Attitude, Knowledge, and Practices on Basic Life Support among Medical Laboratory Science Interns of Selected Universities in Metro Manila, Philippines

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Abstract: - Basic Life Support (BLS) is a first-response medical care used to temporarily support patients from emergencies until they can be given full medical care. Medical laboratory scientists should be equipped with BLS skills that can prolong the victim's life. Moreover, there is an increased risk of encountering hazards in the laboratory workplace. Therefore, this study aimed to measure and gauge the attitude, knowledge, and practices of MLS interns of selected universities in Metro Manila, Philippines using a 20-item online questionnaire that was disseminated using the snowball sampling method, wherein 229 participated. Descriptive and inferential statistics were used to analyze the data. All tests were conducted at the level of significance $\alpha = 0.05$ with a confidence interval of 95%, wherein $p < 0.05$ were considered statistically significant. It was found that the MLS interns had previously attended BLS training and seminars within the last 2-3 years and had low levels (<55%) of knowledge and practices, and that they were somewhat confident in performing CPR (mean = 1.91), somewhat willing to respond during emergencies (mean = 2.47), and rated themselves poorly in BLS performance (mean = 2.00). The level of knowledge did not differ regardless of training status as there was no significant difference ($p = 0.344$), while there was a significant difference in the level of practice ($p = 0.019$). There was a weak but significant relationship between the overall score and the confidence ($p = 0.004$; $r = 0.190$) and willingness ($p = 0.000$; $r = 0.349$) of MLS interns. Through this study, the importance of having BLS knowledge and skills prior to entering the workforce is emphasized, which is why the researchers recommend the inclusion of BLS training and biannual refresher courses into the curriculum.

Key Words: — ***Basic life support, medical laboratory science interns, emergencies, medical laboratory science, cardiopulmonary resuscitation, medical laboratory scientists.***

I. INTRODUCTION

1.1 Background of the Study

Basic Life Support, or BLS, is a first-response medical care, which uses various techniques to immediately support patients or victims from life-threatening situations, such as sudden cardiac arrest, respiratory distress, or airway obstruction.

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It requires basic knowledge and skills in cardiopulmonary resuscitation (CPR), utilization of automated external defibrillators (AED), and the alleviation of airway obstructions in patients (American Red Cross, 2020). The purpose of being knowledgeable and skilled in the ability to perform these techniques stems from the three main points of BLS: securing the circulation, airway, and breathing of the victim or patient until they receive more detailed medical care (Williams, 2021).

In order to propagate BLS knowledge and skills, the Philippine government-mandated Republic Act No. 10871, signed in 2016, otherwise known as the Basic Life Support Training in Schools Act, states that "able-bodied citizens are to be equipped

with the necessary knowledge and basic skills to respond to certain health emergencies"; whereas it shall be the duty of all operating public and private basic education schools to be able to provide BLS training as part of the comprehensive health and physical education curriculum. While BLS is a requirement for those at the basic education level; there is presently no other specific law that mandates the same at the collegiate or tertiary level. This is further highlighted by the fact that health-allied programs, mainly Medical Laboratory Science (MLS), do not contain or require BLS in the curriculum. Moreover, the aforementioned document had only been approved recently, wherein this study's population, MLS interns, were not affected by the implementation of this act. There are various studies in other countries that support the inclusion of BLS in the undergraduate curricula, such as that of Rajashekar et al. (2018), Almesned et al. (2014), and Irfan et al. (2019) since people involved in healthcare have low levels of knowledge regarding it.

Another research made by Al-Shamiri et al. (2017) assessed the awareness of BLS dental students and interns in Saudi Arabia. In the dental clinic, the patients and dentists are faced with several risks, such as the use of local anesthesia, surgical operations, and sensitivity to dental materials. Therefore, it was determined that BLS skills are essential for their profession in times of emergencies. Similarly, MLS professionals should be equipped with these skills as there is an increased risk of encountering hazards in the workplace through the handling of dangerous chemicals, contact with infectious agents, as well as encountering emergencies during patient specimen collection. Furthermore, as part of the healthcare force, they can readily provide BLS to people outside the hospital.

The leading cause of mortality in 2020, according to the Philippine Statistics Authority (2021), remains to be ischemic heart disease, representing 17.3 percent of total deaths in the country. It is a major risk factor of cardiac arrest (National Heart, Lung, and Blood Institute, n.d.), wherein the heart abruptly stops beating and causes the victim to lose breathing and consciousness. This proves fatal since the patient could die within minutes if not treated promptly due to the limited oxygen transported to the brain (Steinbaum, 2019). Chances of survival increase if the steps involved in BLS, such as the use of CPR and AED, are immediately and properly performed to the patient within minutes after onset (Heart Foundation, n.d.). In fact, according to the Philippine Heart Association (n.d.), approximately half of the heart disease deaths are associated with this condition and often occur out of hospitals. This condition highlights the importance of BLS since it can unpredictably occur to anyone with or without pre-existing heart conditions, which stresses its significance for everyone, particularly healthcare providers, to possess adequate knowledge and skills in BLS. In fact, there are private and government organizations that offer BLS training in the Philippines, such as the Philippine Red Cross and Philippine Heart Association (PHA). The PHA's main mission is to equip allied health professionals and doctors with basic and advanced life support training by offering basic and advanced life support courses.

Moreover, there is a high risk of encountering various occupational hazards in the medical laboratory. A study was conducted by Tait et al. (2018) on the occupational safety and health status of 108 medical laboratories in Kajiado County, Kenya. They found that the most common hazards encountered in the laboratory include infectious bacteria (biological), handling unmarked and unlabeled chemicals (chemical), and improperly placed equipment (physical). If a serious and fatal emergency happened, a combination of proper safety training and BLS training could improve the situation's outcome. Although there is a minimal probability of emergency occurrence during patient encounters, it remains optimal for MLS professionals to obtain BLS skills to assure patient safety. This encompasses the complete sample journey, including patient sample collections and encounters (McKeeman, 2020).

Consequently, the main focus of this study is to assess the knowledge, practices, and attitude of MLS interns towards BLS. These are the factors that affect the administration of BLS and are important in the implementation of more structured training and seminars. It could prove that BLS should be part of the curricula to further improve the skills and knowledge of all health care professionals. The researchers believe that the need for instilling attitude, knowledge, and practice in BLS, particularly in health-allied professions such as MLS, is crucial in mitigating possible occupational hazards and adding efforts to safeguard general public safety. However, there is a limited number of previous research and studies which focus on the aspect of BLS in the country, especially in the MLS program.

1.2 Statement of the Problem

BLS knowledge is found to be low in healthcare professionals and students, as observed in studies by

Rajashekar et al. (2018), Almesned et al. (2014), and Irfan et al. (2019). There are limited studies that focus on BLS in the Philippines, especially in relation to MLS. As MLS interns start practicing in the clinical laboratory, they will be exposed to different hazards, giving rise to possible emergencies. Adequate knowledge, attitude, and practices in BLS may be able to equip MLS interns with the proper response to those situations. Therefore, the researchers aim to assess BLS's attitude, knowledge, and practices among MLS interns of selected colleges and universities in Metro Manila, Philippines. Specifically, this study aims to answer the following questions:

1. What is the training status of medical laboratory science interns in terms of:
    a. Number of MLS interns that have attended a BLS training or seminar.
    b. Last time MLS interns attended a BLS training or seminar.
2. Is there a significant difference between the level of knowledge and practices of those who had attended BLS training or seminars, and those who had not?
3. What is the correlation between the attitude of medical laboratory science interns towards BLS compared to their knowledge and practices in BLS when presented with emergency situations?

1.3 Objectives of the Study

General Objective:

The primary purpose of this study is to gauge the knowledge, attitudes, and practices of basic life support among the medical laboratory science interns currently studying in selected accredited colleges and universities in Metro Manila, Philippines.

Specific Objectives:

1. To determine the training status of the MLS interns in terms of:
    a. Number of MLS interns that have attended a BLS training or seminar.
    b. Last time MLS interns attended a BLS training or seminar.
2. To determine if there is a significant difference in the level of knowledge and practices of those who had attended BLS training or seminars and those who had not.
3. To correlate the attitude of medical laboratory science interns compared to their knowledge and practices in BLS when presented with emergency situations

1.4 Hypothesis of the Study

Null Hypothesis:

1. There is no significant difference in the level of knowledge and practice of medical laboratory science interns between those who attended BLS training or seminar and those who did not.
2. There is no significant relationship between the attitude of medical laboratory science interns towards BLS compared to their knowledge and practices in BLS when presented with hypothetical emergency situations.

1.5 Significance of the Study

This study will help determine the attitude, knowledge, and practices regarding basic life support of the medical laboratory interns hailing from universities in Metro Manila, Philippines, in the hope that it would prove useful to the following:

The Medical Laboratory Science Interns. This study aims to stress the significance in not just acquiring the knowledge and training of necessary life support skills for the interns, but in applying it to real-world scenarios, to propagate a safer community for everyone and foster an innate initiative in these individuals to provide an immediate and proper response in cases of severe injuries. Medical Laboratory Science Interns will benefit from not just the knowledge that they will learn about BLS but also in terms of skills that will be proven useful in their future work. Such as sudden life and death situations and even in disaster-response events where the interns and the people they wish to save will definitely benefit. Notably, even more, helpful for those interns who wish to advance their studies in medical school.

The Philippine Health Education System. The researchers aspire to advocate and increase awareness for implementing basic life support training in classes to equip students, particularly those allied in health, with the proper knowledge and skills concerning medical emergency response that mediates the damage and prevents certain lives and situations

from falling into more grievous predicaments. Thus, the more the health education system of the Philippines enhances the knowledge and skills in emergency care response of health-allied students before joining the workforce, the better it can foster quality and competence in them.

The Philippine Health Care System. This research gives them a powerful tool to know that the Philippine health education system delivers its intended impact. The reliance on emergency care on professional healthcare workers decreases as the majority of the health allied students are trained and skilled in basic life support. The enhancement of BLS for health students will make them into greater professionals in the healthcare setting that will give them an edge in practice.

1.6. Scope and Limitations

The scope of the study was limited to Medical Laboratory Science programs from five selected colleges and universities in Metro Manila, Philippines, that have reached at least a level II accreditation by the Federation of Accrediting Agencies of the Philippines (FAAP). Such agencies include the Philippine Accrediting Association of Schools, Colleges, and Universities (PAASCU) and the Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA). The recognition from these agencies ensures the institution's quality of education and assures the researchers that the Medical Laboratory Science program meets or even exceeds the required standards to achieve excellence. The population studied were medical laboratory science students currently undergoing their internship program. The samples were randomly selected amongst them to represent the whole population, and their attitude, knowledge, and practices in basic life support were gauged using a questionnaire. Other students from different year levels, programs, and universities with an accreditation lower than level II or were not located within Metro Manila were excluded from the study. Respondents could withdraw their participation from the research any time by exiting the survey or contacting the researchers to exclude their survey responses.

II. REVIEW OF RELATED LITERATURE

In this chapter, a thorough discussion of related research and previous studies relevant to the paper will be presented. These aspects include a run-through on knowledge, practice, attitude, and training of Basic Life Support and its association to Medical Laboratory Science.

2.1 Basic Life Support

Basic life support consists of medical procedures performed on an emergency patient by a respondent who has undergone training to increase the chance of survival before advanced medical care is administered (Colwell & Soriya, 2012). In the American Heart Association (AHA) guidelines, the important components include early recognition of emergency conditions such as cardiac arrest, activation of emergency medical services (EMS), high-quality cardiopulmonary resuscitation (CPR), and automated external defibrillator (AED) usage. Furthermore, different BLS application sequences were established that must be effectively followed depending on the type of responder, either a bystander with or without training or a healthcare provider (Kleinman et al., 2015). It is also part of the chain of survival, which involves crucial steps to resuscitate a person that may be undergoing cardiac arrest, a condition in which the heart stops beating and pumping blood to other parts of the body and can be fatal if not recognized and treated immediately (National Heart, Lung, and Blood Institute, n.d.).

CPR is one of the important components of BLS given to a cardiac arrest patient to maintain the body's blood and oxygen flow. Standard guidelines, such as rate and depth of compression, must be followed to administer effective, high-quality CPR. There are two types of CPR depending on the type of responder who will administer it; conventional CPR is a combination of chest compression and rescue breaths that is done by people that have undergone training; meanwhile, bystanders without training can perform compression-only CPR (Mayo Foundation for Medical Education and Research, 2021). In a study by Hasselqvist-Ax et al. (2015), there is a higher 30-day survival rate for people who received bystander CPR before EMS arrived than those who did not. Despite this, reluctance among bystanders without training is more likely than those with training (Tanigawa et al., 2011). With these findings, the need for people in the health field to have adequate knowledge, skills, and training in BLS must be emphasized to decrease the number of reluctant people to perform BLS. Different factors such as knowledge, practice, attitude, and training must be considered in assessing basic life support

among people. Numerous literature and studies regarding the factors are discussed in the next sections.

2.2 Knowledge & Practice on Basic Life Support

According to a study by Rajashekar et al. (2018), they concluded that medical professionals such as nurses, doctors, and even students in a hospital in India still need to have enough knowledge of basic life support. Similar results were also deduced from a study conducted by Irfan et al. (2019) in Karachi, which is a huge concern since it is the largest city in Pakistan. Both studies suggested that a program must be added to the undergraduate curriculum. Furthermore, improvements in the poor knowledge of BLS in the health field through inclusion need to be done to apply the skills properly (Almesned et al., 2014). In doing this, they can become more knowledgeable that will lead to proper procedures and no errors performed in case of emergencies since even a small percentage of errors may lead to fatal consequences that defeat the purpose of saving lives.

In a precursor study conducted by researchers from Kist Medical College Hospital in Nepal, they gauged the BLS/CPR training plan through the assessment of knowledge and skills of their medical professionals. They determined that there is an overall lack of adequate knowledge among their respondents. However, those who received CPR training in the last five years had higher mean scores compared to those who did not. Hence, they had justified the need for standard BLS/CPR training in their institution. (Roshana, S. 2012). Another study found that most medical students and junior doctors were untrained and also scored poorly in contrast to trained participants. Additionally, most respondents had a positive attitude towards BLS and agreed that a single training session is not enough to gain adequate knowledge of BLS. Therefore, repeated and practical applications are necessary to maximize the knowledge and skills acquired from BLS training (Yunus et al., 2015).

To prove this, in a study conducted by Velasco et al. (2021) using 35-item questionnaires, they tested the knowledge, attitude, and practices of medical interns in the Philippine General Hospital. They found that regardless of training status, most medical interns had adequate knowledge and a positive attitude towards BLS. Based on the results, some concepts needed further reinforcement, and more than half were unaware of the new BLS guidelines. The authors ultimately concluded that prior training in medical school along with continuous exposure in the medical ward was more effective than solely training. To support this, a study by Ruesseler et al. (2010) was conducted among final-year medical students. They were divided between the control group, who completed the former curriculum, and the intervention group, who received theoretical and simulation-based training on basic life support, advanced cardiac life support, and adapted advanced trauma life support. Both were subjected to a performance-based assessment involving a ten-station objective structured clinical examination. The results revealed that the intervention group did significantly better than the control group, proving that the students gained a better understanding of recognizing, responding, applying, and handling BLS during real-life emergencies. Since the intervention lasted at four months maximum, the authors suggested additional studies to test the long-term retention of knowledge and skills.

One such study was conducted by Srivilaithon et al. (2020) in Thailand, wherein they determined the short and long-term retention of BLS knowledge and skills among second-year medical students. The participants were tested prior, immediately after, and six months after BLS training. The population's overall knowledge and skills score increased significantly shortly after training, in contrast to the pre-test scores. However, the retention test conducted after six months showed a decline in knowledge, while BLS skills were still retained. They recommended periodical BLS seminars as well to strengthen knowledge and skills since it may decline over time. Bystanders will also be able to prolong the lives of cardiac arrest victims through early CPR. Another study by Pande et al. (2014) measured the level of retention among first-year medical students. They also conducted tests prior to and after the comprehensive BLS training course; another test was given the following year. Again, there was a big improvement in the post-test as compared to the pre-test. Though the second post-test, conducted a year after, showed a lower score than the previous post-test, it was still significantly better than the pre-test. Despite the decline in knowledge and skills, previous training is better than none at all.

2.3 Attitudes on Basic Life Support

According to Abolfotouh et al. (2017), the participating pre-BLS and post-BLS healthcare workers have a positive attitude towards BLS if they have better knowledge

and repeated training on the matter. Similarly, the studies of Patidar, A. B & Sharma, A. (2014) and Yunus et al. (2015) show that students have a positive attitude towards BLS, even though they lack knowledge and training. Both studies also recommended establishing an appropriate BLS curriculum for their participants, who are secondary school students, and medical and nursing students, respectively.

Basic life support knowledge and skills of a person may affect their attitude towards performing the different components involved in the process. In a study by Huang et al. (2019) that assessed bystander knowledge, attitudes, and willingness to perform CPR in Taiwan, the respondents were found to be willing to perform CPR if they possessed the required skills to administer it. There are multiple subgroups (demographics) in the study that were less willing to perform CPR, which, oddly enough, includes healthcare professionals.

This astounded the authors, and they recommended further investigation into why this is so. In terms of healthcare students, a study conducted by Pandit & Berry (2020) revealed that physiotherapy interns were confident in performing CPR. Similarly, it was also found that the introduction of knowledge and practice education to bystanders increased one's CPR performance confidence and willingness (Lee et al., 2009). Furthermore, a study found out that two other factors that influenced the increased confidence in CPR performance among university students are the increased knowledge and attitude (Kim & Lee, 2017).

A study by Becker et al. (2019) assessed public perception towards bystander CPR in the United States of America, including comfort levels in performing CPR and barriers to performing CPR on people of various demographics, such as middle-aged women, geriatric males, adolescent males, and adolescent females. The lack of BLS training, fear of causing further harm to the patient, exposure and interference of patient's breasts, and possible accusation of sexual assault were found to be the most common barriers in CPR administration. Improved CPR training and public education were recommended after the study.

In terms of BLS performance self-assessment, physiotherapy interns assessed themselves averagely (Pandit & Berry, 2020). However, self-assessment of performance and skills is often flawed and poorly judged. The gap between self-rating and actual behavior or performance can be quite big, if not average. Other's predictions might even be more accurate than one's judgment. Moreover, people overrate themselves. For students, it was found that they were largely unable to evaluate themselves to how well they have comprehended the study materials and do not necessarily retain the newly learned skills involved (Dunning et al., 2004).

Medical students need to be able to evaluate their deficiencies as medical knowledge is vast and continuously expanding. However, self-rating is often poorly correlated with other performance factors. Though students were able to make macro-level self-assessments, such as being able to perform better than lower year students, they were largely unable to predict the frequency of correct and incorrect answers (Eva et al., 2004).

2.4 Basic Life Support Training

In order to be equipped with knowledge, skills, and attitude in BLS, training must be provided, especially to those in the health field. Several studies mentioned tackled the importance of BLS training and the different ways to implement it. For example, in a study conducted by Perkins, Hulem, Shore, and Bion (1999), a comprehensive eight-hour course was delivered to various undergraduates in the medical field, such as nursing, dentistry, physiotherapy, and medicine programs. It was found that the undergraduates and academic staff received the course well and provided a reduction of workload to the burdened clinical staff.

As a result, it enhanced the quality of their healthcare and service. Another study conducted by Azevedo et al. (2009) sought impacts of conducting basic life support training programs on medical emergency teams to decrease prevalence and mortality in patients at risk of cardiac arrest. The effectiveness of the program depended on the education, awareness, and responsiveness to the patient's physiologic instability. However, it was discovered that there was a significant decrease in the program's long-term effectiveness when BLS training was absent.

Practical training is able to develop and enhance the knowledge and skills of people to increase competency in a particular field, such as BLS. Simulation-based training is a type of effective wherein hypothetical cases are given to trainees to act upon with the knowledge and skills they have acquired (Lateef, 2010).

In a study conducted by Ko (2007), those who attended simulation-based training attained higher skill scores than those who took traditional training, which made it more useful in enhancing the skills in BLS.

For the online approach, based on the research conducted by Tipa, R.O. and Bobinac, G. (2010), there was a major decline and lack of knowledge among medical students. Many were not knowledgeable on the proper protocols, signs and symptoms, medical risk factors, and their associated conditions. The authors aimed to implement basic life support in their institution's curricula, if not through physical classes, then through online courses. However, they had observed that most medical graduates were not confident in their skills on BLS when they entered residency. This was due to online courses that lack simulation and exercise, proving how essential proper physical practice and application were in training the students. Usually, BLS classes do not need a whole course/subject dedicated to it; a 12-24 hour class would suffice without the need for expensive medical equipment or invasive procedures. In fact, in the study by Gianotto-Oliveira, R. et al. (2017), they found that a short online BLS course is enough to supplement learning and training in future health professionals. They have determined this through the implementation of pre- and post-tests to assess theoretical knowledge, while checklist simulations and feedback devices were used to assess a practical application. The utilization of high-fidelity simulators and feedback devices allowed students to evaluate themselves without the presence of instructors. Furthermore, the online course can also be accessed anytime by the students, increasing the retention of BLS knowledge and skills.

In a study conducted by Abbas et al. (2011) among medical students in Pakistan, trained medical students obtained higher knowledge scores than those untrained. However, trained students still did not obtain satisfactory scores. Similarly, Al Enizi et al. (2016) determined the knowledge and attitudes of secondary school teachers in Al-Qassim, Saudi Arabia, on BLS. Less than half of the respondents had CPR training, and overall scores of knowledge and skills were low despite previous training. Most teachers responded positively to the idea of more training and were willing to take a free course if available in the future. This reinforces the fact that the availability, quality, and consistency of training continue to serve as important factors in acquiring and retaining BLS knowledge and skills.

2.5 Medical Laboratory Science in the Philippines

In order to gain further understanding of the significance of the study, this section discusses the medical laboratory science program and its curriculum. Bachelor of Science in Medical Technology/Medical Laboratory Science (BSMT/MLS) is a four-year program that consists of both general education and professional courses. Its fourth-year level is an internship program of one year in a CHED-accredited training laboratory. The program aims for the development of the knowledge, skills, and professional attitudes of MLS students as they perform the necessary clinical laboratory procedures to aid physician diagnosis and treatment (CHED memorandum order No. 13 Series of 2017).

2.5.1 Curriculum of Medical Laboratory Science in the Philippines

According to the same CHED memorandum order No. 13 series of 2017, the Medical Laboratory Science curriculum in the Philippines is composed of 173 units which include general education core courses, general education elective courses, general education mandated courses, physical education courses, NSTP courses, core courses, professional courses, research courses, and clinical internship courses. Despite this, there is no formal course or seminar for Basic Life Support.

2.5.2 Basic Life Support in Medical Laboratory Science

Medical laboratory scientists are often at risk of encountering hazards. Hazards encountered in the laboratory are improperly placed equipment that could cause electrocution and chemicals that may cause suffocation in the laboratory (Tait et al., 2018). Moreover, emergencies could occur during patient encounters. For instance, the patient could suffer from hemorrhage during blood specimen collection. The hazards mentioned are risk factors of ventricular fibrillation, which is a common cause of cardiac arrest (Heart Foundation, n.d.).

To put things into a different perspective, particularly in other health professionals, is the research made by Al-Shamiri et al. (2017) that assessed the awareness of BLS dental students and interns in Saudi Arabia. In the dental clinic, the patients and dentists are faced with many risks, such as the use of local anesthesia, surgical operations, and sensitivity to dental materials. Therefore, the authors have determined that BLS skills are essential for their profession in times of emergencies. They found that, overall, there is a poor level of knowledge among their respondents. The interns were more knowledgeable than the lower year levels, though it is not statistically significant. This result prompted them to suggest

the continuous implementation of refresher courses for dental students.

Although there were several studies that primarily focus on different fields, such as education, nursing, and medicine, there was a limited number of studies relating basic life support to medical laboratory science. However, the studies conducted in the different fields related to BLS could be used as a basis in conducting this research.

III. METHODOLOGY

In this chapter, a thorough discussion of related research and previous studies relevant to the paper will be presented. These aspects include a run-through on knowledge, practice, attitude, and training of Basic Life Support and its association to Medical Laboratory Science.

3.1 Research Design

A descriptive correlational quantitative research design was utilized in the study to make a generalization and correlation of the attitude, knowledge, and practices of basic life support among medical laboratory science interns. A quantitative method of data gathering was done using an online questionnaire to measure and analyze the data using statistical tools to generate results. With this, the researchers were able to determine the attitude, knowledge, and practices regarding basic life support of medical laboratory science interns, as well as the relationship between the attitude of the interns regarding BLS to their knowledge and practice.

3.2 Schematic Diagram of the Study

As seen in Figure 1 below, the study began with the topic proposal, followed by the formulation of research objectives. Chapters 1-3 were then composed, serving as the guide for the research. The adapted questionnaire, derived from studies hosted under public domains, was developed and modified to suit the education level of MLS interns. Validation testing was conducted with respondents not included in the inclusion criteria, particularly 3rd-year college students. The researchers then applied and received the approval of the Ethics Review Committee. Afterward, the data was collected through questionnaire deployment to participating MLS interns and analyzed by a statistician. Existing studies stated in Chapter 2, along with the data collected and analyzed, served as the basis for Chapters 4-5. Once the study was completed, the thesis defense was scheduled. Comments and suggestions from the panelists were taken into account for the final revisions of the study before official submission.

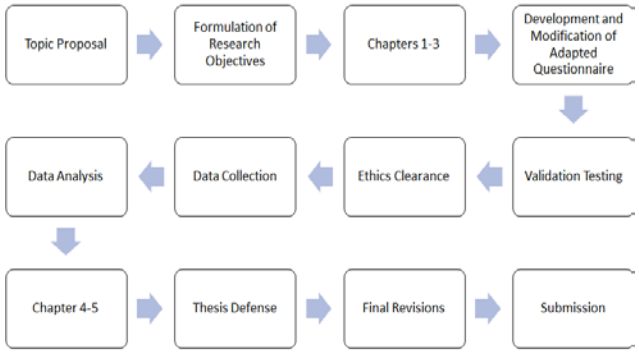

Fig. 1. Schematic Diagram of the Study

3.3 Research Locale

The research locale was five universities with at least level II accredited colleges and universities in Metro Manila, Philippines. The general locale was Metro Manila, Philippines, because most of the accredited universities and colleges that offer medical laboratory science are located here, and most of the researchers have more access since they reside within the area. Their medical laboratory science program must also be accredited by organizations under and certified by the Federation of Accrediting Agencies of the Philippines (FAAP), such as the Philippine Accrediting Association of Schools, Colleges, and Universities (PAASCU) and Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA). The private organizations aforementioned are part of the organizations that are in charge of the accreditation of academic programs that meet excellent standards that ensure quality education (PAASCU, n.d.).

3.4 Research Respondents

For this study, the respondents for this research were medical laboratory science interns limited only to medical laboratory science universities or colleges within Metro Manila. Specifically, the 4th year Medical Laboratory Science students that underwent internship programs. The students were not limited to their gender or race; rather must only be students that underwent internship in their 4th academic year. The universities of the student respondents must also be under

colleges or universities that have reached at least a level II accreditation by organizations under the Federation of Accrediting Agencies of the Philippines (FAAP). The respondents were recruited through emails and social media posts.

3.5 Data Gathering Techniques

The method of data gathering that the researchers utilized was through the form of online questionnaires using Google Forms. This technique granted convenience, timeliness, and safety to both the researchers and respondents in data collection. A study that used the same technique would be that of Chandrasekaran et al. (2010), Reddy et al. (2013), Al-Shamiri et al. (2017), and Pandit & Berry (2020) since they have gathered their data through surveys. However, they used physical means, but for this study, the researchers deployed it electronically due to the current pandemic. The Google Forms questionnaire links that included informed consent were distributed through social media platforms and emails.

3.6 Research Instrument/s

The group utilized a 20-item questionnaire, written in both English and Filipino, about basic life support derived from similar studies, such as that of Chandrasekaran et al. (2010), Reddy et al. (2013), Al-Shamiri et al. (2017), and Pandit & Berry (2020). The questionnaire was modified and adapted to suit the educational level of the medical laboratory interns and divided according to domains of attitude, knowledge, and practices. The questionnaires the instrument was derived from are posted in public domains, which no longer require permission before use as long as the researchers are duly credited and sourced.

The attitude section consisted of six questions. Three of which were Likert scale about the confidence, willingness, and self-assessment of performance in basic life support. It also included two close-ended questions about the reason for reluctance and whether they recommend the inclusion of BLS in the curriculum and one open-ended question.

The knowledge and practice sections consisted of multiple-choice BLS theoretical and hypothetical questions, respectively.

3.6.1. Instrument/s Validation

The researchers performed validation testing on willing university students that were not within the scope of the study, particularly 3rd-year students of varying programs. The participants were given the same questionnaire as the sample population to judge and evaluate the difficulty and appropriateness of the adapted questionnaire.

3.7 Sampling Method

The respondents for this research were interns currently enrolled in the Medical Laboratory Science program from selected universities in Metro Manila and were chosen through snowball sampling, which is a statistical method of collecting data wherein research respondents recruit other potential respondents. An online questionnaire created in Google Forms was disseminated to participants through various social media sites (e.g., Facebook, Instagram, Twitter) to fill up at their convenience. Emails were also utilized in disseminating questionnaires to potential respondents who could fit the inclusion criteria of the study.

3.7.1 Sample Size

In order to achieve a 95% confidence level with a 5% margin of error and 50% population portion, the recommended sample size for the research would be 256 among the population size of 761 medical laboratory science interns from selected universities or colleges in Metro Manila with accreditation of at least level II from FAAP, as seen in Figure 2. A response distribution of 50% of the population sample shall be used as this gives the largest sample size. The computation of the sample size as shown in Figure 2.

$$Sample\ size\ (n) = \frac{\frac{z^2 \times p\ \times (1-p)}{e^2}}{1 + \frac{(z^2 \times p \times (1-p))}{e^2 - N}}$$

$$Where: Confidence\ level\ of\ 95\%\ (z) = 1.96;\ Proportion\ (p) = 0.5$$

$$Population\ size(N) = 761; Margin\ of\ error\ (e) = 0.05$$

$$= \frac{\frac{1.96^2 \times 0.5 \times (1-0.5)}{0.05^2}}{1 + \frac{(1.96^2 \times 0.5 \times (1-0.5))}{0.05^2 \times 761}}$$

$$= \frac{384.16}{1.5048}$$

$$= 255.288$$

$$Sample\ size\ (n) \approx 256$$

Fig.2. Sample Size Computation

3.8. Analysis of Data/ Statistical Tool Used

After the collection of data from the questionnaire, it was reviewed, organized, tabulated, and statistically analyzed using IBM SPSS (Statistical Package for Scientific Studies) version 20 tool. Descriptive statistics were used to summarize the data on the level of attitude, knowledge, and practices in BLS. Inferential statistics were then used to compute the mean score on the data to be tested, and Pearson's correlation coefficient was applied to measure the degree of the linear relationship between the two variables involved in the study. Additionally, hypothesis testing through an independent t-test, which is used to test statistical significance.

A 20-item questionnaire was used to assess the BLS attitude, knowledge, and practices of MLS interns. Each correct answer was allotted one point in the knowledge section and 2 points each in the practice section. Likert scales were used in the attitude part, wherein the weighted means were computed and interpreted through legends. All tests were conducted at the level of significance $\alpha = 0.05$ with a confidence interval of 95%. Results with p-values < 0.05 were considered statistically significant.

3.9. Ethical Considerations

This research used the information collected from the questionnaires answered by the respondents. A certificate of ethics clearance was obtained after the research was presented to the Faculty of Pharmacy - Ethics Review Committee. Only the researchers have access to the data collected, including personal information, such as email addresses and the name of the school attended.

Moreover, they were kept anonymous in order to ensure utmost confidentiality and that the information collected did not violate nor harm the privacy and human rights of the respondents. The terms for the informed consent were included in the questionnaire wherein they were asked if they were aware and consent to the collection of their data.

There was a minimal risk that the respondent might experience emotional discomfort and stress regarding the questionnaire's content. The research was neither funded nor supported by any organization, authority, or agency and did not have any conflict of interest throughout the course of this investigation.

IV. RESULTS AND DISCUSSION

4.1 Results

Out of the 256 expected number of respondents, only 229 participated in the study; therefore, the response rate was 89.45%.

Table 1. Training Status of Medical Laboratory Science Interns

Training Status	n	%
Attendance to any Basic Life Support Training or Seminar		
Yes	149	65.07
No	80	34.93
Last attendance to BLS Training or Seminar		
Within the last 6 months	10	6.71
Within the last year	24	16.11
Within the last 2 years	57	38.26
Within the last 3 years	58	38.93

Table 1 shows the training status of the respondents wherein the majority of them, 149 (65.07%), had attended any Basic Life Support training or seminar, while 80 (34.93%) did not. Among those who attended, 58 (38.93%) attended within the last 3 years, 57 (38.26%) within the last 2 years, 24 (16.11%) attended within the last year, and only 10 (6.71%) attended within the last 6 months.

Table 2. Score Summary of BLS Knowledge and Practices

Summary Scoring System	Knowledge		Practices	
	n	%	n	%
Low 0-5 (<55%)	133	58.08	168	73.36
Average 6-7 (55-75%)	76	33.19	34	14.85
High 8-10 (>75%)	20	8.73	27	11.79

Table 2 shows that, in the knowledge domain, 58.08% of the respondents scored low. Subsequently, 33.19% of the respondents scored average, then 8.73% scored high, based on the grading system. Therefore, the respondents had a low level of knowledge of BLS. In the practice domain, 73.36% of the respondents scored low, 14.85% scored average, and only

11.79% scored high. Therefore, the respondents had a low level of practice on BLS.

Table.3. Likert Scale Attitude Questions

Question	Weighted Mean	Verbal Interpretation
1. How confident are you in performing CPR?	1.91	Somewhat confident[a]
2. How willing are you to respond to emergency crises?	2.47	Somewhat willing[b]
3. How will you rate yourself in terms of basic life support performance?	2.00	Poor[c]

[a]1.00 to 1.74 = Not confident at all; 1.75 to 2.49 = Somewhat confident; 2.50 to 3.24 = Confident; 3.25 to 4.00 = Very Confident

[b]1.00 to 1.74 = Not willing at all; 1.75 to 2.49 = Somewhat willing; 2.50 to 3.24 = Willing; 3.25 to 4.00 = Very willing

[c]1.00 to 1.74 = Very poor; 1.75 to 2.49 = Poor; 2.50 to 3.24 = Good; 3.25 to 4.00 = Excellent

Table 3 demonstrates the weighted mean computed from its respective questions located in the attitude domain in the questionnaire. A Likert scale (1 being the lowest and 4 being the highest) was used to gauge the participants' responses to each question. A weighted mean of 1.91 was computed for the first question, meaning the respondents were overall somewhat confident in performing CPR. The weighted mean for willingness was 2.47, indicating that the population was somewhat willing to respond to emergency crises. While, the weighted mean was revealed to be 2.00 when asked to rate themselves in terms of BLS performance, which means the respondents evaluate themselves to have poor BLS performance.

Table 4. Reason for Reluctance to Perform BLS

What do you think is the reason for reluctance?	n	%
Fear of causing further harm to the patient	155	67.69
Unaware of the correct procedure	141	62.57
Fear of being punished by the authority	58	25.33
Not exposed to professional training	126	55.02

Table 4 shows what the respondents subjectively believe are the reasons for reluctance to perform BLS, wherein 67.69% feared causing further harm to the patient, 61.57% were unaware of the correct procedure, 55.02% were not exposed to professional training, and 25.33% feared of being punished by the authority.

Table 5. Frequency of Inclusion of BLS Training in the Academic Curriculum

Do you recommend inclusion of BLS training in your academic curriculum?	n	%
Yes	206	89.96
No	23	10.04

Table 5 divides the respondents who recommend the inclusion of BLS training in the academic curriculum and those who did not. A significant portion (89.89%) answered yes, expressing their approval to incorporate BLS training in the curriculum, while few (10.04%) disagreed. The participants were provided the option to explain why they agree or disagree with the idea. Those who are in favor mentioned the following reasons: BLS is a necessary lifelong skill for health professionals, every second is crucial during emergencies, a single seminar as part of the NSTP is not enough (an annual refresher course is ideal) to save lives, etc. It was even mentioned that BLS should be part of every curriculum, regardless of field. For those not in favor, the following are the reasons given by the respondents: it is rare for MLS to encounter emergencies in the laboratory, the addition of more units is not ideal, etc. There was one who said that BLS could be added but as an optional program rather than a mandatory one.

Table 6. Level of Knowledge and Practices Based on Previous BLS Training or Seminar Attendance

Score Category	With BLS Training/Seminar	Without BLS Training/Seminar	p-value
	Mean	Mean	
Knowledge Score	4.78	5.04	0.344
Practice Score	3.87	3.03	0.019

According to Table 6, the knowledge score ($p = 0.344$) has a value of more than the α (0.05), which fails in rejecting the Ho,

meaning that there is no significant difference in knowledge from those who took BLS training to those who did not take BLS training. With this, the level of BLS knowledge among the population is almost equal, regardless of training status. On the other hand, the practice score (p = 0.019) has a value less than the α (0.05), meaning that there is a significant difference between those who took BLS training from those who did not take BLS training. Thus, those who previously attended BLS training or seminars performed better in terms of BLS practice.

Table.7. Correlation between Level of Knowledge and Practices with Attitudes

	Attitudes	p-value	Pearson Correlation Coefficient	Interpretation*
Knowledge Score	Confidence in Performing CPR	0.004	0.190	Very Weak Correlation
	Willingness to respond to emergency crises	0.000	0.349	Very Weak Correlation
	Self-rating of BLS performance	0.588	0.036	Weak Correlation
Practice Score	Confidence in Performing CPR	0.002	0.202	Weak Correlation
	Willingness to respond to emergency crises	0.005	0.184	Very Weak Correlation
	Self-rating of BLS performance	0.732	0.023	Very Weak Correlation

* 0.0 = no correlation; 0.00 - 0.19 = very weak correlation; 0.20 - 0.39 = weak correlation;

0.40 - 0.59 = moderately strong correlation; 0.60 - 0.79 = strong correlation;

0.80 - 0.99 = very strong correlation; 1.00 = perfect correlation

Table 7 demonstrates the correlation between the level of BLS knowledge and practices with attitude towards it. In order to reject the null hypothesis in two-tailed statistical significance testing, the p-value must be less than 0.05. Pearson's correlation coefficient was used to assess the relationship between the score attained by the respondents and their corresponding attitudes.

In the knowledge domain, the null hypothesis was rejected (p = 0.004) for the confidence in performing CPR, indicating a significant relationship between confidence and the level of BLS knowledge; nonetheless, the correlation between them was very weak (r = 0.190). The same held true for the willingness to respond to emergency crises (p = 0.000); however, the correlation was only weak (r = 0.349). In contrast, there was no sufficient evidence (p = 0.588) to prove that the way respondents rate themselves in terms of BLS performance is related to their knowledge of the subject; again, there was a very weak correlation between them (r = 0.036).

In the practice domain, there is a significant relationship (p = 0.002) with a weak correlation (r = 0.202) between confidence and the level of practice. In terms of willingness to respond to emergency crises and the level of practice, there is also a significant relationship (p = 0.005), but the correlation was very weak (r = 0.184). Although there is also a very weak correlation (r = 0.023) between how the respondents rate their BLS performance, there was no sufficient evidence to prove their relationship (p = 0.023).

4.2 Discussion

According to the data in Table 2, medical laboratory interns have low levels of knowledge and practice in basic life support in both knowledge and practice assessments. Results from the studies of Rajashekar et al. (2018), Almesned et al. (2014), and Irfan et al. (2019) also showed similar results among the people in the healthcare system, such as students and professionals. One of the contributing factors to the low scores could be when MLS interns last attended a BLS seminar, as shown in Table 1 since the majority attended within the last 2-3 years. Furthermore, the non-inclusion of BLS training in the curriculum has led to the lack of reinforcement in the knowledge and skills learned from past sessions. For example, studies by Rajashekar et al. (2018) and Irfan et al. (2019) have recommended the inclusion of BLS in the undergraduate curriculum to enhance BLS knowledge. Another study by Abbas et al. (2011) was conducted among medical students in Pakistan, whereas trained respondents scored significantly better than the untrained students, it was still not satisfactory or less than average, which led them to suggest yearly reinforcement on the subject. Additionally, BLS training in several organizations, including the Philippine Red Cross, is conducted and finished in a minimum of 8 hours, which may not be enough time to internalize and retain the information. Thus, the low scores attained may also be due to the participants not being able to comprehend too much information in a short amount of time, so BLS/CPR training seminars must be more structured and systematic to maximize retention of knowledge and skills (Abolfotouh et al., 2017).

Based on the data shown in Table 6, regardless of training status, there is no significant difference in the level of

knowledge due to the large probability that the trained respondents had either not retained the knowledge or failure to recall the information. Thus, the trained individuals are on the same level of BLS knowledge as the untrained ones. This is similar to the results obtained by Velasco et al. (2021) among medical interns, wherein the level of knowledge was equal regardless of training status. Although, medical interns had naturally attained higher education, possessed better background knowledge, and were repeatedly exposed to emergencies in the medical wards in contrast to MLS interns, who lack experience in these regards. Additionally, a study by Al Enizi et al. (2016) revealed that the scores collected from trained and untrained populations did not differ as well. In fact, a study by Yunus et al. (2015) found that most respondents, both trained and untrained, had agreed that a single training session is not enough to gain adequate knowledge and practices in BLS. Therefore, continuous and enhanced training methods to increase the retention of knowledge among MLS interns are necessary.

On the other hand, there is a significant difference in the practice domain, with trained respondents having higher mean scores than the untrained ones, as shown in Table 6. Prior training may have provided a better understanding of the procedures needed in applying BLS in emergencies since it includes simulation activities. It was found that people that received simulation-based training did significantly better in the practical examination than those who had not (Ruesseler et al., 2010). In addition, those who received simulation-based training had higher grades in terms of skills than those with theoretical training alone (Ko, 2007). A study by Srivilaithon et al. (2020) found that, though knowledge and skills increased immediately after training, the knowledge was not retained six months later. However, the skills did remain, which is very similar to the results obtained by this study. Hence, one must possess critical thinking and problem-solving skills, which are further developed through continuous training, to fully maximize BLS application during emergencies as it plays a vital role in saving lives.

Based on the results in Table 3, it is shown that MLS interns were somewhat confident in performing CPR, somewhat willing to respond to emergency crises, and rated themselves as poor in BLS performance. The results in terms of confidence in CPR performance and self-rating of BLS performance are in contrast to the study conducted by Pandit & Berry (2020), wherein most of the physiotherapy interns were confident in performing CPR and rated themselves averagely. These attitudes were correlated with the knowledge and practice scores, resulting in the data seen in Table 7.

As CPR is one of the crucial components of BLS, adequate theoretical and practical knowledge must be obtained to facilitate CPR since any deviation from the guidelines can greatly affect the outcome. Hence, in this study, the MLS interns' low scores on BLS knowledge and practices may have contributed to their somewhat confidence in CPR performance, as seen in Table 7. This is in connection with the findings of Kim & Lee (2017), wherein confidence is directly proportional to the knowledge acquired. Additionally, it is also in line with the results of Lee et al. (2009), wherein laypersons had increased confidence when given practical knowledge.

Based on Table 7, the somewhat willingness to respond to emergencies may also be attributed to the low knowledge and practice scores obtained by the participants. According to a study by Huang et al. (2019), the willingness to perform bystander CPR and respond to emergencies depends on the possession of the required skills. Out of the study's large demographic scope of population, healthcare professionals are surprisingly one of those who were unwilling to perform BLS. This may be due to their deeper consideration of the consequences involved if BLS is not done correctly. In fact, the study also found that the most common barriers to performing CPR are fear of legal consequences and the risk of harming the patient. Similarly, the results gathered may also be due to the several reasons for the reluctance to perform BLS, as seen in table 4, where the leading causes were the fear of causing further harm to the patient and being unaware of the correct procedure. Similar results were seen in a study conducted by Becker et al. (2019), where participants were reluctant to perform CPR due to several reasons. The leading concern of the participants was causing harm to the patients, which is followed by the lack of appropriate CPR skills.

As shown in table 7, the low knowledge and practice scores did not affect the MLS interns' poor self-rating on BLS performance. This may be possible due to the limited number of BLS assessments that make it difficult to determine their own level, which is why they automatically evaluate themselves as having poor performance. In a research done by Dunning et al. (2004), students find it difficult to assess themselves on how poorly they have understood newly studied materials. They have a tendency to be overconfident in newly learned skills but

do not necessarily retain them, suggesting the need for more accurate evaluating methods. As time goes by, this confidence is greatly reduced with the lack of retention, reinforcement, and refreshers. Another study by Eva et al. (2004) states that recognizing one's deficiencies is an important lifelong skill for those in the medical field as medicine continuously develops. However, they found self-rating is poorly correlated with other performance measures, as in line with the results found within this study.

V. CONCLUSION

In determining the levels of knowledge, attitude, and practice among MLS interns of accredited colleges and universities in Metro Manila, Philippines in regards to BLS, this study has found that medical laboratory science interns have low levels of knowledge and practice on BLS. Their attitudes were also found to be somewhat confident in performing CPR, somewhat willing to respond to emergency situations, and rated themselves poorly in terms of BLS performance. Moreover, MLS interns have attended BLS training or seminars, wherein the majority attended within the last 2-3 years. There was no significant difference between the level of knowledge of medical laboratory science interns between those who attended BLS training or seminar and those who did not. However, there was a significant difference between their practice scores. There was also a weak but significant correlation between the confidence and willingness of MLS interns to respond to emergency crises and their knowledge and practice scores. Meanwhile, there was no significant correlation between the self-rating of the BLS performance of MLS interns and their knowledge and practice scores. Through this study, MLS interns were found to have little knowledge and skills needed in BLS, emphasizing its necessity to be taught and cultivated in them prior to entering the workforce.

4.1 Recommendation

Due to the current COVID-19 pandemic, the researchers resorted to utilizing an online setup in disseminating the questionnaire. Instead of an online questionnaire, future studies may consider using a practical exam for more accurate data. Furthermore, adjustments on the questionnaire based on updated evidence-based guidelines from qualified sources may be done, and the application of Cronbach's alpha analysis in validation testing to further enhance reliability. They may also correlate knowledge and practices with other performance factors, such as the number of times respondents have attended BLS training or the number of times they have applied BLS in real-life situations. The researchers recommend using other populations, such as different health-allied or non-health allied programs, with a bigger sample size to further refine data accuracy. Furthermore, gauging students' knowledge, attitude, and practices from a different research locale outside the capital could be useful. The researchers recommend BLS to be more incorporated into the MLS curriculum and to have a biannual BLS refresher course in each academic year.

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