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Critical care Nurses' knowledge, Practices, and Attitudes regarding the ICU Configuration Prevention Measures in the Covid-19 Era

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Abstract:
Background: *Nurses act as a part of healthcare facilities that are on the frontline against the covid-19 era.* ***Aim of the study:*** *this study aims to determine critical care nurses' knowledge, practices, and attitudes regarding ICU configuration preventive measures in the COVID-19 era.* ***Method:*** *260 critical care nurses were included in this study.* ***Results:*** *The majority of them had good knowledge and practice. Whereas most of them had a positive attitude.* ***Conclusion:*** *It was determined that critical care nurse's knowledge about the ICU configuration preventive measures is good. They exhibit positive attitudes. Their knowledge and attitudes are a mirror of their practices to a large extent. Good KAP is a tool that can positively be used to control the spread of COVID-19 in intensive care units. In-service training programs should be organized in such a way as to include the use of technology to care for critically ill patients with COVID-19 with less risk and harm to staff.*
Key Word*: Critical Care Nurses, Knowledge, Practices, Attitudes; Intensive Care Units; Preventive Measures, COVID-19 Pandemic, ICU Configuration.*

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I. Introduction

Coronavirus disease caused by the novel coronavirus (SARS-CoV-2) has posed a medical emergency and a global crisis that rapidly emerged in December 2019 (Shailendra K. Saxena, 2020). Healthcare facilities have a vital role in responding to emergencies on the international and local scales (ELSukkary & Youssef, 2021). Alharthy, et al (2020) reported that their intensive care unit (ICU) beds occupancy rates had never exceeded 80% until 2019, which changed dramatically after March 2020 when the ICU occupancy rates have reached 100% (Alharthy et al., 2021).

Continued evaluation of the ICU strategies for managing ICU capacity and monitoring the impact of caring for COVID-19 patients on ICU staff are still needed (Medicine, 2021). The report of the Society of Critical Care Medicine (SCCM) about ICUs readiness assessment revealed that the ICUs are not prepared for the potential attack of COVID-19(Alharthy et al., 2021). WHO has recommended a series of preventive measures to stop the spread of the pandemic (Peter Murphy, 2020).

Society of Critical Care Medicine recommended an ICU configuration strategy. Configuration Preventive measures are defined as remodeling the recent strategy to decrease the transmission of infection in the ICUs. It includes infection control measures that have been strictly implemented protocols for donning and doffing of personal protective equipment, providing sanitizer dispensers, applying strict room disinfection protocols. Clinical management strategy is highly recommended that its principles and protocols for COVID-19 patient care such as anticoagulation, renal support, and ventilator management. Also, increasing ICU capacity by adjusting existing ICUs and remote use infusion pumps and physiologic monitoring. Refinement of respiratory care strategy included changing the ventilator circuits and filters, avoid nebulizers, creating specialized intubation or prone positioning ventilation teams, and upgrading the oxygen supply system. Moreover, family and patient communication, and emotional support for staff (Halpern et al., 2020).

The success of the implementation of these measures is largely dependent on the high awareness and knowledge of the critical care nurses. Nursing is an essential component of health care, and nurses' knowledge about disease directly affects patient outcomes. Similarly, during an outbreak, nurses' Knowledge, practices, and attitudes (KPA) play positive roles in improving the recovery rate, reducing the length of the hospital stay and mortality, and preventing in-hospital infection and occupational exposure. To date, most studies focus on the KPA of the public, and few have investigated the KPA of critical care nurses. To further understand the

current status of the KPA of critical care nurses towards the prevention and control of COVID-19 during the outbreak, more studies are needed. To decrease the spread of transmission of this virus, the nurses should be fully aware of the mode of transmission to break the chain of infection(Charlotte Gordon, 2020; Hamed, 2020)

As the current wave of COVID-19 subsides, Nurses act as a part of healthcare facilities that are on the frontline against the covid-19 pandemic (Al Thobaity & Alshammari, 2020). It is also important to have good knowledge about coronavirus infection and practice preventive measures in the ICUs. Therefore, the current study was carried out to assess the critical care nurses' knowledge, practices, and attitudes regarding ICU configuration preventive measures in the COVID-19 era (Al Thobaity, 2020).

Significance of the study:

The emergence of outbreak of COVID-19 pandemic has become extremely deadly. The continually changing landscape of the novel coronavirus 2019 (COVID-19) pandemic makes it clear that health care system can no longer depend on their previous approaches in their intensive care units (ICUs). Critically ill patients with COVID-19 need treatments of high complexity. Thus, it is expected that there will be imbalance between the supply and demand for human resources especially critical care nurses. Critical care nurses need to assess and modify their knowledge, practices, and attitudes regarding the ICU configuration preventive measures in the COVID-19 era.

II. Material And Methods

Aim of the study:

This study aims to assess the critical care nurses' knowledge, practices, and attitudes regarding the ICU configuration preventive measures in the COVID-19 era.

Study questions:

1. What is the level of critical care nurses' knowledge regarding the ICU configuration preventive measures in the COVID-19 era?
2. What is the level of critical care nurses' practices regarding the ICU configuration preventive measures in the COVID-19 era?
3. What are the attitudes of critical care nurses regarding the ICU configuration preventive measures in the COVID-19 era?

Operation definition:

ICU configuration preventive measures in the COVID-19 era are defined as the following Clinical management strategy; increasing ICU capacity; remote use infusion pumps; remote physiologic monitoring; refinement of respiratory care strategy; infection control measures; family and patient communication, and emotional support for staff.

Research design:

A descriptive research design was used in this study.

Setting:

The study was conducted in the ICUs of the Alexandria Main University Hospital which is affiliated with Alexandria University.

Subjects:

A convenience sample of 260 critical care nurses who are working at ICUs departments at the previously mentioned hospital were included. The sample size was determined through the utilization of the Epi info program (7). (Total population 780 -Confidence level 95%- acceptance error 5%- prevalence of the problem 50%- Minimum sample size 257-Final sample size 260). The inclusion criteria were CCNs of both sexes who provided direct care for patients with COVID-19 for at least 1 week. The exclusion criterion was CCNs who are not bedside nurses.

Tools:

One tool was used to collect the necessary data in the current study.

Tool I: COVID-19 ICU- configuration data online questionnaire:

Part one: Critical care nurses' basic data questionnaire: This tool was developed by the researchers after an extensive review of current & relevant literature(Alharthy et al., 2021; Demirkol et al., 2020; Griffin et al., 2020; Halpern et al., 2020). It included critical care nurses'- socio-demographic and professional data such as age, marital status, previous experience working in the isolation units, academic degree, and total years of experience.

Part two: Critical Care Nurses' knowledge regarding the ICU configuration preventive measures online questionnaire:

This tool was developed by the researcher to measure the critical care nurses' knowledge regarding the ICU preventive measures. It consisted of 10 questions. The response was evaluated based on three points Likert likes scale as follows: Incorrect answers = 0; Correct but incomplete answers = 1; and Correct and complete answers

= 2. The total scores for knowledge items ranged from 0-32, the level of nurse's knowledge was categorized as follows: Poor for the total score which was from 0-10. Fair for the total score which was from 11-21. Good for the total score which was from 22 -32.

Part three: Critical care nurses' practices regarding the ICU configuration preventive measures questionnaire: This tool was developed by the researcher to appraise the critical care nurses' practices regarding the ICU configuration preventive measures. It covered 10 items. Critical care nurses' practices were evaluated based on three points Likert likes Scale as previous. The total scores for practices items ranged from 0-34, the level of practice was categorized as follows: Poor score was from 0-10; Fair was from 11-22; Good was from 23 -34.

Part four: Critical care nurses' attitude regarding the ICU configuration preventive measures questionnaire:

This tool was adapted to measure the Critical care nurses' attitude regarding the configuration preventive measures. It contained 5 statements. Each one was scored on a three-point Likert likes scale ranging from 1-3 (Agree (3)- Neutral (2) -Disagree (1). For each subject, the total scores ranged from 7- 21. Accordingly, each subject's attitude was categorized as follows: negative attitude was from 7-11; neutral attitude was from 12-16; positive attitude was from 17-21.

METHOD

- The study was conducted according to the following steps:
- Approval from the Ethical Research Committee from the previously mention hospital was obtained their permission for conducting the study.
- . One tool was developed by the researcher after a review of recent relevant literature.
- Tool reliability was accomplished by Cronbach's alpha test and the result was statistically acceptable (r=0.90).
- An electronic questionnaire was used in this study. The data was collected through an online questionnaire. The questionnaire link sent to nurses or onsite applied in the unit. To reduce the missing data, all questions are required to answer questions in electronic form.
- A pilot study was conducted to establish the applicability, feasibility, and clarity of the tools and to identify the limitation of data collection and the necessary modifications were done. The reliability was done by Cranach's Alpha which revealed that the internal consistency of knowledge was 0.81 and the internal consistency of the attitude was 0.76.
- The collected data was revised, categorized, coded, computerized, tabulated, and analyzed using a statistical package for social sciences (SPSS) version 20. The following statistical measures Fisher ANOVA test and t Student T-Test were used.

Ethical considerations:

All nurses in the previously mentioned settings were invited to participate in the study via email or WhatsApp. Nurses who accepted the invitation to participate were included in the study. An electronic informed consent was obtained from all nurses after explanation of the aim of the study through emails and WhatsApp. All nurses were informed that participation in this study was optional, and they could withdraw from the study without giving reasons. Nurses' privacy was respected. Data confidentiality was assured during the implementation of the study Right to the voluntary participation of the subjects and assuring confidentiality of their data.

III. Result

Table (1) presented 69.2%of studied nurses were unmarried, and 50.8% aged from 30 to 39 years old. Also, 41.9 % of nurses graduated from a secondary school of nursing diploma. More than 78 % of them had experienced in the isolation unit. 40 % of nurses reported having less than 5 years of work experience.

Tables (2) showed a distribution of studied nurses according to levels of knowledge, attitude, and practice regarding ICU configuration preventive measures. It was found that more than half of them (88.5%, 97.7%) had good knowledge and practice about ICU configuration preventive measures of the Covid 19 respectively, with a mean of 24.36 % for their knowledge and 28.88 % for their practices. Also, near half of them (51.5 %) had neutral attitudes.

Table (3) pointed to the relationship that was observed between the level of knowledge, practice, and attitudes of nurses and their age and educational level. there was a highly statistically significant relationship between the mean score of knowledge and nurses' characteristics including age, marital status, educational level, and years of experience. In addition, a mean score of knowledge was increased in younger who had experience years less than 5 with bachelor educational level. Nurses who were younger with a higher level of education had a better level of knowledge about Covid 19. About demographic data and level of practices of critical care nurses. There was a highly statistically significant relationship between the mean score of level of practice and nurses' characteristics including age, marital status, educational level, previous experience in

isolation units, and years of experience. The mean score of practice was increased in nurses who had previous experience in isolation units.

Table (1): Distribution of the studied nurses according to their demographic characteristics:

Nurses' characteristics	N=260 Total	
	No.	%
Age (years)		
▪ 20-29	63	24.2
▪ 30-39	132	50.8
▪ ≥40	65	25.0
Marital status		
▪ Unmarried	180	69.2
▪ Married	57	21.9
▪ Divorced	15	5.8
▪ Widowed	8	3.1
Educational level		
▪ Secondary School of Nursing diploma	109	41.9
▪ Technical Institute of Nursing diploma	89	34.2
▪ Bachelor degree	62	23.8
Previous experience in isolation units		
▪ Yes	203	78.1
▪ No	57	21.9
Years of experience		
▪ Less than five years	104	40.0
▪ From five to less than ten years	101	38.8
▪ More than or equal ten years	55	21.2

Table (2): Distribution of the studied nurses according to the levels of knowledge, attitude, and practice regarding ICU configuration preventive measures of Covid 19:

Items	N=260 Total	
	No.	%
Nurses' knowledge about preventive measures of Covid 19		
Poor	0	0.0
Fair	30	11.5
Good	230	88.5
Mean +-SD 24.36 ± 2.547		
Nurses' practice of preventive measures of Covid 19		
Poor	0	0.0
Fair	6	2.3
Good	254	97.7
Mean +-SD 28.88 ± 2.895		
Nurses' attitude towards preventive measures of Covid 19		
Negative	0	0.0
Neutral	134	51.5
Positive	126	48.5
Mean +-SD 16.85 ± 2.494		

Table (3): The relationship between the studied nurses' Knowledge, practice and attitude mean score and their basic characteristics:

Nurses' characteristics	Mean Score of Knowledge	X^2 Sig	Mean Score of practice	X^2 Sig	Mean Score of attitude	X^2 Sig
Age (years)						
▪ 20-29	24.70±2.417	F=6.832	28.19±3.241	F=8.228	16.09±2.352	F=25.877
▪ 30-39	23.35±2.437	P=0.001*	29.76±1.932	P=0.000*	16.68±2.481	P=0.000*
▪ ≥40	24.63±2.684		29.42±2.597		18.57±1.912	
Marital status						
▪ Single	25.23±2.543	F=4.209	27.40±3.731	F=8.970	16.51±2.421	F=0.856
▪ Married	24.02±2.472	P=0.006*	29.23±2.449	P=0.000*	16.89±2.472	P=0.465
▪ Divorced	24.33±2.498		28.80±1.935		17.27±2.987	
▪ Widowed	25.75±2.866		31.63±2.875		17.75±2.605	

Educational level						
▪ Secondary School diploma ▪ Technical Institute diploma ▪ Bachelor degree	24.33±2.875 24.23±3.464 25.06±2.167	F=3.765 P=0.003*	27.92±1.033 27.56±4.041 30.07±1.310	F=4.343 P=0.001*	15.63±2.552 15.71±1.155 17.83±1.584	F=7.939 P=0.000*
Previous experience in isolation units						
▪ Yes ▪ No	24.38±2.543 24.26±2.581	t=0.100 P=0.752	29.09±2.920 28.12±2.693	t=5.032 P=0.026*	16.01±2.317 16.87±2.509	F=19.137 P=0.000*
Years of experience						
▪ Less than five years ▪ From five to less than ten years ▪ More than or equal ten years	24.99±2.601 23.51±2.091 24.71±2.807	F=9.901 P=0.000*	27.87±3.368 29.60±1.970 29.45±2.840	F=11.493 P=0.000*	16.01±2.317 16.87±2.509 18.42±2.016	F=19.137 P=0.000*

*F ANOVA test t Student T-Test * Statistically significant at ≤ 0.05

IV. Discussion

COVID-19 is an evolving infectious disease that had a significant threat and increases morbidity and mortality. Configuration ICU is recommended to reduce the spread of threats of COVID-19, which is affected by nurse's knowledge, attitudes, and practices. Critical care nurses cope with COVID-19 and translate their knowledge into practice to minimize the risk of infection (World Health Organization, 2020). Thus, this study aimed to assess the knowledge, attitudes, and practices of the critical care nurses, for novel coronavirus disease.

Our findings indicated that most studied samples were knowledgeable about COVID-19 as most of them had a good level in the questionnaire. It can be due to they gained awareness and knowledge from social media; TV; work experience; and attendance online workshops.

This finding is in line with other studies that have shown satisfactory levels of knowledge about COVID-19 (Al-Hanawi et al., 2020; Al-Mohrej et al., 2016; ALdowyan et al., 2017). This may be due to the characteristics of the sample, as most of them had a secondary school of nursing diploma, and their level of experience was less than 5 years and the near half of the nurses aged from 30to 39 years old. This result was supported by Abd El Fatah, et al (2020) who reported that Facebook was the most common source of information (Abd El Fatah et al., 2020).

Regarding practices, it was found that the majority of the studied sample had a good satisfactory level toward practices. This finding is supported by Tadesse (2020) who found that 67% of the studied nurses had good practices towards COVID-19(Tadesse et al., 2020). This may be due to the satisfactory level of knowledge that affects their practice and the mean score of practice increased in nurses who had experience working in isolation units. There was a significant positive association found between practice and studied sample age, educational level, marital status, previous experience in isolation units, and years of experience.

Regarding attitudes, more than half of the studied sample showed a neutral attitude toward COVID-19. This may be due to there was a highly statistically difference between the mean score of attitude and nurses' characteristics such as previous experience in isolation. The mean score of practice was increased in older aged who had experience years more than 10.

The current study finding was in line with Tadesse, et al (2020) was found that more than half of the studied nurses had a favorable attitude towards COVID-19. Huynh, et al (2020) had found that the majority of the studied staff had good knowledge and a positive attitude toward COVID-19. Srikanth, et al (2020) was found that positive awareness of COVID-19 prevention and control of the studied population. (Akshaya, 2020; Huynh et al., 2020; Tadesse et al., 2020).

This finding is consistent with a recent study conducted in China, where most of the studied sample reported that the disease is curable (Zhong et al., 2020). Conflicting, these results contrast with Blendon, et al (2004) that suggest persons tend to express negative emotions, such as anxiety and panic, during a pandemic that could affect their attitude (Blendon et al., 2004). In addition, Abd El Fatah, et al (2020) reported that most of their studied students had unsatisfactory responses to the current pandemic (Abd El Fatah et al., 2020). It can be concluded that high knowledge of COVID-19 translates into good and safe practices, which had a positive effect on an increased level of attitude without a doubt.

The study findings may be useful to inform the legislators and healthcare professionals, on further the health education programs and awareness campaigns about COVID-19, arranged by healthcare authorities; is through making periodic webinars for managing the health team which also include medical and nursing students. Critical care environment required continuous monitoring and nurses beside patients' beds which increase the risk for nurses and their families.

LIMITATIONS OF THE STUDY

Due to the busy schedule of the nurses and the nature of an online questionnaire without face-to-face interviews, the reliance on self-report had limitations, as it may be prone to misinterpretation

V. Conclusion

The majority of studied nurses had good knowledge regarding ICU configuration preventive measures of Covid-19 pandemics.

Almost all of them had a good practice regarding ICU configuration preventive measures.

They had a positive attitude regarding ICU configuration preventive measures.

Consequently, attitude to deal with life-threatening patients depends on the practices which are a mirror of knowledge to control the spread of COVID-19.

These findings boost the need to continue training for new critical care nurses' staff for the ICU configuration preventive measures for COVID-19 especially in critical procedures such as closed system suction; and cardiopulmonary resuscitation for the patient with COVID-19.

Recommendations

Critical care nurses need to update their own knowledge about Covid-19 pathophysiology and its mode of transmission.

Critical care practice is a mirror of their attitude and knowledge about preventive measures especially donning and doffing protocols.

ICU configuration in the covid era is highly challenged and needs an optimistic attitude from critical care nurses.

Good KAP is a tool that can positively be used to control the spread of COVID-19 in intensive care units.

In-service training programs should be organized in such a way as to include the use of technology to care for critically ill patients with COVID-19 with less risk and harm to staff.

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