agree
Inadequate reporting system	4.23	4.05	4.15	Agree
Non-compliance with standard precautions	4.09	4.11	4.10	Agree
Limited laboratory space	4.18	3.74	3.98	Agree
Lack of supervision	3.77	3.63	3.71	Agree
Overall	4.22	4.05	4.15	Agree

The results demonstrate an important distinction between individual competence and the conditions under which competence is applied. Laboratory personnel may possess appropriate knowledge, skills, and safety attitudes, yet unsafe organizational or environmental conditions can interfere with consistent implementation of preventive practices. Improper disposal of sharps is especially important because improperly handled or discarded needles and other sharp objects can directly expose laboratory personnel to accidental puncture and potentially infectious materials. The high ratings for insufficient training and inadequate safety devices further indicate that prevention requires sustained institutional investment rather than relying solely on individual staff competence.

The operational challenges identified in the study also include heavy workload, time pressure, fatigue, and prolonged working hours. These conditions may decrease personnel's ability to maintain concentration and consistently follow established safety procedures. Limited reporting mechanisms and insufficient institutional support may further weaken occupational safety systems by preventing injuries from being appropriately documented, investigated, and used to guide preventive actions. The manuscript consequently emphasizes that workplace and systemic factors may hinder uniform implementation of safety practices even when staff demonstrate strong individual competence.

These findings are consistent with the literature cited in the thesis. Sependi et al. (2023), Tawiah et al. (2020), Kaweti et al. (2024), and Liao identified training deficiencies, shift-related factors, workload pressure, and non-compliance with safety precautions as contributors to occupational injury. Hosseinipalangi et al. (2021), Mohamud et al. (2023), and Al Qadire et al. (2021) also emphasized sharps-related practices as important causes of occupational injury. Other studies in the manuscript highlighted continuing gaps in reporting and post-exposure responses.

The findings therefore indicate that high staff competence does not eliminate workplace risk. The manuscript similarly notes that limited resources, heavy workload, poor supervision, organizational limitations, inappropriate sharps disposal, insufficient safety equipment, and inadequate institutional support can undermine infection-control and occupational-safety practices.

Competence of laboratory staff in preventing percutaneous injuries between Rural Health Units (RHUs) and City Health Units (CHUs)

Table 5 shows that assignment area was associated with a statistically significant difference in knowledge but not in skills or attitude. For knowledge, CHU laboratory staff obtained a higher mean rank of 24.97 compared with 17.57 among RHU personnel, with a Mann–Whitney U value of 133.5 and a p-value of 0.022. Thus, a significant difference in knowledge was

observed between the two groups. In contrast, skills showed no significant difference between RHU and CHU personnel (U = 169.5, p = 0.211), and attitude likewise showed no significant difference (U = 198.5, p = 0.715).

Table 5. *Comparison of Laboratory Staff Competence Between RHUs and CHUs (N = 41)*

Competence Domain	Assignment	Mean Rank	Mann–Whitney U	p-value	Interpretation
Knowledge	RHU	17.57	133.5	0.022	Significant difference
	CHU	24.97			
Skills	RHU	19.20	169.5	0.211	No significant difference
	CHU	23.08			
Attitude	RHU	21.48	198.5	0.715	No significant difference
	CHU	20.45			

The higher knowledge mean rank among CHU personnel suggests that characteristics associated with the work setting may contribute to differences in awareness and understanding of percutaneous injury prevention.

As discussed in the manuscript, variation in work environment, exposure to laboratory procedures, access to training opportunities, and institutional support systems may influence knowledge. CHU personnel may have greater exposure to safety practices, infection-prevention activities, or continuing education opportunities; however, these explanations should be regarded as interpretations rather than variables directly tested by the study.

The absence of significant differences in skills and attitude is also relevant. It suggests that, despite differences in knowledge, personnel in both RHUs and CHUs demonstrated broadly comparable technical abilities and safety orientations.

This may reflect the application of common laboratory standards and safety procedures across community-based health facilities. The manuscript links these findings to the need for more equitable access to knowledge-focused training and educational resources, particularly where differences between assignment areas remain evident.

The thesis further cites Mbaisi et al. (2013), who reported that occupational assignment and exposure to clinical procedures can affect healthcare workers' knowledge and perceptions of sharps-injury hazards. Rapisarda et al. (2019) likewise observed that personnel routinely performing laboratory and clinical procedures had greater awareness of infection-control strategies.

These studies support the interpretation that workplace context and professional exposure may influence knowledge related to percutaneous injury prevention.

Evidence-based approaches to strengthen laboratory staff competence and address workplace challenges related to the prevention of percutaneous injuries

Table 6 integrates the findings into four intervention components: Training and Education, Safety Compliance and Monitoring, Incident Reporting and Monitoring, and Institutional and LGU Support. These approaches respond directly to the study's major findings.

Although laboratory staff demonstrated very high competence, workplace challenges persisted, especially improper sharps disposal, insufficient training, inadequate safety devices, workload-related pressures, reporting-system limitations, and institutional constraints.

The proposed interventions therefore address both individual competence and the organizational environment in which safety practices are implemented.

Table 6. Proposed Evidence-Based Approaches for Strengthening Percutaneous Injury Prevention

Intervention Component	Proposed Actions	Intended Focus
Training and Education Program	Conduct refresher training, seminars, workshops, competency assessments, and orientation for newly appointed personnel	Infection prevention, sharps injury prevention, post-exposure management, standard precautions, institutional policies, and proper sharps handling
Safety Compliance and Monitoring	Reinforce PPE use and strengthen safety and compliance mechanisms	Consistent implementation of occupational safety practices
Incident Reporting and Monitoring System	Conduct compliance monitoring, supervision, performance evaluation, systematic surveillance, and incident reporting	Identification of safety gaps, injury trends, and areas requiring corrective action
Institutional and LGU Support	Ensure continuous availability of PPE and safety resources; promote employee wellness, safe working conditions, teamwork, shared responsibility, and open communication	Adequate resources, staff well-being, and positive safety culture

The Training and Education Program responds particularly to the comparatively lower score for familiarity with post-exposure management and to the identification of insufficient training as a major workplace challenge. The manuscript proposes refresher courses, seminars, workshops, competency assessments, and orientation for newly appointed personnel covering infection prevention, sharps injury prevention, institutional policies, standard precautions, proper sharps handling, and post-exposure management. Continuous education is appropriate because the literature cited in the thesis indicates that trained and educated healthcare workers demonstrate greater biosafety awareness, safer practices, and reduced occupational risk.

Safety Compliance and Monitoring addresses the need to translate high perceived competence into consistent everyday practice. The study's finding that improper sharps disposal remained the most prominent workplace concern demonstrates that knowledge and skills do not necessarily guarantee uniform adherence to safe practices. Monitoring PPE use, standard precautions, sharps disposal, and other preventive behaviors can therefore help identify discrepancies between perceived competence and actual workplace practice.

The Incident Reporting and Monitoring System responds to the identified weaknesses in reporting and post-exposure management. The manuscript proposes systematic surveillance, incident documentation, regular supervision, compliance monitoring, and performance evaluation. Such mechanisms would enable laboratory administrators to identify injury trends and safety gaps and to implement appropriate corrective measures. The importance of this intervention is reinforced by studies cited in the manuscript reporting under-reporting of occupational exposures and incomplete post-exposure responses among healthcare workers.

Finally, Institutional and LGU Support recognizes that effective prevention cannot depend exclusively on individual laboratory personnel. The manuscript recommends continuous availability of PPE, sharps containers, safety-engineered devices, and other laboratory safety resources, together with safe working conditions, employee wellness initiatives, teamwork, shared responsibility, and open communication. These actions address the resource, workload, and organizational challenges identified in the study and support the development of a sustainable safety culture. The proposed framework is aligned in

the manuscript with Republic Act No. 11058 and DOH Administrative Order No. 2016-0002.

Overall, the findings demonstrate that laboratory staff in community-based laboratories possess very high competence in percutaneous injury prevention, particularly in attitude, skills, and knowledge. However, this high individual competence exists alongside substantial workplace challenges. The findings therefore indicate that preventing percutaneous injuries requires a combined strategy involving competent personnel, continuous education, adequate safety equipment, effective reporting and monitoring systems, and sustained institutional and LGU support. The study consequently shifts the focus from competence as an individual characteristic alone toward a broader occupational-safety approach in which staff capability and workplace conditions jointly influence the prevention of percutaneous injuries.

IV. CONCLUSION & RECOMMENDATION

The study demonstrates that laboratory staff in community-based laboratories possess very high competence in preventing percutaneous injuries across the domains of skills, knowledge, and attitude. Among these domains, attitude obtained the highest overall mean, followed by skills and knowledge, indicating strong professional responsibility, technical capability, and awareness of injury-prevention practices. Despite this high level of competence, laboratory personnel continue to encounter substantial workplace challenges, particularly improper disposal of sharps, insufficient training, inadequate safety devices, heavy workload, fatigue, limited reporting mechanisms, and insufficient institutional support. The comparison between Rural Health Units and City Health Units further showed a significant difference in knowledge, with CHU personnel obtaining higher mean ranks, while no significant differences were observed in skills and attitude. These findings indicate that individual competence alone is insufficient to ensure consistent prevention of percutaneous injuries and that workplace conditions, access to resources, training opportunities, monitoring systems, and organizational support remain critical determinants of laboratory safety.

Community-based laboratories should strengthen percutaneous injury prevention through an integrated approach that combines continuous competency development with improved institutional safety systems. Regular refresher training, competency assessments, and orientation programs should be implemented, particularly in post-exposure management, sharps handling, standard precautions, and institutional policies. Laboratory administrators and Local Government Units should ensure the continuous availability of personal protective equipment, sharps containers, safety-engineered devices, and other essential safety resources, while also strengthening incident-reporting systems, surveillance, supervision, and compliance monitoring. Particular attention should be given to addressing the knowledge gap observed between RHU and CHU personnel by promoting equitable access to training and educational resources. Workload management, employee wellness, safe working conditions, teamwork, and open communication should likewise be reinforced to support a sustainable culture of occupational safety and reduce the risk of percutaneous injuries in community-based laboratories.

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