Attitudes and Practices toward Droplet and Airborne Universal Precaution among Nurses during the COVID-19 Outbreak in Indonesia

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Purpose: Nurses are at the forefront of the battle against the Coronavirus Disease 2019 (COVID-19) pandemic. Nurses’ expertise, attitude, and practice of prevention and control are important to provide a good quality of care for patients and to protect themselves from COVID-19 infection. This study aimed to investigate the attitudes and practices toward droplet and airborne universal precaution among nurses during the COVID-19 outbreak and to identify factors associated with nursing practices.

Methods: A cross-sectional online survey was conducted among nurses who had been involved in COVID-19 prevention and control and were able to join in the research from referral hospitals from Bandung, West Java, Indonesia from May 1 to 20, 2020. The questionnaire comprised three parts: demographic characteristics, attitude toward droplet and airborne universal precaution, and practice toward droplet and airborne universal precaution.

Results: The response rate was 91.7% (550 of 600 nurses). The majority were women (75.5%), aged 31.26±7.19 years (range: 22~55). Attitude (β=.51, p=.036) and perception of risk of contracting COVID-19 (β=.66, p=.045) were factors found to be associated with practices toward droplet and airborne universal precaution during the COVID-19 outbreak.

Conclusion: The Indonesian government needs to improve health services by enhancing and expanding tailored training programs for nurses on routine infection prevention and provide policies to better control the spread of the COVID-19 pandemic.

Key Words: Attitude; Nursing practices; Universal precautions; COVID-19; Nursing

INTRODUCTION

After the preliminary reports of Coronavirus Disease 2019 (COVID-19) infections in China at the end of December 2019, devastating cases extended globally, with nearly 18,510,119 cases reported and more than 698,901 deaths recorded by 3 August 2020[1]. The World Health Organization (WHO) then announced the COVID-19 pandemic as a global public health emergency [1]. In Indonesia, approximately 115,056 cases have been reported with nearly 1,000 new cases daily and a fatality rate of 4.7, consequently, Indonesia is the country with the second highest number of COVID-19 cases in the Asia-Pacific region. Disease prevention is particularly complicated because of the non-specific symptoms of pneumonia, COVID-19’s long incubation period, and its transmission by airborne droplets, secretions, and contact. Since there is currently no medication or vaccine available for this virus; the therapeutic approach focused on isolation, symptoms in patients, and the prevention and treatment of progression of the infectious disease [2].

Nursing plays a vital role and is becoming a key element in every country’s fight against the COVID-19 outbreak. Their health and safety are not only a major concern for the continued safe and secure care of patients but also for controlling any pandemic [3]. However, at the beginning of the COVID-19 outbreak, there was a limited availability of universal precautions for nurses. Personal pro-
Protective equipment was often used for long periods of time, which caused some problems around fulfilling their basic needs such as eating and excretion. Many nurses could not go back to their homes, where they stayed with their families, because they needed to be quarantined due to having close contact with confirmed COVID-19 patients. Moreover, it is estimated that more than 90,000 nurses were confirmed to have had COVID-19 and more than 260 nurses died as reported in May 2020[4]. In Indonesia, as reported in June 2020, approximately 61 nurses were confirmed to have had COVID-19; it was reported that 97 COVID-19 positive nurses were asymptomatic, 48 nurses needed intensive monitoring, and 19 nurses died from the disease [5].

Nurses are at the forefront of the battle against the pandemic and their expertise, attitudes and practices of COVID-19 prevention and control is important to ensure a good quality of care for patients and that they themselves remain protected from being infected [6]. However, previous studies conducted in Indonesia noted that responsibility and fairness were significant variables that affect public hospital performance; however, these were not significant effects in private hospital settings [7]. Another study reported that patients in private hospitals are more satisfied with the health services provided by health care providers as compared to patients in public hospitals [8]. Therefore, considering that resources and characteristics may differ among nurses who work in public and private hospitals [9], it is necessary to investigate nurses’ attitudes and practices toward droplet and airborne universal precaution during the COVID-19 outbreak. This will assist in the fight against COVID-19 and similar future threats by helping nurses maintain positive attitudes and awareness of the threat. This study aimed to investigate the attitudes and practices toward droplet and airborne universal precautions during the COVID-19 outbreak among nurses and to identify factors associated with nursing practices toward droplet and airborne universal precautions.

2. Setting and Sample

This study was conducted at two referral public and private hospitals for COVID-19 in Bandung, West Java, Indonesia from May 1st to 20th, 2020. Researchers approached nurses working in the hospitals and explained the purpose of the research and eligibility for participation. With the assistance of the nurses in charge, an online survey form was distributed to all registered nurses through social media.

The participants in this study were nurses who had been involved in COVID-19 prevention and control for at least one month, were over 18 years of age, had a minimum education background of a diploma III, were temporary or permanent workers, and were willing to participate in this study. A convenience sampling technique was used to select participants. The sample size was determined using G*Power Software Version 3.1.6 and an F test with the assumptions that $\alpha = .05$, effect size=0.15 (medium effect size), power level=.80, and number of predictors=8. The initial sample estimate was 109. A total of 600 questionnaires were distributed and 550 were collected in this study.

3. Ethical Consideration

This study was approved by the ethics committee of the affiliated university (reference number: III/034/KEKPK/STIKEP/PPNI/Jabar/2020) and informed consent was obtained from all participants by a checkbox on the online survey.

4. Questionnaire

The questionnaire comprised three parts: demographic characteristics, attitudes toward droplet and airborne universal precaution, and practices toward droplet and airborne universal precaution. Demographic characteristics included age, gender, education level, work experience, working division, training related to universal precautions, difficulties in using personal protective equipment, and perception of their risk of contracting COVID-19. When filling out the survey, nurses were asked about the type of hospital in which they worked.

Perception of risk of contracting COVID-19 was defined as the self-assessed probability and susceptibility of contracting COVID-19 and was measured by 5-point Likert scale items, as recommended by WHO. The first question was “What do you consider to be your probability of getting infected with the novel coronavirus?” (1 is extremely unlikely and 5 is extremely likely); the second question was “How severe would contracting the novel

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**METHODS**

1. Study Design

A cross-sectional study, using an online survey, was conducted to explore the attitudes and practices toward droplet and airborne universal precautions among nurses during the COVID-19 outbreak in Indonesia and to identify the factors associated with nursing practices toward droplet and airborne universal precautions.
coronavirus be for you (how seriously ill do you think you will be?)” (1 is very severe and 5 is not severe); the third question was “How susceptible do you consider yourself to an infection of the novel coronavirus?” (1 is very susceptible and 5 is not at all susceptible). The original version of the adopted instrument must follow a procedure sequences as according to the forward-backward translation and cultural adaptation process. The Content Validity Index (CVI) was used to determine the translated questionnaire’s content validity. Five experts were invited to study the questionnaire after it had undergone forward-backward translation into Bahasa. The CVI index ranged from .67 to .70. In the current study, the Cronbach’s α was .69.

The instrument to measure attitude toward droplet and airborne universal precaution of COVID-19 was developed based on the guidelines for prevention and control of COVID-19 issued by the National Health Commission of Indonesia and adapted from a previous study [7]. The measurements consisted of 18 items using a 5-point Likert scoring system: “extremely disagree” scored 1 point and “extremely agree” scored 5 points; the total score ranged from 18 to 90 points. A higher score indicates a higher or better attitude. As with the previous instrument, five experts examined the translated questionnaire and the CVI index was found to range from .61 to .72. In the current study, the Cronbach’s α was .76.

The instrument to measure the practice toward droplet and airborne universal precaution of COVID-19 was mainly designed based on the guidelines for prevention and control of COVID-19 issued by the National Health Commission of Indonesia and adapted from previous studies [7]. The instrument consisted of 17 items using a 5-point Likert scoring system: “never” scored 1 point and “always” scored 5 points; a total score of 17 to 85 points was possible. A higher score indicates a higher or better practice. The five experts invited to study the Bahasa version of this questionnaire after forward-backward translation found a CVI index range of .71 to .80. In the current study, the Cronbach’s α was .79.

5. Data Collection/Procedure

Adhering to the concept of informed consent, a standardized framework was used to notify respondents about the intent and privacy procedures of this study. An online survey (via a website application platform) was sent to all head nurses in both public and private hospitals who were then required to distribute the surveys to all hospital nurses. Respondents could use a computer or smartphone which opened a website, or could check a fast response code to complete the survey.

6. Data Analysis

The categorical data were presented using percentages and continuous variables were presented as means with Standard Deviations (SD). Bivariate analysis was conducted using a student t-test for continuous data and x² for categorical data. A linear regression model was used to determine factors associated with practice. The factors that are significant at a p-value of .05 and other important factors (“perception of risk of contracting COVID-19” and “attitude” in this study) were chosen to be entered into the final linear regression model. p-values of less than .05 were considered as statistically significant. The data were analyzed using SPSS 22.0.

RESULTS

The response rate was 91.7% (550 of 600 nurses); there was no significant difference between respondents and non-respondents with respect to their education level (p=.400) while gender (p=.003) and mean age (p=.005) were significantly different. The majority of participants were females (75.5%), and their average age was 31.26 ± 7.19 years (range=21~55). The majority of participants had a diploma, and the mean working experience was 7.38 ± 6.52 years. Many of them were working in the inpatient department (48.0%), followed by the outpatient department (18.9%), and emergency or intensive care unit (16.0%). About 54% of the participants had received training related to universal precaution, but 48.7% reported having difficulty using personal protective equipment due to its limited availability at the early stage of the COVID-19 outbreak in Indonesia. Many of the participants had high perceptions of their risk of contracting COVID-19. In Table 1, nurses who received training related to universal precaution showed better practice than those who did not receive training. There was no significant relationship among demographic data except training related to universal precaution with practice.

The total score for attitude of the nursing staff was 83.42 (range=18~90), indicating that the attitude of the nursing staff toward droplet and airborne isolation precaution during the COVID-19 outbreak was positive. There was a significant relationship between attitude with practice toward droplet and airborne isolation precaution (r=.47, p=.004). The total score for practice of the nursing staff was 68.40 (range=17~85), indicating that the practice of the nursing staff toward droplet and airborne isolation
precaution during the COVID-19 outbreak was good. There was a significant relationship between perception of risk of contracting COVID-19 and practice toward droplet and airborne isolation precaution (r = .37, p = .027) (Table 2).

In this survey, items in which 94% or more answered as ‘agreed’ or ‘extremely agree’ were: “hospital wards must be notified before accepting patients who need precautions from droplets,” “the ward must be notified before accepting patients who need precautionary measures through airborne transmission,” “practice cleanliness when coughing or sneezing into elbows or tissues and then immediately removing or cleaning it,” and “choose the right Personal Protective Equipment (PPE) and trained in how to wear and remove it.” (Table 3). Items in which 97% or more answered as ‘often practice’ and ‘always practice’ were: “I wore a mask when entering the patient’s room,” “I practice ethics when coughing or sneezing into elbows or tissues and then immediately removing or cleaning it,” “I wear a medical mask if I have respiratory symptoms and wash my hands after removing the mask,” and “I practice hand hygiene with alcohol-based hand washing if my hands don’t look dirty, or with soap and water if my hands are dirty.” (Table 4).

In the multivariable analysis, we found that after adjusting for all confounders in the final model attitude (β = .51, p = .036) and perception of risk of contracting COVID-19 (β = .66, p = .045) were the factors associated with practice toward droplet and airborne universal precaution during the COVID-19 outbreak (Table 5).
### Table 3. Attitude toward Droplet and Airborne Universal Precaution during Outbreak COVID-19 among Nurses (N=550)

| Items                                                                 | Percentage of answering as 'agree' or 'extremely agree' (%) |
|-----------------------------------------------------------------------|-------------------------------------------------------------|
| Hospital wards must be notified before accepting patients who need precautions for droplets | 94.4                                                        |
| The ward must be notified before accepting patients who need precautionary measures for airborne transmission | 94.4                                                        |
| Practice cleanliness when coughing or sneezing into elbows or tissues by immediately removing or cleaning | 94.4                                                        |
| Choose the right PPE and trained in how to wear and remove it.        | 95.5                                                        |
| Often practice hand hygiene with alcohol-based hand washing if your hands do not look dirty, or with soap and water if hands are dirty | 92.5                                                        |
| Avoid touching your eyes, nose and mouth                               | 92.5                                                        |
| Wear a medical mask if you have symptoms of respiratory distress and wash your hands after removing the mask | 92.1                                                        |
| The doors of the rooms of patients with infectious diseases transmitted through the air must always be closed | 93.0                                                        |
| COVID-19 patients must wear a mask while traveling                    | 93.0                                                        |
| COVID-19 patients must be isolated in a special room                  | 83.8                                                        |
| Must maintain a minimum distance of 100 cm from COVID-19 patients for prevention of transmission | 89.1                                                        |
| Use N95 masks for health workers                                       | 86.8                                                        |
| Health workers involved in direct care of patients must use the following PPE: gowns, gloves, medical masks, and eye protection (goggles or face shields) | 93.4                                                        |
| Patients with airborne infectious diseases must be isolated in separate rooms with negative pressure | 90.5                                                        |
| Patients who need precautions for airborne transmission must wear surgical masks when transported | 90.9                                                        |
| All health workers must be vaccinated                                  | 87.5                                                        |
| Wearing a mask is necessary when entering the patient’s room          | 84.0                                                        |
| Masks should be worn when health workers are within 90 cm of the patient under transmission prevention treatment | 81.0                                                        |

COVID-19=Coronavirus disease 2019; PPE=personal protective equipment.

**DISCUSSION**

The majority of the participants included in the study had high precautionary attitudes regarding droplet and airborne isolation during the COVID-19 outbreak, suggesting that most participants had a good attitude about COVID-19 precautions and prevention. Similar findings were shown by in a study conducted in Greece which reported that most participants (84.8%) displays a high attitude score concerning the prevention of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection [8]. Almost all participants agreed that hospital wards must be notified before accepting patients who need precautions for droplets or airborne infections, practicing cleanliness when coughing or sneezing is essential, and choosing the right PPE and being trained in how to wear and remove it is important. In the current study, practices of the nursing staff toward droplet and airborne universal precaution during the COVID-19 outbreak were found to be good. In addition, all nurses wore masks when
Table 4. Practice toward Droplet and Airborne Universal Precaution during Outbreak COVID-19 among Nurses (N=550)

| Items                                                                 | Percentage of answering as 'often' or 'always' (%) |
|-----------------------------------------------------------------------|---------------------------------------------------|
| I wore a mask when entering the patient’s room                        | 97.2                                              |
| I practice ethics when coughing or sneezing into elbows or tissues and then immediately removing or cleaning it | 97.2                                              |
| I wear a medical mask if I have respiratory symptoms and wash my hands after removing the mask | 99.1                                              |
| The doors of the rooms of patients with an infectious disease should remain closed | 94.8                                              |
| I practice hand hygiene with alcohol-based handwash, if my hands don’t look dirty, or with soap and water, if my hands are dirty | 97.6                                              |
| I avoid touching my eyes, nose and mouth                               | 95.5                                              |
| COVID-19 patients were isolated in a special room                     | 93.6                                              |
| COVID-19 patients must wear a mask while traveling/in the treatment room | 89.3                                              |
| I use a mask within 90 cm of the patient under treatment for prevention of transmission | 91.6                                              |
| The treatment room where I work is notified before accepting patients who need precautions for airborne transmission | 89.2                                              |
| I maintain a minimum distance of 100 cm from COVID-19 Patients for prevention of transmission | 87.6                                              |
| I chose the right PPE and was trained in how to wear and remove it.   | 68.2                                              |
| Health workers involved in direct care of patients must use the following PPE: gowns, gloves, medical masks, and eye protection (goggles or face shields) | 86.2                                              |
| The treatment room where I work is notified before accepting patients who need precautions from droplets | 83.1                                              |
| Airborne patients are isolated in separate rooms with negative pressure | 86.2                                              |
| Patients who require airborne transmission prevention measures wear surgical masks when transported | 83.4                                              |
| All health workers are vaccinated                                      | 47.1                                              |

COVID-19=Coronavirus disease 2019; PPE=personal protective equipment.

Table 5. Multiple Regression of Factors Associated with Practice toward Droplet and Airborne Universal Precaution during Outbreak COVID-19 among Nurses (N=550)

| Variables                                      | β  | B (SE)          | 95% CI       | t (p)              |
|------------------------------------------------|----|-----------------|--------------|--------------------|
| Attending training                             | .61| 1.16 (1.35)     | -1.51~3.82   | 0.53 (.391)        |
| Perception of risk of contracting COVID-19     | .66| 2.89 (1.47)     | 1.05~5.75    | 3.97 (.045)        |
| Attitude toward droplet and airborne universal precaution | .51| 0.10 (0.05)     | 0.01~0.19    | 5.16 (.036)        |

R^2=.35, Adjusted R^2=.21, F=3.52, p=.040

CI=confidence interval; COVID-19=Coronavirus disease 2019; SE=standard error.

entering patients’ rooms if they had respiratory symptoms. However, the study in Greece found that the majority of health care workers did not perform preventive practice aimed at SARS-CoV-2[8]. Nurses’ attitudes and their practices of COVID-19 prevention and control are important to providing good quality care for patients and to protect themselves from being infected with COVID-19.

Despite their good practices toward droplet and airborne precautions during the COVID-19 outbreak, very few health care workers (47.1%) were vaccinated and many nurses have high perceptions of their risk of contracting COVID-19. Considering that healthcare profession-
nals are unable to practice self-isolation and are at a greater risk of COVID-19 exposure, they are likely to spread the infection to their patients. Availability of PPE for health care staff in several countries is a key issue due to supply problems correlated with the outbreak’s rapid progression. Health practitioners’ health is of great significance and the introduction of a COVID-19 vaccine will aid in this context considerably. Our findings demonstrate the necessity for a comprehensive health education and policy plan aimed at enhancing the vaccination of health care workers to defend and protect both themselves and others from infection.

Nurses showed higher percentages in their practice toward hospital policies such as alcohol-based hand washing, using adequate PPE, isolated rooms with negative pressure, and training to upgrade the understanding of COVID-19 prevention. Therefore, support from the government to help referral hospitals provide PPE, vaccinations, and financial support, is imperative in fight against COVID-19. Due to the increasing number of patients with COVID-19, not all patients were isolated in negative pressured rooms. Previous evidence suggests that when rooms were maintained under negative-pressure conditions, a false feeling of safety was provided and this may have led to negligence with respect to essential measures, such as environment cleaning [9].

The attitude scores were significantly associated with the practice scores; therefore, nurses with more positive attitudes engaged in better practices toward droplet and airborne isolation precaution during the COVID-19 outbreak. A previous study reported that attitude was associated with practices, indicating that healthcare professionals with a higher attitude score are more likely to perform practices toward the prevention of SARS-CoV-2 transmission [8]. Previous research showed diverse findings on health-care professionals’ attitudes and practices for Ebola and Zika viruses. Oladimeji et al., in particular, stated that a good understanding of Ebola virus was not related to the level of good practice among Lagos health care workers; attitudes and experience surveys are widely used to recognize differences and behavioral trends to help the implementation of successful strategies [10]. However, a ceiling effect of attitudes on the practice scale may bias the results for those who were aware of the risk that a yes to all items but may disclose their real attitude concerning the important issue. Our study was conducted early in the disease’s outbreak and can help set goals for global public health strategies to tackle the most problematic and dangerous activities. Factors which can affect attitudes and practices toward COVID-19 need to be thoroughly understood and defined.

There are numerous limitations to our analyses. We accept that the participants’ geographical sample is a disadvantage to the design of the analysis due to the majority of participants coming from the West Java Province, while Indonesia has 34 provinces in total. Convenience sampling is another limitation because it has population bias-related limitations which may restrict the interpretation and generalization of the target sample findings. Due to time sensitivities, the study used a convenient sampling method and therefore the sample might not be reflective of all nurses. However, we conclude that the data provided here may be regarded as adequate representations of attitudes and nursing practices regarding droplet and airborne universal prevention during the COVID-19 outbreak considering that the study involved personnel from both public and private hospitals. In addition, this study utilizes self-reported information that could lead to bias. Another potential constraint of our research might be that the gender of respondents was disproportionately women.

CONCLUSION

Our study highlights positive attitudes and good practices of nurses cornering droplet and airborne precautions during the COVID-19 outbreak. Many nurses have high perceptions of their risk of contracting COVID-19. Attitudes and perceptions of risk of contracting COVID-19 were the factors found to be associated with practices toward droplet and airborne universal precaution during the COVID-19 outbreak. Tailored training programs regarding PPE, caring for patients with COVID-19, and environmental cleaning, and aimed at thorough and sustained nursing practices are imperative to update evidence regarding the novel COVID-19. Healthcare policies need to pay more attention to protecting nurses from COVID-19 infections by providing adequate PPE and support in their working environments.

CONFLICTS OF INTEREST

The authors declared no conflict of interest.

AUTHORSHIP

Study conception and design - LL and DI; Data collection - T and DI; Data analysis and interpretation - LL, T and DI; Drafting of the article - LL, PB and DI; Critical revision of the article - LL and PB.

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