Assessment of the knowledge, attitudes, and practices of medical technologists working in clinical laboratories within Metro Manila on the proper usage of N-95 masks to limit the spread of COVID-19

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Abstract:

Introduction: Medical technologists (MT) have higher risk of exposure to COVID-19 due to the nature of their work; therefore, it is essential that the proper usage of personal protective equipment (PPE), such as N-95 masks, is practiced. There are currently no existing studies in the Philippines that evaluate the knowledge, attitudes, and practices (KAP) of healthcare workers on the proper usage of face masks; as such, this study aimed to evaluate the KAP of MTs on the proper usage of N-95 masks. Medical Technologists working in clinical laboratories within Metro Manila were the participants in this online survey. **Methodology**: A quantitative-descriptive approach was applied in assessing the responses in which each component was scored and interpreted separately. **Results**: Results indicated that the respondents presented a high level of attitudes and practices and a low level of knowledge. **Discussion**: In the knowledge section, participants scored poorly on questions regarding important considerations and donning procedures when using the N-95 mask due to the presence of contradicting information from different sources; hence, the proponents encourage policymakers, and hospital and laboratory administrators to develop policies and training programs on the proper usage of N-95 masks, to enhance the current knowledge of MTs, and promote the standardization of guidelines across different institutions.

Keywords: COVID-19, KAP, Medical Technologists, N-95 Mask

INTRODUCTION

Healthcare workers (HCWs) are constantly exposed to infectious agents, such as bacteria, fungi, viruses, and parasites. The amplified risk of exposure of HCWs to infectious agents does not change even in light of the current Coronavirus Infectious Disease 2019 (COVID-19) pandemic – an increasingly relevant public health concern troubling all countries worldwide. The causative agent of the highly transmissible and pathogenic

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acute respiratory illness, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), is another infectious agent that HCWs are highly exposed to when handling suspected and confirmed COVID-19 cases due to its primary mode of transmission: direct, indirect, and close contact with infected secretions, such as saliva, droplets, and respiratory secretions (World Health Organization [WHO], 2020b). In the Philippines, the increased susceptibility of HCWs to the COVID-19 virus is evident, provided that as of June 6, 2020, the Department of Health (DOH) declared 2,710 confirmed HCW-associated COVID-19 positive cases (Villanueva et al., 2020).

Among the broad roster of HCWs, one of the medical frontliners that presents a high risk of exposure to infectious agents is the medical technologist. As HCWs, MTs collect, handle, and process a wide array of specimens. In the context of the COVID-19 pandemic, the central role of an MT proves to be invariant because an MT is one of the healthcare professionals that plays an essential role in the diagnosis of COVID-19 through the collection of nasopharyngeal swabs (DOH, 2020).

As a result of the rising cases of COVID-19, due to the high transmissibility of SARS-CoV-2, several international health organizations have attempted to control and manage the outbreak through the proposal of guidelines and protocols on the collection, handling, and processing of specimens for COVID-19 testing. According to the advisories of the WHO (2020a) and the Centers for Disease Control (2020d), the use of the N-95 or higher respirator is highly recommended. The N-95 mask, as the name implies, utilizes a filter that removes at least 95% of airborne particles from the breathing air of the user (D'Alessandro & Cichowicz, 2020). Due to the efficiency of the N-95 mask in preventing the transmission of viruses, it has become more commonly used in the healthcare setting.

Contrary to popular belief, using the proper mask alone is insufficient in preventing the transmission of the COVID-19 virus. A review study by bin-Reza et al. (2011) states that for face masks to be effective, consistent and correct mask usage must be practiced. Additionally, WHO (2020a) concurs that the incorrect usage of face masks may increase the transmission rate of the virus.

With the constant exposure of HCWs to suspected and confirmed COVID-19 positive patients, active engagement in the proper KAP on the correct usage of masks is expected to be of utmost priority; however, studies conducted in other countries showed that HCWs have insufficient KAP on the proper usage of surgical masks. In the study of Kumar et al., (2020), despite the positive attitude regarding the use of face masks of most of the HCWs from a hospital in Karachi, Pakistan, their scores in the procedural questions were found to be moderate to poor. Also, Tadesse et al. (2020), revealed that the KAP of HCWs on the proper utilization of face masks in the police health facility of Addis Ababa, Ethiopia were relatively low as compared to other studies. In contrast to the aforementioned studies, Ahmed et al. (2020) discovered that the KAP of the HCWs were found to be good. However, improvement on the awareness of several aspects of the knowledge section, such as the types of masks and the duration of using masks, has been deemed necessary. Additionally, in the study of Honarbakhsh, Jahangiri, and Ghaem (2017), HCWs from the hospitals in Iran were found to have only moderate knowledge and practices and positive perceptions regarding the appropriate use of respiratory protection equipment (RPE). With this, it is evident that most of the previous KAP studies focused more on assessing the HCW's usage of surgical masks rather than N-95 masks. Furthermore, as the sample populations of most of these studies belong to other countries, there is a lack of KAP studies that focus on assessing the proper usage of N-95 masks among Filipino HCWs. As a resolution to this, this research aims to provide groundwork on the topic as one of the first studies that intends to assess the KAP of HCWs on the proper usage of N-95 masks in the Philippines, specifically among registered MTs working in Metro Manila.

METHODOLOGY

A quantitative-descriptive research approach was implemented in assessing the KAP of MTs on the usage of N-95 masks. Upon collation of the data from the respondents of the survey questionnaire, the results were generalized and explained. The following variables were also considered during the interpretation of data: knowledge of MTs on the proper N-95 mask usage guidelines set by the CDC, perceptions of MTs on the benefits and barriers of the N-95 mask, susceptibility to COVID-19, self-efficacy in using the N-95 mask, and compliance of MTs on the proper N-95 mask usage guidelines set by the Occupational Safety and Health Administration (OSHA).

Subjects and Study Site

The participants were comprised of registered MTs working in primary, secondary, or tertiary clinical laboratories within Metro Manila. Information about the total population of MTs was obtained from the DOH to compute the sample size. Using the Slovin's formula, with a 10% margin of error, the sample population was also identified to be 98 MTs from the total population of 3,738 Furthermore, the snowball sampling method was employed to survey 103 MTs.

Data Gathering Procedure

Prior to launching and circulating the survey form, approval from the Ethics Review Committee (ERC) of the University of Santo Tomas (UST) was secured. Dissociation of names from the responses during the recording process was observed all throughout the gathering of data. Afterwards, the survey was pilot tested on 34 respondents, and the reliability was computed using Cronbach Alpha (Attitudes) and KR-20 (Knowledge and Practices). The KR-20 values of the knowledge and practices sections were 0.565 and 0.558 respectively, while the Cronbach alpha value of the attitudes section was 0.697. Once confirmed to reach the recommended values, the survey was formatted into the Google Forms platform, and disseminated to the target population through Facebook and Viber. Moreover, the informed consent of the participants was already obtained prior to the administration of the survey.

Data Instrumentation

The survey instrument that was utilized in the study was a standardized KAP questionnaire that also collected the socio-demographic profile of the respondents, particularly, sex, age, city or municipality of the workplace, and hospital or laboratory classification.

For the knowledge and attitudes section, several survey questions from previous KAP studies focusing on the proper usage of face masks (Ho, 2012; Kumar et al., 2020; Tadesse et al., 2020) were adapted and slightly modified, while other questions were based on the infection control guidelines of 3M Center (2020), D'Alessandro and Cichowicz (2020), and CDC (2014a, 2020b, 2020c, 2020e, 2021). In terms of the practices section, the questions were adapted and slightly modified from the survey of Honarbakhsh et al. (2017).

Data Analysis

Entries were collated using Google Forms, while the data was organized and computed using Google Sheets. Following this, descriptive statistics [mean score, standard deviation (SD), and maximum and minimum scores] was applied to the collated data from the survey questionnaire.

To obtain the data from the entries, separate scoring systems for the KAP components were employed. A percentage score of >80% was considered as high level, a score of 60-80% was considered as medium level, and scores below 60% are regarded as low level (Kumar, et al., 2020; Tadesse et al., 2020).

The knowledge component of the survey was a seven-item questionnaire, consisted of multiple-choice and true-or-false test types. Each correct answer for each question was scored one point whereas each incorrect

answer was given a score of zero. A total possible score of 7/7 (100%) could be obtained by the respondents for the knowledge component.

The practices component of the survey was scored similarly to the knowledge component. Each correct answer to the seven total dichotomous questions was scored one point while each incorrect answer was given a score of zero. A total possible score of 7/7 (100%) could be obtained by the respondents for the practices component.

Lastly, the attitudes component of the survey, which consisted of nine questions, was scored based on the four-point Likert scale, a modification of the three-point Likert scale used in the study of Ho (2012). The four possible responses for the nine questions were assigned to a point value from one to four where "Strongly disagree" corresponds to one point and "Strongly agree" corresponds to four points. A total possible score of 36/36 (100%) could be obtained by the respondents for the attitudes component (Croasmun & Ostrom, 2011).

RESULTS AND DISCUSSION

A total of 103 medical technologists (MTs) working in clinical laboratories within Metro Manila answered the survey. The respondents consisted of 63 females (61.2%) and 40 males (38.8%), and the majority of them was within the age bracket of 20 to 29 years old (60.2%). Geographically, most are employed in Pasig (25.2%), Quezon (20.4%), and Manila (14.6%). Additionally, more than half of the respondents work in tertiary hospitals or laboratories (63.1%).

Knowledge on Correct N-95 Mask Usage

Each correct response in the knowledge category was given a score of one while each incorrect response was given a score of zero. Hence, the maximum possible score was seven, and the minimum possible score was zero. Out of 103 respondents, 73 participants (70.9%) had a low level of knowledge whereas 18 participants (17%) and 12 participants (12%) had a medium and high level of knowledge, respectively, with regards to N-95 mask usage according to the CDC guidelines as seen in Figure 1.
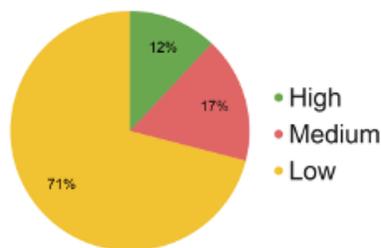

Figure 1. Frequency distribution of knowledge regarding the use of N-95 mask (n =103)

The mean score was computed to be 3.6 [standard deviation (SD) 1.47]. Out of the seven questions that were asked in the knowledge section, four questions were observed to be frequently missed by the respondents. As seen in Table 1, 63.1% of the respondents believed that the top strap of the N-95 mask should be pulled over the head before the bottom strap. CDC guidelines (2014b), however, affirmed that the bottom strap must be pulled over prior to the top strap. Moreover, 57.3% of the respondents assumed that facial hair is capable of trapping dirt and infectious pathogens; hence, why it should be maintained when donning an N-95 mask. Contrary to this belief, maintenance of facial hair is attributed to reduced protection brought about by the increased leakage of particles. While N-95 masks provide the same level of protection, regardless of the presence of an exhalation valve, 78.6% believed otherwise. Fifty-five out of 103 respondents considered fluid resistance as the primary function of N-95 masks, as seen in Table 1. Conversely, the U.S. Department of Labor, OSHA, DHHS, CDC, and NIOSH (2015) state that N-95 masks are designed to provide protection against aerosols.

Table 1. *Knowledge of Medical Technologists on N-95 Mask Utilization Based on CDC Guidelines*

Variables	Category	n	%
Ideally, how long should you wear an N-95 mask?	4 hours	24	23.3
	8 hours	68	66
	12 hours	9	8.7
	15 hours	2	1.9
*Upon doffing, it is recommended that the top strap be pulled over the head before the bottom strap.	TRUE	65	63.1
	FALSE	38	36.9
*Why should facial hair be maintained when donning the N-95 mask?	Facial hair may cause reduced protection due to increased leakage of particles	42	40.8
	Facial hair may cause discomfort	2	1.9
	Facial hair may trap dirt and infectious pathogens	59	57.3
The N-95 mask is resistant to oil.	TRUE	22	21.4
	FALSE	81	78.6
*An N95 mask with an exhalation valve provides the same level of protection to the wearer as one that does not have a valve.	TRUE	22	21.4
	FALSE	81	78.6
The N, in N-95, stands for:	Not resistant to water	15	14.6
	Not resistant to oil	76	73.8
	Not resistant to blood	4	3.9
	Not resistant to alcohol	8	7.8
*Fluid resistance is the primary function of N-95 masks.	TRUE	55	53.4
	FALSE	48	46.6
Total score (Mean ± SD)			3.6 ± 1.47

*Notable result

In this study, 71% of the respondents had a low level of knowledge. It is slightly lower compared to the respondents of Tadesse et al. (2020) where 76% were also assessed to have poor knowledge about face masks. However, it is significantly higher compared to the study of Honarbakhsh et al. (2017) where only 9.5% had poor knowledge regarding the usage of respiratory protection equipment. The discrepancies in the results of all three studies may be attributed to the differences in the target population, sample size, and the operational definition utilized (Tadesse et al., 2020). In addition, the difference in the types of masks or respirators assessed in all these studies may have also contributed to the disparity, since this particular study focused on the proper usage of N-95 masks while Tadesse et al. (2020) and Honarbakhsh et al. (2017) focused on surgical face masks and protective respiratory equipment, respectively.

The generally low level of knowledge among respondents warrants that more than half of the total number of questions was answered incorrectly. One of which was noted to be a question on the N-95 strap placement, where 63.1% of the respondents got it wrong. The mastery of the donning and doffing procedure of the N-95 mask is a key to the proper protection of healthcare workers (HCWs), in this case, MTs, as they are constantly exposed to several clinical hazards. When worn properly, it is capable of decreasing the concentration of infectious agents circulating in the air (Brown et al. 2017; Occupational Health and Safety Administration, CDC, & National Institute for Occupational Safety, as cited in Rogers, Buckheit, and Ostendorf (2018). Although current CDC guidelines (2014b) emphasize that the bottom strap must be pulled over prior to the top strap to allow for easy removal and disposal without touching the actual mask itself, in a study conducted by Rogers et al. (2018) on the competencies of healthcare workers on respiratory protection, it was also found that all aspects of donning and doffing of N-95 masks were deficient. Ironically, simple steps, such as strap placement, nosepiece adjustment, and seal checks, were often neglected by the subjects. This was further

supplemented by the collective agreement of the focus group participants from the same study. The group assented that basic knowledge on donning and doffing, particularly of strap placement, should be reviewed among the hospital staff.

Another question that most respondents answered incorrectly was on the maintenance of facial hair among N-95 mask users. More than half or 57.3% answered that facial hair traps dirt and infectious pathogens over the notion that it causes reduced protection due to the leakage of particles. Although the latter is supported by the claims of D'Alessandro and Cichowicz (2020) and the study of Sandaradura et al. (2020), a possible reason for the majority to have answered the former could be attributed to the circulation of several articles stating that individuals who do not perform proper facial hygiene are more susceptible to COVID-19 when droplets containing infectious diseases come into contact with their ungroomed facial hair (Bowman & Donevan, 2020; Cavender, 2020). Baker et al.'s study (2020) contradicted this claim by stating that facial hair cannot entrap pathogens.

Additionally, 78.6% of the respondents also assumed that the efficacy of using an N-95 mask with an exhalation valve as compared to one without varies. Similarly, when the general public was asked whether a mask with or without a valve was most appropriate during this pandemic, 27.9% chose the former option while 72.9% chose the latter (Sayare et al. 2021). This particular question may have been divisive for many reasons. Several reports suggest that although the presence of an exhalation valve allows for easier breathing and reduces heat build-up (Food and Drugs Administration, 2021), it is still not appropriate for reducing the proliferation of infectious diseases transmitted through respiratory droplets, especially in sterile conditions (Department of Health and Human Services, 2015; as cited by CDC & NIOSH, 2020; Staymates, 2020). Conversely, CDC, through its joint technical report with NIOSH (2021), asserted that an N-95 mask with an exhalation valve will provide the same level of protection as one without a valve.

There has also been a disparity of answers regarding the question on the primary function of N-95 masks. More than half of the respondents (53.4%) were confused of its function with fluid resistance. In a document released by the U.S. Department of Labor, OSHA, DHHS, CDC, and NIOSH (2015), it was highlighted that surgical masks are intended for protection against fluids, while N-95 respirators are designed for non-oil aerosol resistance. The filtering efficacy of an N-95 respirator against airborne particles is attributed to its fiber diameter, porosity, and filter thickness. Contrary to its known primary purpose, Rengasamy et al. (2015) deduced that there were four existing N-95 models in the market that were found to be fluid resistant. This information may have contributed to the general knowledge of the respondents with regard to the technicalities of an N-95 mask.

Practices Related to the Usage of N-95 Masks

For the practices category, the participants were tasked to answer seven dichotomous (yes or no) questions regarding N-95 mask usage according to the OSHA guidelines. Each correct response was scored one while each incorrect response was scored zero.

Out of 103 respondents, 73 participants (70.9%) presented a high level of practice regarding the use of N-95 masks while 21 (20.4%) and 9 (8.7%) participants presented a moderate and poor level of practice, respectively, as seen in Figure 2. These results were significantly higher compared to the study conducted by Honarbakhsh et al. (2017) where less than half of the respondents or only 48.9% observed a high level of practice regarding the use of face masks.
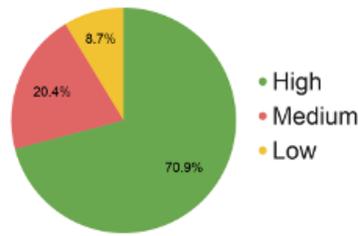
Figure 2. Frequency distribution of practices regarding the proper usage of N-95 mask (n = 103)

The mean score for practices was computed to be 5.9 (SD 0.99). Four questions were particularly notable. Out of 103 participants, 90.3% used the bands when doffing while 92.2% of the participants also adjusted the nose clip when donning the respirator. The majority or 97.1% of the MTs washed their hands after contact with the outer surface of the respirator. It is also noted that 53 out of 103 respondents did not perform a medical evaluation prior to using a respirator for the first time as seen in Table 2.

Table 2. Compliance of Medical Technologists on the Proper N-95 Mask Usage Based on OSHA guidelines.

Variables	Yes		No	
	n	%	n	%
Do you usually have facial hair (beard) when using a respirator?	14	13.6	89	86.4
*Do you use the bands when doffing the respirator?	93	90.3	10	9.7
*Do you adjust the nose clip when donning the respirator?	95	92.2	8	7.8
Do you perform the seal check (a test to ensure the right fit of respirator on the face) when wearing the N-95 respirators?	90	87.4	13	12.6
*Do you wash your hands after contact with the outer surface of the respirator?	100	97.1	3	2.9
*Have you received medical evaluation before using the respirator for the first time?	50	48.5	53	51.5
After being in close contact with any-patient co-infected with an infectious disease requiring contact precautions, do you discard the N-95 mask?	90	87.4	13	12.6
Total score (Mean ± SD)	5.9 ± 0.99			

Notable result

As mentioned, the majority of the participants (90.3%) was observed to use the bands when doffing. This is notably higher than the results observed in the study of Honarbaksh et al. (2017), where 80.6% used the bands.

Ninety-five participants also practice adjusting the nose clip when donning the respirator. The CDC (2020f) stated that the nosepiece of the N-95 mask should be fitted into the nose with both hands to reduce the entry of aerosols and droplets. This is also similar to the study of Honarbaksh et al (2017), which declared that 92.3% follow this protocol.

One hundred MTs wash their hands after coming in contact with the outer surface of the respirator. This is significantly higher compared to the results of Honarbakhsh et al. (2017), where only 73.9% practiced proper hand hygiene after touching the respirator.

The main weakness in this category can be attributed to not receiving medical evaluation prior to using the respirator for the first time. According to OSHA (2020a), one of the most frequently cited violations after COVID-19 inspections is the lack of medical evaluation. Medical evaluation is required prior to fit testing, provided that wearing the N-95 mask for a prolonged period of time may pose a burden, especially to those with respiratory problems; however, despite the medical evaluation required by the OSHA through the Respiratory Protection Guidance, 53 out of 103 were still not able to perform the evaluation prior to respirator use. An identical trend can also be observed in the study of Honarbakhsh et al. (2017) in which 64.4% admitted to not having performed medical evaluation prior to the first use of a respirator.

Attitudes Toward Usage of N-95 Masks

The participants were asked nine questions regarding their attitudes based on the key constructs of the health belief model, specifically the perceived susceptibility of COVID-19; perception on the benefits and barriers of the N-95 mask; and self-efficacy in using the N-95 mask to describe their level of agreement in a four-scale response format, similar to the study of Ho (2012). The four-point Likert scale options, scored from one to four, were strongly disagree, disagree, agree, and strongly agree. Figure 3 shows that out of 103 respondents, 56 (54%) have positive attitudes toward the proper utilization of N-95 masks while 45 (44%) and two (2%) of the respondents have moderate and poor attitudes respectively.
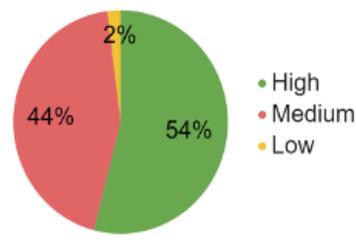

Figure 3. Frequency distribution of attitudes on the perceived susceptibility to COVID-19, perceived benefits and barriers of the N-95 mask, and the self-efficacy in using the N-95 mask (n=103)

The mean score for attitudes is computed to be 28.5 out of 36 (SD 3.71). Out of the nine questions that were asked in the attitude section, the responses obtained from the six questions were particularly notable. The majority of the respondents (96.1%) answered that wearing an N-95 mask will provide them protection from COVID-19. On the other hand, 82.6% of thought that they have a higher chance of being infected with COVID-19 while they are inside the clinic. It must be noted as well that 99% were willing to know the correct steps of wearing an N-95 mask, and 73.8% disagreed that it is acceptable to reuse an N-95. In terms of the possible development of detrimental breathing effects due to prolonged N-95 mask usage, the responses were quite divided where 47.6% disagreed, and more than half, or 52.4%, agreed. Lastly, Table 3 reveals that 90.2% of the respondents believed that upon extended use or reuse of N-95 masks, they are at a higher risk of contact transmission from touching its surface.

Table 3.*Attitudes on the Perceived Susceptibility to COVID-19, Perceived Benefits and Barriers of the N-95 Mask, and the Self-Efficacy in Using the N-95 Mask.*

Variables	1		2		3		4	
	n	%	n	%	n	%	n	%
Perceived Susceptibility to COVID-19								
*There is a high chance of having COVID-19 while in the clinic.	5	4.9	13	12.6	39	37.9	46	44.7
Susceptibility to the virus increases when I am working in the clinic.	7	6.8	12	11.7	45	43.7	39	37.9
Perceived Benefits of the N-95 mask								
*Wearing an N-95 mask will protect me from COVID-19	3	2.9	1	1	18	17.5	81	78.6
I believe that wearing an N-95 mask is a good way to protect myself against the coronavirus at the clinic.	1	1	5	4.9	22	21.4	75	62.8
*Reusing an N-95 mask is acceptable	53	51.5	23	22.3	10	9.7	17	16.5
Perceived Barriers of the N-95 mask								
*The cost of N-95 masks does not hinder its routine usage.	6	5.8	23	22.3	44	42.7	30	29.1
*I may develop detrimental effects to breathing if I use the N-95 mask for a prolonged time.	26	25.2	23	22.3	31	30.1	23	22.3
Upon extended use or reuse of N-95 masks, I am at higher risk of contact transmission from touching its surface.	4	3.9	6	5.8	26	25.2	67	65
Self-efficacy in Using the N-95 Mask								
*I am willing to know the correct steps of wearing an N-95 mask	1	1	0	0	11	10.7	91	88.3
Total score (Mean ± SD)	28.5±3.71							

Legend: Strongly disagree - 1; Disagree - 2; Agree - 3; Strongly Agree - 4
***Notable result*

For this study, more than half of the respondents, or 54%, showed positive attitudes regarding the proper usage of N-95 masks to limit the spread of COVID-19. Likewise, the study conducted by Tadesse et al. (2020) revealed that more than half of their respondents (54.7%) have positive attitudes towards the proper usage of face masks. On the other hand, the results of Kumar et al. (2020) are higher where 88.5% of the respondents have positive attitudes towards proper face mask usage. Similar to the explanation of Tadesse et al. (2020), the discrepancies of the respective results among this study and the two other studies could be due to the difference in the area where the research was conducted and the assessment tool used. In addition, the discrepancies could also be due to the different objectives of each research, as this study solely assessed the proper usage of N-95 masks while Tadesse et al. (2020) and Kumar et al. (2020) focused on surgical face masks.

Furthermore, in the statement pertaining to the belief that wearing the N-95 mask while in the clinic is a good protection against coronavirus under the key construct of perceived benefits of wearing the N-95 mask and the willingness to know the correct steps of wearing it under the key construct of self-efficacy in using the N-95 mask, 84.2% and 99% of the respondents agreed to both of these statements, respectively. This number is in line with the results in the study of Ho (2012) in which similar statements under the same key constructs garnered 88.5% and 88.4% respondents who agreed to both statements, respectively. The high amount of positive responses to both statements in the two studies could be attributed to the fact that correctly wearing a face mask along with other preventive measures, such as proper hygiene and social distancing, protects the user and surrounding individuals from aerosols and droplets that could contain the virus (CDC, 2020a; Mayo Clinic, 2021).

As for the statement with regard to having a high chance of getting COVID-19 while in the clinic under the key construct perceived susceptibility to COVID-19, 82.6% of the respondents agreed in this study. This is in line with the results from a similar statement in the study of Ho (2012), even though it was significantly lesser where only 68% agreed. When it comes to the statement about how the cost of N-95 mask does not hinder its routine usage under the key construct of perceived barriers of wearing an N-95 mask, 71.8% of the respondents agreed.   Likewise, with the findings presented in the study of Ho (2012), 81.8% of their respondents agreed to a similar statement. The high amount of respondents for both studies who agreed on how the cost of the mask does not hinder its usage could be due to it being more cost-saving or cost-effective when compared to either no intervention or other control measures against respiratory infection transmission (Mukerji, MacIntyre, & Newall, 2015).

The slight discrepancies in the results in this research and Ho's study (2012) may be attributed to the different aims, study area, tool of assessment, and study population of both studies (Tadesse et al., 2020). This study focused on assessing the proper usage of N-95 masks among MTs to limit the spread of COVID-19 while the study of Ho (2012) centered on assessing the existence of the knowledge gap and the correlations among the KAP on the use of face masks of outpatients and their caregivers in an outpatient clinic in Hong Kong.

On the other hand, it may be observed that 73.8% of the respondents disagreed when it comes to the acceptability of reusing the N-95 mask. These results are in line with a study conducted by Alshahrani et al. (2021) where more than half of their respondents (58.4%) disagreed   to reusing N-95 or surgical masks. According to Fisher and Shaffer (2014), the common practice is to discard the N-95 mask, particularly after close contact with a patient, for the purpose of infection control. Adherence to the aforementioned practice may explain why the majority of the respondents disagreed to the reuse of N-95 masks. However, it must be highlighted that Fisher and Shaffer (2014) mentions that during infectious disease outbreaks and pandemics, the extended use and limited reuse of N-95 masks should be recommended to conserve the supplies of these masks. As pointed out by the OSHA (2020b) guidelines, the reuse of N-95 masks may be permitted such that the respirator's structural and functional integrity is maintained (i.e. no physical damage or contamination). Although the extended "single-use" is preferable due to the risks of contact transmission upon repeated donning or doffing when reusing an N-95 mask.

In terms of the prolonged usage of the N-95 mask and the possibility of developing detrimental effects to breathing, there is a notable partition between agreement and disagreement where 47.6% disagreed and 52.4% agreed with the risk of   acquiring detrimental effects that come with mask-wearing. Purushothaman et al. (2020) suggested that the prolonged use of facemasks (i.e. > 4 hours per day) among HCWs induced difficulties in breathing on exertion among 58.2% of the participants. Their study also showed that 48.8% of the participants experienced generalized nasal discomfort when wearing the face mask for an extended time. The

results of their study may demonstrate why the respondents of the current study are also ambivalent in agreeing with the given statement that not all HCWs experienced breathing difficulties in the study of Purushothaman et al. (2020). In an attempt to explain the divided responses, the respondents' answers to this particular question may stem from their own experiences on the prolonged usage of the N-95 mask. Even though detrimental effects have been reported, CDC (2020d) recommends that respirators, such as the N-95 mask, could ideally be worn for eight hours straight without affecting the respirator's fit and function. In cases where the respirator becomes noticeably damaged or when the mask makes it hard to breathe for the wearer, it is recommended that healthcare facilities develop clearly written procedures in advising personnel on the proper disposal of the respirator (CDC, 2020d).

CONCLUSION

In connection to the significance of mask usage amidst the COVID-19 pandemic, this research is able to provide groundwork on the knowledge, attitudes, and practices (KAP) of registered medical technologists (MTs) on the proper usage of masks in the local setting. The data obtained from the survey questionnaire revealed that registered MTs working in clinical laboratories within Metro Manila have presented a high level of attitudes and practices and a low level of knowledge on the proper usage of N-95 masks. As an intervention to the poor knowledge of registered MTs on the proper usage of the N-95 masks, the proponents encourage policymakers and hospital and laboratory administrators to develop policies and training programs that will educate health care workers (HCWs) about the proper usage of N-95 masks. The enhancement of the current knowledge of MTs, promotion of standard of guidelines across different institutions, maximization of the efficacy of face masks, and ultimately, the ensured safety of registered MTs while in the laboratory must also be considered in policy making and development of training programs. Additionally, it may be better for future researchers to perform correlational studies that could compare the KAP of public and private institutions with regard to the proper usage of N-95 masks. They may also investigate proper PPE usage whether or not their research participants' training in their institution could yield a higher KAP score. A correlational study may also investigate if the KAP factors have a degree of correlation with one another as well as help identify other factors that could affect the KAP of MTs, such as their socio-demographic profile. Finally, future researchers may also broaden the scope and limitations of the sample population by including other healthcare workers who work in other regions of the country. Furthermore, future studies may also look into evaluating the KAP of other types of masks or personal protective equipment (PPE).

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