



# Knowledge, Attitudes, and Practices Regarding COVID-19 Management Among Emergency Nurses in Chengdu, the People's Republic of China\*

ความรู้ ทศนคติ และการปฏิบัติเกี่ยวกับการจัดการโควิด-19  
ของพยาบาลฉุกเฉินในเฉิงตู สาธารณรัฐประชาชนจีน\*

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## Abstract

Emergency nurses play significant roles in COVID-19 management. Assessment of knowledge, attitudes, and practices among emergency nurses will provide basic information for enhancing the quality of COVID-19 management in emergency departments. This descriptive correlational research aimed to explore emergency nurses' knowledge, attitudes, and practices (KAP) regarding COVID-19 management and the relationships between them. The Knowledge-Attitude-Practice (KAP) Model (Schwartz, 1976) and the literature review were used as the study framework. The survey was conducted online with 308 emergency nurses working in hospitals in Chengdu, China. Research instruments included the Demographic Data Form and the KAP Questionnaire developed by the researchers based on the Chinese Infection Prevention and Control Technical Guide in Health Care Settings (third edition) and the literature review. Descriptive statistics and Pearson's correlation were used for data analysis.

The findings revealed that the participants had a good level of knowledge ( $\bar{X} = 16.30$ ,  $SD = 1.53$ ), positive attitudes ( $\bar{X} = 3.57$ ,  $SD = 0.40$ ), and good practices of COVID-19 management ( $\bar{X} = 4.76$ ,  $SD = 0.33$ ). There were statistically significant weak positive correlations between knowledge and attitudes ( $r = 0.18$ ,  $p < 0.01$ ), and attitudes and practices ( $r = 0.33$ ,  $p < 0.001$ ). There was also a weak positive correlation between knowledge and practices ( $r = 0.11$ ), but it was not statistically significant.

These findings could be used as basic information for further strengthening COVID-19 management among emergency nurses in China.

**Keywords:** COVID-19 management; Emergency nurses; Knowledge; Attitude; Practice

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## บทคัดย่อ

พยาบาลหน่วยตรวจฉุกเฉินมีบทบาทสำคัญในการจัดการโควิด-19 การประเมินความรู้ ทักษะ และการปฏิบัติของพยาบาลหน่วยตรวจฉุกเฉิน จะทำให้ได้ข้อมูลพื้นฐานสำหรับการพัฒนาคุณภาพการจัดการโควิด-19 ในหน่วยตรวจฉุกเฉิน การวิจัยเชิงพรรณนาเพื่อหาความสัมพันธ์ครั้งนี้มีวัตถุประสงค์เพื่อศึกษาความรู้ ทักษะ และการปฏิบัติเกี่ยวกับการจัดการโควิด-19 ของพยาบาลหน่วยตรวจฉุกเฉิน และศึกษาความสัมพันธ์ระหว่างตัวแปรทั้งสาม โดยใช้รูปแบบความรู้-ทัศนคติ-การปฏิบัติ (Schwartz, 1976) และการทบทวนวรรณกรรมเป็นกรอบแนวคิดในการศึกษา ทำการสำรวจออนไลน์กับพยาบาลหน่วยตรวจฉุกเฉินที่ทำงานในโรงพยาบาล เมืองเฉิงตู สาธารณรัฐประชาชนจีน จำนวน 308 คน เครื่องมือที่ใช้ในการวิจัย ได้แก่ แบบบันทึกข้อมูลทั่วไป และแบบสอบถามความรู้ ทักษะ และการปฏิบัติที่พัฒนาโดยผู้วิจัยจากแนวทางการป้องกันและควบคุมการติดเชื้อในสถานบริการสุขภาพของประเทศจีน ฉบับที่ 3 และการทบทวนวรรณกรรม วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา และสถิติ Pearson's correlation

ผลการวิจัยพบว่า กลุ่มตัวอย่างมีความรู้ในระดับที่ดี ( $\bar{X} = 16.30$ ,  $SD = 1.53$ ) ทักษะด้านบวก ( $\bar{X} = 3.57$ ,  $SD = 0.40$ ) และการปฏิบัติเกี่ยวกับการจัดการโควิด-19 ที่ดี ( $\bar{X} = 4.76$ ,  $SD = 0.33$ ) พบความสัมพันธ์ระดับต่ำอย่างมีนัยสำคัญทางสถิติระหว่างความรู้กับการปฏิบัติ ( $r = 0.18$ ,  $p < 0.01$ ) และทัศนคติกับการปฏิบัติ ( $r = 0.33$ ,  $p < 0.001$ ) ทั้งนี้ความรู้และการปฏิบัติมีความสัมพันธ์กันในระดับต่ำ ( $r = 0.11$ ) แต่ไม่มีนัยสำคัญทางสถิติ

ผลการวิจัยสามารถนำไปเป็นข้อมูลพื้นฐานสำหรับการพัฒนาการจัดการโควิด-19 ของพยาบาลฉุกเฉินประเทศจีนต่อไป

**คำสำคัญ:** การจัดการโควิด-19 พยาบาลฉุกเฉิน ความรู้ ทักษะ การปฏิบัติ

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## Background and Significance

The COVID-19 pandemic has been the biggest global health threat of the century, infecting more than 600 million people worldwide and causing 6.5 million deaths (World Health Organization, 2022). It has pushed healthcare systems worldwide to the brink and caused healthcare workers, especially nurses, to face huge challenges in managing the disease.

Emergency nurses play significant roles in COVID-19 management, especially in China where the emergency department (ED) is the first line of COVID-19 management. Practices regarding COVID-19 management include identification of patients, care for suspected and confirmed patients, and prevention of the disease's spread. Based on the Chinese Infection Prevention and Control Technical Guide in Health Care Settings (third edition) (Comprehensive Group of Joint Prevention and Control Mechanism of the State Council to Respond to the COVID-19 Epidemic, 2021), for identification of patients, emergency nurses in China need to pre-examine them, categorize them into high and low-exposure-risk groups, and then guide the high-risk groups to treatment in an isolated area. In terms of care for suspected and confirmed patients, emergency nurses are involved in providing support and symptomatic treatment, transferring of confirmed patients to a designated unit, and serving as a communication bridge between doctors and patients. To prevent the spread of the disease, emergency nurses must adhere to standard procedures including hand hygiene, wearing personal protective equipment (PPE), respiratory hygiene and cough etiquette, cleaning and disinfection management, and medical waste management (Comprehensive Group of Joint Prevention and Control Mechanism of the State Council to Respond to the COVID-19 Epidemic, 2021; Deitrick, Adams, & Davis, 2020).

Optimal COVID-19 management of emergency nurses could help to reduce the rate of missed diagnosis in high-risk COVID-19 patients, reduce the waiting time in the emergency department, and avoid the occurrence of cluster infections and cross-infection (Comprehensive Group of Joint Prevention and Control Mechanism of the State Council to Respond to the COVID-19 Epidemic, 2021). Since the COVID-19 pandemic, several studies have explored practices regarding COVID-19 management among healthcare workers and general nurses around the world (Kamacooko et al., 2021; Limbu, Piryani, & Sunny, 2020; Olum, Chekwech, Wekha, Nassozi, & Bongomin, 2020; Wen, Wang, Li, & Gu, 2021; Zhang et al., 2020). Findings have been inconsistent, which may be due to the different timings and different contexts of the studies. However, up until now, there has been no study assessing practices regarding COVID-19 management specific to emergency nurses.

There are several factors which may contribute to COVID-19 management practices among healthcare providers, and these factors can be divided into organizational and personal. Organizational factors include lack of PPE, lack of decision rights related to workflow, limited staffing and allocation of staff resources, and lack of communication between hospital administration and frontline workers on evolving changes (Fernandez et al., 2020). Personal factors include age, work experience, knowledge, and attitudes (Fernandez et al., 2020; Jeong &



Kim, 2022; Rastogi et al., 2021; Wen et al., 2021). This study focused on exploring modifiable personal factors including knowledge and attitudes regarding COVID-19 management among emergency nurses.

Knowledge regarding COVID-19 management refers to an emergency nurse's understanding of COVID-19 management, including identification of patients, care for suspected and confirmed patients, and prevention of the spread of infection. Previous studies have shown a good level of knowledge regarding COVID-19 management among general nurses and other healthcare workers (Kamacooko et al., 2021; Limbu et al., 2020; Nemati, Ebrahimi, & Nemati, 2020; Saqlain et al., 2020; Wen et al., 2021; Zhang et al., 2020). Weak positive correlations ( $r = 0.08$  to  $0.14$ ) between knowledge and attitude regarding COVID-19 management were reported, but the relationship between knowledge and practice was not clearly confirmed ( $r = 0.04$  to  $0.15$ ) (Kamacooko et al., 2021; Limbu et al., 2020; Rastogi et al., 2021; Saqlain et al., 2020; Wen et al., 2021).

Emergency nurses' attitude is important to their practice regarding COVID-19 management. A positive attitude could promote an effective disease management (Kemppainen, Tossavainen, & Turunen, 2013). Attitudes regarding COVID-19 management refer to feelings or opinions toward COVID-19 management, including emotional state during the COVID-19 pandemic, willingness and confidence regarding COVID-19 management, and beliefs based on COVID-19 management knowledge. Previous studies found both positive attitudes (Bekele, Sheleme, Fekadu, & Bekele, 2020) and negative attitudes towards COVID-19 management among healthcare workers, including general nurses (Limbu et al., 2020; Wen et al., 2021; Zhang et al., 2020). Weak to moderate positive correlations ( $r = 0.13$ - $0.55$ ) between attitudes and practices were reported (Kamacooko et al., 2021; Rastogi et al., 2021; Saqlain et al., 2020; Wen et al., 2021).

Although the COVID-19 situation has subsided, China remains committed to a dynamic Zero-COVID epidemic prevention strategy. China is committed to the race against the virus through quickly detecting, identifying, and dealing with it, and then cutting its chain of transmission. This has placed great demands on emergency nurses during COVID-19 management. To enhance the quality of COVID-19 management among emergency nurses, it is necessary to understand the current situation of their knowledge, attitudes, and practices regarding COVID-19 management. Results from previous Chinese studies (Wen et al., 2021; Zhang et al., 2020) could not be generalized in order to capture the knowledge, attitudes, and practices regarding COVID-19 management among emergency nurses due to different working contexts between emergency nurses and other healthcare providers working elsewhere. This study aimed to explore the knowledge, attitudes, and practices related to COVID-19 management among emergency nurses, and the relationships among these variables. The gained information is a valuable basis of information for relevant targeted training and policies in the evolving COVID-19 pandemic in order to guide nurses in prioritizing protection and avoiding occupational exposure.

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## Objectives

To explore the knowledge, attitudes, and practice regarding COVID-19 management, and their relationships among emergency nurses in Chengdu, the People's Republic of China.

## Conceptual Framework

The conceptual framework of this study was based on the Knowledge-Attitude-Practice (KAP) Model (Schwartz, 1976) and the literature review. According to Schwartz, there are correlations between knowledge and attitude, knowledge and practice, and attitude and practice. The relationships among knowledge, attitude, and practice are potentially reciprocal and dynamic (Schrader & Lawless, 2004). Knowledge refers to the emergency nurse's understanding of COVID-19 management, including identification of patients, care for suspected and confirmed patients, and prevention of the spread of infection. Attitude refers to emergency nurses' feelings or opinions toward COVID-19 management, including emotional state during the COVID-19 pandemic, willingness and confidence regarding COVID-19 management, and beliefs based on COVID-19 management knowledge. Practice refers to emergency nurses' actions regarding COVID-19 management including identification of patients, care for suspected and confirmed patients, and prevention of the spread of infection. In this study, the researchers assume that there is a positive correlation in knowledge and attitude, knowledge and practice, and attitude and practice.

## Methods

### Population and Sample

The target population was registered nurses who worked in emergency departments in Chengdu, China.

Samples were 308 registered nurses working in emergency departments in Chengdu, China, who met the inclusion criteria which included 1) working in the emergency department for more than 1 year, and 2) agreeing to participate in the study. Nurse administrators were excluded. The sample size was calculated using Yamane's (1967) formula at the level of significance of 0.05.

### Research Instruments

1. The Demographic Data Form was developed by the researchers based on the literature review.
2. The Knowledge, Attitude, and Practice Questionnaire (KAP Questionnaire) was developed by the researchers based on the Chinese Infection Prevention and Control Technical Guide in Health Care Settings (third edition) (Comprehensive Group of Joint Prevention and Control Mechanism of the State Council to Respond to the COVID-19 Epidemic, 2021) and the literature review. The questionnaire includes three sections, which are knowledge, attitudes, and practices.

The knowledge section contained 20 items. Each item had 3 answer options (true, don't know, false). A score of 1 was given for each correct answer and a score of 0 was given for each "don't know" or wrong answer. The possible knowledge score ranged from 0 to 20. Bloom's



cutoff points were used to assess knowledge: 80-100% = good, 60-79% = moderate, and less than 60% = poor (Bloom, 1968). The total score was used in the analysis to examine the relationships among the study variables.

The attitude section contained 8 items. Each item had a 5-point Likert scale with answers from 1 (strongly disagree) to 5 (strongly agree). Mean score was used to calculate the total attitude score. The scores of two negative items were reversed before calculating the mean score with the possible scores ranging from 1 to 5. According to the 5-point Likert scale for the attitude items, a midpoint score (score 3) meant neither agree nor disagree (neutral attitude); therefore, this was used as a cut-off for positive and negative. A score of less than 3 meant a negative attitude and more than 3 meant a positive attitude. The total score was used in the analysis to examine the relationships among the study variables.

The practice section contained 18 items. Each item had a 5-point Likert scale with answers from 1 (never) to 5 (always). Mean score was used to calculate the total practice score. The possible score ranged from 1 to 5. The midpoint score (score 3 = sometimes) was used as a cut-off for good and poor practice. A score of less than 3 meant poor practice and a score of more than 3 meant good practice. The total score was used in the analysis to examine the relationships among the study variables.

#### Validity and reliability of research instruments

The KAP Questionnaire was validated by a panel of 6 experts, include two nursing instructors who were experts in COVID-19 management, two nurses who had experienced related to COVID-19 management in emergency departments, one nurse who had experience working in emergency departments in China, and one nurse who had experienced related to COVID-19 management in China. An item-objective congruence (IOC) score for each item yielded IOC scores from 0.67 to 1.

The KAP Questionnaire was tested for internal consistency with 10 emergency nurses. The Cronbach's coefficient alphas of the knowledge, attitudes, and practices sections were 0.70, 0.72, and 0.77, respectively.

#### Ethical Considerations

The study has been approved by the Institutional Review Board of the Faculty of Nursing, Chiang Mai University, COA No. 056/2022. Before data collection, participants received an electronic consent form in Chinese. In addition, confidentiality and anonymity of individual responses were ensured. Participants were informed that the questionnaires were anonymous, and their identities were not disclosed in study reports or research publications.

#### Data Collection

The data collection was conducted online via the Questionnaire Star APP in July 2022. The Questionnaire Star APP uses a unique WeChat ID as an account, and each account can answer the questionnaire only once. The steps are as follows:



1. The researcher advertised the research study at emergency departments in accessible hospitals and provided a QR code for the informed consent form.
2. After the participants gave their electronic informed consent, they received a link to answer the online questionnaires.

### Data Analysis

All statistical analysis was performed using IBM SPSS 26. Descriptive statistics were used to analyze the demographic data, as well as the data on knowledge, attitudes, and practices. Pearson's correlation analysis was used to examine correlations between variables. The statistical significance was set at 0.05.

### Results

The participants were 308 emergency nurses, aged between 21-54 with a mean age of 31.68 (SD = 6.40). The demographic characteristics of the participants are presented in Table 1.

Participants' knowledge regarding COVID-19 management was at a good level with a mean score of 16.30 (SD = 1.53, range 8-20). Regarding participants' scores for knowledge, 220 participants (71.43%), 87 participants (28.25%), and one participant (0.32%) had good knowledge scores ( $\geq 16$ ), moderate scores (12-15), and poor scores ( $< 12$ ), respectively. Regarding the correct responses for each item, there were 5 out of 20 items in which less than 80% of the participants answered correctly, as presented in Table 2.

The participants in this study had a positive attitude toward COVID-19 management with a total mean score of 3.57 (SD = 0.40, range 2.38-5.00). There were 15 participants (4.87%) with total mean scores of less than 3.00, which indicates a negative attitude, and there were 7 participants (2.27%) with total mean scores of 3.00. Six items had mean scores of more than 3.00, which indicated a positive attitude toward COVID-19 management. There were two items, including anxiety and fear for infection, which had mean scores of less than 3.00, which indicated a negative attitude, as presented in Table 3.

There was good practice of COVID-19 management among participants, with a total practice mean score of 4.76 (SD = 0.33, range 2.56-5.00). All practice items had mean scores over 3.00, which indicated good practice of COVID-19 management, as presented in Table 4.

There were statistically significant weak positive correlations between knowledge and attitude ( $r = 0.18, p < 0.01$ ), and attitude and practice ( $r = 0.33, p < 0.001$ ). There was also a weak positive correlation between knowledge and practice ( $r = 0.11$ ), but it was not statistically significant.



**Table 1** Demographic Characteristics of the Participants (n = 308)

Demographic characteristics	Frequency (%)
Gender	
Females	263 (85.39)
Males	45 (14.61)
Education Level	
Associate Degree	88 (28.57)
Bachelor's Degree	219 (71.11)
Master's Degree	1 (0.32)
Years of working experience in ED (mean 6.80, SD 5.73, range 1-35 )	
≤ 5 years	165 (53.57)
6-10 years	67 (21.75)
11-15 years	59 (19.16)
>15 years	17 (5.52)
Ever had training for COVID-19 management	
Yes	289 (93.83)
No	19 (6.17)

**Table 2** Knowledge items that have less than 80% correct responses (n = 308)

Items	Management aspects	Frequency (%)
1) Medical staff and drivers who transport confirmed patient should replace a full set of personal protective equipment every 4 hours.	Care for suspected/confirmed patients	64 (20.78)
2) Hand sanitizer containing ethanol and other ingredients that is effective against COVID-19 in both visible dirt and non-visible dirt situation.	Prevention of the spread of infection	87 (28.25)
3) Chlorhexidine can be used to inactivate the virus.	Prevention of the spread of infection	155 (50.32)
4) Medical waste generated by confirmed or suspected patients should be tightly sealed in a one-layer bag and marked with "infectious waste".	Prevention of the spread of infection	199 (64.61)
5) A person, who has been vaccinated, having runny nose and low-grade fever, is not a suspicious case of COVID-19 infection.	Identification of the patients	202 (65.58)



Table 3 Attitude scores by item (n = 308)

Items	$\bar{X}$ (SD)
1) Anxiety for infection when working in screening and triage area*	2.67 (0.88)
2) Fear for infection when taking care of suspected/confirmed patients*	2.57 (0.88)
3) Willing to care for suspected/confirmed patients	3.67 (0.71)
4) Confidence in providing standard care to suspected/confirmed patients	3.85 (0.63)
5) Belief in prevention effect of appropriately wearing a qualified mask	3.90 (0.70)
6) Belief in prevention effect of frequent hand hygiene	3.89 (0.70)
7) Belief in prevention effect of frequent cleaning of high-touch objects	3.81 (0.79)
8) Belief in prevention effect of appropriate use of PPE while caring for confirmed patient	4.19 (0.51)

Note \*Reversed score was calculated.

Table 4 Practice scores by item (n = 308)

Items	$\bar{X}$ (SD)
1) Check temperature of every patient	4.76 (0.48)
2) Check COVID-19 signs & symptoms of every patient	4.60 (0.62)
3) Check the exposure history of patients	4.61 (0.66)
4) Check the travel code of patients	4.79 (0.52)
5) Transfer suspicious patients to fever clinic	4.72 (0.63)
6) Monitor vital signs, blood oxygen saturation, and consciousness of all critical cases	4.67 (0.78)
7) Appropriately wear PPE during transfer of confirmed patients	4.77 (0.62)
8) Make confirmed patient wear proper mask during transfer	4.75 (0.67)
9) Transfer confirmed patients in negative pressure ambulance	4.03 (1.51)
10) Replace a full PPE set immediately after each transport mission	4.64 (0.94)
11) Perform five moments hand hygiene	4.87 (0.42)
12) Wash hands with running water and hand sanitizer when there is visible dirt on hand	4.93 (0.29)
13) Wear surgical mask and, other PPE (if necessary) while performing pre-screening and triage	4.84 (0.46)
14) Wear qualified medical masks in working environment	4.78 (0.69)
15) Remind any entering person who is not wearing a mask	4.88 (0.38)
16) Discard disposable medical devices immediately after each use in infectious waste container	4.88 (0.43)
17) Place patient in different area based on COVID-19 risk and critical situation	4.85 (0.41)
18) Put suspected/confirmed patients' medical waste in infectious waste container	4.84 (0.44)



## Discussion

The findings from this study indicated a good level of knowledge, a positive attitude, and good practice regarding COVID-19 management. The good level of knowledge among emergency nurses found in this study is consistent with earlier studies conducted with general nurses and other healthcare workers in China (Wen et al., 2021; Zhang et al., 2020), and other countries (Kamacooko et al., 2021; Limbu et al., 2020; Nemati et al., 2020; Saqlain et al., 2020). As this study was conducted during the ongoing COVID-19 pandemic in China, where the government insists on timely and accurate information disclosure, the good level of knowledge among emergency nurses in this study is not surprising. COVID-19 management training, which most participants (93.83%) received (Table 1), may contribute to the good level of knowledge found in this study.

However, when taking a closer look at each participant's knowledge score, 28.25% of participants had a moderate level, and 0.32% had a poor level of knowledge. Moreover, there were five items which had less than 80.00% answering correctly, and two of these five had less than 50% answering correctly (Table 2). Among those five items, three items were about knowledge related to prevention of the spread of infection, which is critical for avoidance of cluster infections and cross-infection occurrence. One item related to knowledge regarding replacement of personal protective equipment after caring for confirmed patients, which is necessary for cross-infection prevention. Another item was about knowledge related to identification of suspicious cases, which is important for reducing the rate of missed diagnoses in high-risk patients (Comprehensive Group of Joint Prevention and Control Mechanism of the State Council to Respond to the COVID-19 Epidemic, 2021). These findings indicate the necessity of targeted knowledge improvement among emergency nurses. Misunderstanding of content should be corrected and emphasized via official information resources. Also, training or retraining may be targeted at those who have less than a good level of knowledge to deepen their understanding of COVID-19 management.

Participants in this study had positive attitudes toward COVID-19 management, as indicated by the total mean score of 3.57 (SD = 0.40) (Table 3). Since attitudes have been explored using different definitions and by different measurement tools in previous studies, comparing overall results should be done with caution. This study's findings showed positive attitudes towards the prevention effects of wearing masks, hand hygiene, and cleaning the environment, among participants (Table 3), which was similar to previous studies (Kamacooko et al., 2021; Rastogi et al., 2021). In terms of willingness and confidence to perform patient care, this study showed positive attitude findings consistent (Table 3) with studies published in 2021 (Kamacooko et al., 2021; Wen et al., 2021). However, the results were inconsistent with an earlier study from Uganda, which reported that only 44% of the healthcare workers had confidence in COVID-19 management (Olum et al., 2020).



One possible explanation for the positive attitude findings in this study might be because of the impact of Chinese anti-pandemic policy. Evidence has shown that 90.8% of Chinese hold a positive attitude towards COVID-19 because of the active role of the government in fighting the pandemic (Zheng, Chen, & Ma, 2021). Another explanation is that this study was undertaken during the ongoing phase of the pandemic when there was better understanding of the disease and more effective management, compared to the earlier phase of the pandemic, when there was limited knowledge. Almost all participants in this study were trained for COVID-19 management (Table 1). This may contribute to their positive attitude towards COVID-19 management.

However, the study results showed mean scores of less than 3.00 in items about anxiety for infection and fear of infection, which indicated negative attitudes. These findings were similar to previous studies (Limbu et al., 2020; Zhang et al., 2020). Since working in screening and triage areas and taking care of suspected/confirmed patients places emergency nurses at greater risk of infection, it was not surprising to find such negative feelings among them.

Practices regarding COVID-19 management consist of identification of patients, care for suspected and confirmed patients, and prevention of spread of the disease. This study's findings revealed good practices of overall COVID-19 management among emergency nurses and for each item of management (Table 4). Since this is the first study examining practice regarding COVID-19 management among emergency nurses and because COVID-19 management in emergency departments in China is different from COVID-19 management in other contexts, there are some limitations in comparing our findings with previous studies. The good practices found in this study may be influenced by trainings received, good knowledge, and good attitudes of the participants. However, we did not find a significant correlation between knowledge and practice.

The participants reported good practice levels for all items (Table 4). These findings are somewhat different from previous studies' results. Poor practice levels regarding care for suspected or confirmed patients, which may be the result of PPE shortage, were reported in other countries (Kamacooko et al., 2021; Olum et al., 2020). When this study was conducted, there was no shortage of PPE or healthcare personnel in China which could also contribute to good practice levels in this study. Another possible reason for good practice results may be the Chinese government's strict policy regarding COVID-19 management, in which all responsible medical institutions are mandated to strengthen pre-screening and management for COVID-19 (Comprehensive Group of Joint Prevention and Control Mechanism of the State Council to Respond to the COVID-19 Epidemic, 2021). However, the good practice levels in this study could be possibly inflated by a self-reporting effect.

There was a weak positive correlation between knowledge and attitude ( $r = 0.18, p < 0.01$ ) found in this study which was consistent with our assumption and with earlier studies (Kamacooko et al., 2021; Rastogi et al., 2021; Saqlain et al., 2020; Wen et al., 2021). Knowledge is a prerequisite for forming positive attitudes, and adequate knowledge could promote the development of positive attitudes (Abdel Wahed, Hefzy, Ahmed, & Hamed, 2020). Healthcare workers with



adequate knowledge could have more confidence to deal with the COVID-19 pandemic, which results in positive attitudes (Zhang et al., 2020).

The weak positive correlation between attitude and practice ( $r = 0.33$ ,  $p < 0.001$ ) in this study confirmed earlier findings (Kamacooko et al., 2021; Rastogi et al., 2021; Saqlain et al., 2020; Wen et al., 2021). The positive attitudes regarding COVID-19 management reported by the participants may contribute to their good practices. According to Schwartz's KAP model (1976), it also possible that the participants' COVID-19 management practices could influence their attitudes.

The non-significant weak positive correlation between knowledge and practice may indicate that only knowledge is not enough to change practice. Factors influencing COVID-19 management practices include both personal and organizational factors (Fernandez et al., 2020). To optimize COVID-19 management, therefore, it is necessary to target not only enhancing knowledge, but also promoting attitudes among emergency nurses and other influencing factors.

### Implication of Research Findings

The results of this study could be used as basic information for relevant targeted trainings and policies during the ongoing COVID-19 pandemic, especially in China.

### Recommendations for Further Research

Further studies should be taken to explore other influencing factors of COVID-19 management among emergency nurses. A training program for emergency nurses emphasizing misunderstood issues could also be developed and tested for its effects.

### References

- Abdel Wahed, W. Y., Hefzy, E. M., Ahmed, M. I., & Hamed, N. S. (2020). Assessment of knowledge, attitudes, and perception of health care workers regarding COVID-19, a cross-sectional study from Egypt. *Journal of Community Health, 45*(6), 1242–1251.
- Bekele, F., Sheleme, T., Fekadu, G., & Bekele, K. (2020). Patterns and associated factors of COVID-19 knowledge, attitude, and practice among general population and health care workers: A systematic review. *SAGE Open Medicine, 8*. doi: 10.1177/2050312120970
- Bloom, B. S. (1968). Learning for Mastery. Instruction and curriculum. Regional education laboratory for the Carolinas and Virginia, topical papers and reprints, number 1. *Evaluation Comment, 1*(2), n2.
- Comprehensive Group of Joint Prevention and Control Mechanism of the State Council to Respond to the COVID-19 Epidemic. (2021). *Notice on issuing the technical guidelines for the prevention and control of COVID-19 infection in medical institutions* (3rd ed.). Retrieved from [http://www.gov.cn/xinwen/2021-09/14/content\\_5637141.htm](http://www.gov.cn/xinwen/2021-09/14/content_5637141.htm)



- Deitrick, K., Adams, J., & Davis, J. (2020). Emergency nursing care of patients with novel coronavirus disease 2019. *Journal of Emergency Nursing*, 46(6), 748–759.
- Fernandez, R., Lord, H., Halcomb, E., Moxham, L., Middleton, R., Alananzeh, I., & Ellwood, L. (2020). Implications for COVID-19: A systematic review of nurses' experiences of working in acute care hospital settings during a respiratory pandemic. *International Journal of Nursing Studies*, 111. doi: 10.1016/j.ijnurstu.2020.103637
- Jeong, S., & Kim, J. (2022). Factors influencing nurses' intention to care for patients with COVID-19: Focusing on positive psychological capital and nursing professionalism. *PLOS ONE*, 17(1). doi: 10.1371/journal.pone.0262786
- Kamacooko, O., Kitonsa, J., Bahemuka, U. M., Kibengo, F. M., Wajja, A., Basajja, V., ... Ruzagira, E. (2021). Knowledge, attitudes, and practices regarding COVID-19 among healthcare workers in Uganda: A cross-sectional survey. *International Journal of Environmental Research and Public Health*, 18(13). doi: 10.3390/ijerph18137004
- Kemppainen, V., Tossavainen, K., & Turunen, H. (2013). Nurses' roles in health promotion practice: An integrative review. *Health Promotion International*, 28(4), 490–501.
- Limbu, D. K., Piryani, R. M., & Sunny, A. K. (2020). Healthcare workers' knowledge, attitude and practices during the COVID-19 pandemic response in a tertiary care hospital of Nepal. *PLOS ONE*, 15(11). doi: 10.1371/journal.pone.0242126
- Nemati, M., Ebrahimi, B., & Nemati, F. (2020). Assessment of Iranian nurses' knowledge and anxiety toward COVID-19 during the current outbreak in Iran. *Archives of Clinical Infectious Diseases*, 15(COVID-19): e102848. doi: 10.5812/archcid.102848
- Olum, R., Chekwech, G., Wekha, G., Nassozi, D. R., & Bongomin, F. (2020). Coronavirus disease-2019: Knowledge, attitude, and practices of health care workers at Makerere University teaching hospitals, Uganda. *Frontiers in Public Health*, 8, 181.
- Rastogi, A., Syed, S., Bansal, A., Ramalingam, A., Sharma, T., Kumar, V., ... Varshney, M. (2021). Knowledge, attitude, and practice toward prevention and management of COVID-19 among Indian nurses: A cross-sectional study. *Journal of Applied Sciences and Clinical Practice*, 2(1), 14.
- Saqlain, M., Munir, M. M., Rehman, S. U., Gulzar, A., Naz, S., Ahmed, Z., ... Mashhood, M. (2020). Knowledge, attitude, practice and perceived barriers among healthcare workers regarding COVID-19: A cross-sectional survey from Pakistan. *Journal of Hospital Infection*, 105(3), 419–423.
- Schrader, P. G., & Lawless, K. A. (2004). The knowledge, attitudes, & behaviors approach how to evaluate performance and learning in complex environments. *Performance Improvement*, 43(9), 8–15.
- Schwartz, N. E. (1976). Nutrition knowledge, attitudes and practices of Canadian public health nurses. *Journal of Nutrition Education*, 8(1), 28–31.
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- Wen, X., Wang, F., Li, X., & Gu, H. (2021). Study on the knowledge, attitude, and practice (KAP) of nursing staff and influencing factors on COVID-19. *Frontiers in Public Health*, 8. doi: 10.3389/fpubh.2020.560606
- World Health Organization. (2022). *WHO Coronavirus (COVID-19) Dashboard*. Retrieved from <https://covid19.who.int>
- Yamane, T. (1967). *Statistics: An introductory analysis*. New York: Harper & Row.
- Zhang, M., Zhou, M., Tang, F., Wang, Y., Nie, H., Zhang, L., & You, G. (2020). Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. *The Journal of Hospital Infection*, 105(2), 183–187.
- Zheng, L., Chen, K., & Ma, L. (2021). Knowledge, attitudes, and practices toward COVID-19 among construction industry practitioners in China. *Frontiers in Public Health*, 8. doi: 10.3389/fpubh.2020.599769