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Nurses' experiences of caring for people diagnosed with COVID-19 in Hong Kong: A qualitative inquiry

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Title page

Title: Nurses' experiences of caring for people diagnosed with COVID-19 in Hong Kong: A qualitative inquiry

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Abstract

Objectives: Nurses have been working at the frontlines of the coronavirus disease (COVID-19) pandemic. An understanding of their lived experiences, the challenges they encountered, and the strategies they used to address them may inform efforts to better prepare and support nurses and public health measures when facing a resurgence of COVID-19 or future pandemics. This study aimed to explore the experiences of nurses who have provided care for people suspected or diagnosed with COVID-19 in Hong Kong.

Design: A qualitative study was conducted using individual, semi-structured interviews. All interviews were audio recorded and transcribed verbatim for thematic analysis.

Setting: Participants were recruited from acute hospitals and public health departments in Hong Kong.

Participants: A purposive sample of registered nurses (n=39) caring for patients with COVID-19 in Hong Kong was recruited.

Results: Two-thirds of the nurses had a Master's degree and over a third had 6 to 10 years of nursing experience. Around 40% of the nurses cared for COVID-19 patients in isolation wards, and a quarter performed COVID-19-related work. Most (90%) had training on COVID-19, and three-quarters had experience of working in infection control teams. Six key themes emerged: confronting facility and resource shortages; changes in usual nursing responsibilities and care modes; maintaining physical and mental health; need for effective and timely responses from relevant local authorities; role of the community in public health protection and management; and advanced pandemic preparedness.

Conclusions: Our study findings showed that nurses possessed resilience, self-care, and adaptability in confronting resource shortages, changing nursing protocols, and mental and physical health threats during the COVID-19 pandemic. Concurrent coordinated support from

the practice environment, local authorities and community, and advanced pandemic preparedness could optimise nursing responses to future infectious diseases.

(Word count: 283 words)

Strengths and limitations of this study

- A qualitative methodology allowed an in-depth analysis of Hong Kong nurses' experiences during the COVID-19 pandemic, adding to the limited evidence in this area.
- This study utilised a relatively larger sample size of 39 compared to other existing qualitative studies to understand the experiences of nurses from diverse backgrounds.
- However, the use of purposive sampling to recruit participants limits the generalisability of our findings.
- Another key limitation is that the study results do not reflect the rapidly changing scenario of the COVID-19 pandemic in Hong Kong but only nurses' experiences at the time of interview.

BACKGROUND

In late December 2019, a number of cases of pneumonia with unknown aetiology were reported in Wuhan, China.[1] The first confirmed case of coronavirus disease (COVID-19) was reported in Hong Kong on 23rd January 2020.[2] Subsequently, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic on 11th March 2020 as a result of its rapid global spread.[3] By 16th March 2020, more than 120 million cases of COVID-19 had been confirmed worldwide, resulting in more than 2 million deaths across 192 countries/regions.[4] In Hong Kong, over 11,000 cases have been confirmed, with more than 200 deaths.[2]

Healthcare systems globally are facing tremendous challenges in combatting the COVID-19 pandemic. Unprecedented measures have been taken by healthcare authorities to cope with the potential surges in patients. For instance, general wards have been set up as isolation wards, and nurses and other frontline healthcare workers without infectious diseases expertise have stepped up to provide care for COVID-19 patients.[5] To alleviate the risk of viral spread and cross infections among patients and staff within clinical settings, further measures, such as suspending elective surgeries, have been taken.[6,7]

Due to the widespread nature of the pandemic, nurses have been working relentlessly on the front line of care, with a large number, irrespective of specialty, deployed to manage patients with COVID-19. This includes nurses with limited infectious diseases expertise suddenly working in entirely unfamiliar and stressful environments, exposing their lives to great risks.[8] By the end of October 2020 more than 1500 nurses worldwide had lost their lives to the virus.[9] Regardless, nurses' sense of duty, dedication to patient care, self-sacrifice, and professional collegiality have intensified during this pandemic,[10] with their consistent commitment and compassion towards infection prevention, infection control, isolation, containment, and public health being displayed.[11] However, this has resulted in concerns about nurses' personal and family safety, and physical and emotional vulnerability.[10]

Moreover, infectious disease outbreaks are known to exert significant psychological impacts on healthcare workers, as well as the general public.[12] Hong Kong gained considerable experience battling the severe acute respiratory syndrome (SARS) epidemic in 2003. At that time, 22% of all infected persons were healthcare workers, of whom eight lost their lives.[13,14] Healthcare workers during the SARS and Middle East respiratory syndrome (MERS) outbreaks faced extraordinary stress and mental health problems due to factors such as risk of infection, stigmatisation, and understaffing.[5,12,15,16] With COVID-19, positive and negative emotions interweaved and coexisted in frontline nurses.[17] Negative emotions were dominant initially while positive emotions appeared gradually, with self-coping styles and psychological growth playing an imperative role in maintaining nurses' mental health. Uncertainty and fear have again magnified the impact of the disease on Hong Kong's healthcare system, despite the experience acquired from the SARS epidemic.

Pivotal aspects of nursing's contribution to fighting COVID-19 include: the role of nurses in health education with strategies focusing on infection prevention and early detection of symptoms, prevention of nosocomial infections, and surveillance; the implementation of appropriate precautions in nursing homes and protection of patients with long-term illnesses who are prone to infection; and ensuring the provision of personal protective equipment (PPE).[18] Other aspects include reasonable work schedules, effective communication, psychological support, and intensive training for nurses who lacked experience in the management of infectious diseases.[5] However, few studies have explored nurses' experiences of caring for patients with COVID-19. A better understanding of nurses' lived experiences might help inform their preparation and support to tackle future pandemics.

METHODS

Aims

This study aimed to explore the experiences of registered nurses caring for people suspected or diagnosed with COVID-19, including the challenges they encountered and the strategies they adopted to address them, and their views about the preparation and support of nurses and public health measures regarding future pandemics.

Participants

A purposive sample of 39 registered nurses with the following inclusion criteria was recruited: 1) currently or have experience providing direct nursing care to suspected and/or confirmed COVID-19 patients in hospitals or other clinical settings; 2) communicable in Cantonese; and 3) consented to participate in study. Participants were recruited from acute hospitals and public health departments in Hong Kong.

Ethical consideration

Ethical approval was obtained from the Survey and Behavioural Research Ethics Committee of The Chinese University of Hong Kong (Reference no.: SBRE-19-594), and the study followed the Declaration of Helsinki. Prior to data collection, participants were given a full explanation of the study objectives and procedures and informed of their right to agree or refuse to participate or withdraw from the study, following which written informed consent was obtained. All data were anonymous, used for research purposes only, and kept strictly confidential in a locked cabinet or via encryption, with access given only to the research team.

Data collection

A semi-structured interview guide was developed. Eligible participants were interviewed by a research assistant by phone. Participants were invited to share their experiences caring for COVID-19 patients, challenges encountered, strategies adopted to address them, and views about the preparation and support of nurses and public health measures regarding future pandemics. Each interview was conducted in Cantonese and audio recorded. Participants' demographic and work characteristics were also collected, including age, gender, marital

status, educational level, years of work experience, professional position, department/ward, time spent caring for people with COVID-19, previous infection control experience, training on COVID-19, and sleep quality and quantity.

Data analysis

Data were transcribed verbatim from the audio recordings. All transcripts were then analysed thematically based on the six phases of thematic analysis outlined by Braun and Clarke (2006).[19] The transcripts were coded and grouped under themes and sub-themes according to the aims of the study. The themes were carefully considered in relation to the overall data set, and consensus reached by team members, ensuring that the most representative themes and sub-themes were chosen.

Patient and public involvement

This study focused on the experiences of nurses caring for COVID-19 patients. Hence, due to the nature of the study, patients or the public were not involved.

RESULTS

39 registered nurses were recruited and participated fully in the study. Interviews were conducted from June 2020 to August 2020 and lasted a median of 60 (range 35 to 89) minutes. Table 1 summarises participants' demographic and work characteristics. Six key themes emerged.

Table 1. Demographic and work characteristics of the 39 interviewed nurses

Characteristic	No. (%)
Age (years)	
20–29	12 (30.8)
30–39	17 (43.6)
40–49	5 (12.8)
50–59	5 (12.8)

Gender	
Male	12 (30.8)
Female	27 (69.2)
Marital status	
Single	21 (53.8)
Married	18 (46.2)
Children	
One	3 (7.7)
More than one	7 (17.9)
None	29 (74.4)
Education	
Bachelor's degree	10 (25.6)
Master's degree	26 (66.7)
Doctoral degree	3 (7.7)
Years of nursing experience	
1–5	11 (28.2)
6–10	14 (35.9)
11–15	4 (10.3)
>15	10 (25.6)
Position	
Registered nurse	23 (58.9)
Advanced practice nurse	8 (20.5)
Senior nursing officer	1 (2.6)
Ward manager	3 (7.7)
Nurse consultant	3 (7.7)

Department operations manager	1 (2.6)
Ward worked when caring for COVID-19 patients	
Isolation	16 (41.0)
Intensive care unit	7 (20.6)
Accident and emergency	8 (23.5)
Medical and geriatric	1 (2.9)
Paediatrics	5 (14.7)
Other roles	2 (5.1)
Time spent doing COVID-19-related care or work (hours/week)	
1–10	6 (15.4)
11–20	9 (23.1)
21–30	2 (5.1)
31–40	10 (25.6)
>40	9 (23.1)
Difficult to measure	3 (7.7)
Time spent doing COVID-19-related care or work (months)	
1–2	8 (20.5)
3–4	10 (25.6)
5–6	20 (51.3)
7–8	1 (2.6)
Previous infection control team experience?	
Yes	29 (74.4)
No	10 (25.6)
Received COVID-19-related training?	
Yes	35 (89.7)

No	4 (10.3)
Have wash-out period?	
Yes	6 (15.4)
No	31 (79.5)
Not applicable	2 (5.1)
Living situation during care of COVID-19 patients	
Hotel	19 (48.7)
Flat rental	3 (7.7)
No change	17 (43.6)
Sleep quality during care of COVID-19 patients	
Good	3 (7.7)
Normal	26 (66.7)
Poor	10 (25.6)
Sleep quantity during care of COVID-19 patients	
Increased	3 (7.7)
No change	32 (82.1)
Decreased	4 (10.3)

Theme 1: Confronting facility and resource shortages

All participants emphasised shortages of facilities and resources, namely PPE, isolation wards and beds, as the biggest challenges in the care of confirmed and suspected COVID-19 patients. Due to high caseloads, particularly from a large number of imported cases, participants encountered problems securing appropriate negative pressure and isolation rooms for high-risk individuals and procedures, and a lack of basic PPE, including face shields, masks and gloves. They commonly expressed feelings of powerlessness in their ability to fully care for patients:

"PPE is a very basic need. How can I properly take care of patients when I cannot even protect myself?" (Participant 15, male, RN)

As a result of a lack of space in hospitals, participants described having no choice but to ask suspected individuals to wait outside in open areas or in corridors in the Accident and Emergency (A&E) Department prior to COVID-19 tests. They stressed the importance of being adaptable and having hospital measures to flexibly address increases in patient numbers, for instance setting up enhanced surveillance wards and converting medical wards to isolation wards. At the same time, most participants acknowledged the limitations posed by such measures, with their failure to provide completely adequate isolation environments:

"As there weren't enough isolation wards, some general wards were converted to isolation wards…The problem is that the setting inside is not the same [in the converted wards]…we need separate places for entering and leaving in isolation wards as we need to de-gown before we can go out [of the ward]…patient flow is affected." (Participant 19, female, RN)

They further revealed that PPE standards had been frequently downgraded in response to difficulties faced by hospitals in acquiring PPE stock. While understanding the need for these measures, participants expressed feeling that health worker and patient safety was being compromised. Most participants mentioned taking the initiative to enhance their personal precautions, for instance limiting interaction with confirmed and suspected patients, and reinforcing their alertness and awareness of infection control practices during patient care in order to minimise potential infection risks:

"To better manage the PPE resources that we have, I try to talk to patients using a walkie talkie from outside the [isolation] room instead of in person…When I wear PPE and go inside the [isolation] room, I try to be more careful and plan what I may need

well so I don't need to leave the room to get anything and waste a set of PPE." (Participant 28, female, nurse consultant (NC))

Theme 2 Changes in usual nursing responsibilities and care modes

Adapting to new and erratic procedural guidelines and protocols

Most participants expressed that the previous experiences of hospitals in handling cases during the 2003 SARS and the 2009 swine flu epidemics significantly directed the planning of hospital workflows and procedural guidelines during the COVID-19 pandemic. However, they also mentioned the need to learn numerous new specific protocols and guidelines, including on triage criteria, the transport of patients to the intensive care unit, nasopharyngeal swab (NPS) and nasopharyngeal aspirate (NPA) procedures, safe handling of test specimens, and transfer and admission of suspected or confirmed cases under quarantine. They also reiterated the importance of nurses' awareness of environmental contamination risks and abiding by infection control practices more strictly, for instance the proper use of PPE and hand hygiene:

"I had to quickly learn how to take care of isolated patients…how to do infection control [well], like donning and doffing PPE and washing hands...I also had to learn to cooperate with my colleagues [to combat this pandemic]." (Participant 15, male, RN)

Participants highlighted that coping with rapidly changing guidelines and protocols posed a major challenge. They frequently needed to ensure that they remained updated on modifications to infection control policies in response to PPE shortages, requirements of FTOCC (fever, travel history, occupational exposure, contact history, clustering) risk assessment, and new knowledge on disease pathology and symptoms to inform screening, treatment, and infection control:

"*The guidelines we need to follow keep changing every day…so when I go to work, I first need to see what changes there are, for example which countries are on the high*

travel risk list…Initially, we used to use NPS for COVID-19 tests, but now, it has been changed to NPA…we needed to adapt to the new procedures very fast." (Participant 16, male, RN)

Consequently, participants emphasised the importance of quick dissemination of evidence-based information from reliable and easily accessible sources, particularly text messaging groups with hospital and ward staff, change-of-shift meetings, and communication kits prepared by the Hospital Authority (HA), Hong Kong:

"We need to always keep ourselves updated, for example about PPE stocking, so we can modify our care practices…[To do this,] I usually look at emails from the hospital, our HA Chat [A secure platform for staff to send text, photo, voice, and video messages], the communication kit from HA …There's a lot of information out there...it can be difficult to screen and see which is the most important or trustworthy." (Participant 28, female, NC)

Re-focusing patient care towards psychological care and meeting patients' basic needs

With most COVID-19 cases admitted to hospitals being asymptomatic and relatively physically healthy, participants conveyed a greater emphasis of patient care on psychological well-being. They expressed the need to spend the majority of bedside care time assisting isolated patients to manage their fluctuating emotions, encouraging them, and alleviating their feelings of fear, sadness, and loneliness due to the uncertainty of their health outcomes, and being unable to see their family and friends:

"We need to help patients stay positive…[some patients] start crying and we need to go into the isolation room in full gear to help them calm down…They feel scared as they don't know what's going on…stressed as [there are] a lot of unknowns…need to spend some time with them." (Participant 2, female, advanced practice nurse (APN))

Some participants indicated that a lack of patient cooperation was a prevalent issue due to patients' insufficient understanding of the virus, and stress and frustration from receiving positive COVID-19 test results. They asserted that effective communication with patients, including clear explanations of their possible length of stay, treatment flow, and testing requirements for discharge, were vital in pacifying them and reducing their distress, especially for non-local patients admitted to hospital:

> *"You need to have two negative COVID-19 tests with the same type of clinical specimen 24 hours apart before you can be released from isolation…A patient kept getting fluctuating results…[He] got very frustrated and said, 'Why didn't anyone tell me about this rule earlier?'…tried to leave the hospital…We called the police and he came back after talking to them…Communicating the rules and plans [to patients] early is very important…cannot assume they know why they are in hospital."* (Participant 6, female, APN)

Besides psychological care, participants conveyed that meeting the basic needs of patients to allow them to have a more comfortable stay in hospital also constituted a major part of their patient care responsibilities. It was important for them to be flexible and understanding of the needs of patients who were isolated in hospital for long periods of time, particularly regarding their food and entertainment preferences, and basic amenities required, including Internet connectivity and toiletries:

> *"Due to prolonged hospitalisation, patients have some very simple needs, like Wi-Fi, TV…They don't want to eat hospital food…order delivery."* (Participant 4, female, RN)

Some participants expressed that patient care additionally extended to family members. As close contacts, it was necessary to inform family members of their need to be quarantined, as well as regularly update them on the patient's condition and circumstances. Patients were also provided with video calling capabilities to maintain social contact:

"For elderly patients [without a phone with video calling capabilities], we give them a Tablet to use so that they can video call their family members." (Participant 7, female, ward manager (WM))

Theme 3 Maintaining physical and mental health

Tackling adverse impacts on nurses' physical and mental health

Most participants revealed that they stayed in hotels rather than at their homes to keep their families safe when taking care of suspected and confirmed COVID-19 cases. They disclosed strong feelings of loneliness and social isolation from their friends and families, spending large amounts of time alone to avoid potentially infecting others. Some participants also conveyed being afraid of possible social rejection by friends as a concern as they may be seen as "dirty" due to their place of work. All of these resulted in negative thoughts and emotions in participants:

"Most of us [nurses] feel very alienated from society…We try to isolate ourselves from our family members and friends…have less social interaction with people as we don't want to infect them…I feel that I don't have much social support… feel a bit depressed." (Participant 39, female, department operations manager (DOM))

Moreover, some participants expressed feeling fearful when taking care of patients, in particular during high-risk procedures, namely aerosol generating procedures. However, at the same time, most participants conveyed that regardless of all the negative feelings, they held a strong sense of professional responsibility to contribute to the fight against the COVID-19 pandemic, and faith in their own skills and knowledge to protect themselves and others:

"I found out I was pregnant while working in the isolation ward…My colleagues and family were worried about me, but I decided to continue working there…I had a friend with a similar experience and she was ok…if I wear full PPE properly and trust my skills, I can still do my job safely." (Participant 35, female, APN)

As a result, participants indicated working harder to ensure their physical health via effective self-care and personal-protection practices, including greater care and alertness in infection control, and clear planning and preparation prior to conducting high-risk procedures:

"When performing high-risk aerosol generating procedures on confirmed cases, we need to be very clear on the steps we take…need to be smooth…very alert, especially during doffing of PPE, washing hands, and showering [afterwards]." (Participant 32, male, RN)

In addition, participants further highlighted that family, friends, and peer support was essential in promoting their mental and emotional health, providing reassurance, and alleviating their worries and anxieties:

"My friends and family call me to tell me to be careful…I also have very supportive friends in the hospital who constantly ask if I need anything…I don't feel that lonely [because of them]." (Participant 6, female, APN)

Importance of teamwork and a supportive practice environment

Most participants shared that the support and cooperation of their team played an important role in helping them maintain their physical and mental health. With large numbers of new staff deployed from other wards, participants also expressed that it was necessary to work together to train them, and for more experienced and senior nurses to ensure their understanding of proper nursing interventions:

"We have very good team spirit…everyone is very supportive…We use a buddy system so that when one of us is going to take care of [infected] patients, there would be another person watching you to make sure you do all the [nursing] procedures safely." (Participant 5, female, RN)

Additionally, participants emphasised the benefit of a supportive hospital environment, particularly the management team. Some participants conveyed appreciation towards the

hospital management team for the arrangement of rental allowances and subsidies from the HA to staff caring for COVID-19 patients. However, others asserted that improved PPE and understanding of frontline staff needs were required. They highlighted that explaining the rationale behind management decisions was imperative in reducing discontent and negative feelings among frontline staff:

> *"Frontline staff needs to be given more information on management decisions…if they can understand why different decisions are made, they would have fewer grievances and can be more supportive."* (Participant 10, male, senior nursing officer (SNO))

Theme 4 Need for effective and timely responses from relevant local authorities

Most participants described the responses of governmental departments as an important factor in ensuring adequate public health measures during the COVID-19 pandemic. They stressed such departments had the ability to considerably impact the provision of adequate patient-centred care within manageable patient caseloads. Some participants criticised the slow and lacking response measures of the local authorities in relation to the establishment of protocols and guidelines, setting up of isolation wards, management of PPE shortages, and step-down arrangements for non-serious cases:

> *"Many things need to be prepared earlier, especially hospital negative pressure rooms…In my hospital, there was a time when we needed to urgently prepare the negative pressure room, but we noticed that there was some water leakage there and a little problem with the double doors of the room…these things should have been fixed earlier as we never know when there may be a sudden explosion in cases."* (Participant 4, female, RN)

Most participants supported earlier and more enforced government responses to the pandemic consisting of more prompt restrictions on travel into the city, earlier screening, improved monitoring and management of quarantined cases, active promotion of mask-

wearing, and surgical mask distribution to disadvantaged groups. Some participants also suggested that public health decision-making by government agencies necessitated greater involvement of frontline healthcare professionals, who are more aware of and better placed to make decisions:

> *"More frontline [healthcare] professionals should be involved in giving input to the government…the government should listen to their suggestions…tell people to wear masks earlier, control number of people on public transport in rush hour, and disseminate more information on how people can protect themselves."* (Participant 2, female, APN)

Overall, participants attributed the lack of sufficient foresight and a severe underestimation of the disease by authorities as a prominent reason for the burden faced by nurses during the pandemic.

Theme 5 Role of the community in public health protection and management

Apart from the provision of patient-centred care to infected individuals, participants mentioned the value of collective community efforts in effectively controlling infectious disease outbreaks. They emphasised the importance of promoting the proper adoption of simple personal protective and hygiene measures, namely keeping hands clean by washing them or using hand sanitisers, wearing eye goggles and masks, social distancing, and ensuring cleanliness of the surrounding environment within the community. Some participants also highlighted the need for specific measures in the Chinese cultural context, such as avoiding tea and hotpot gatherings, and using serving chopsticks during meals:

> *"When people started wearing masks, we noticed that the number of patients coming in with other URIs [upper respiratory infections] also reduced…clearly, such measures are very important and effective."* (Participant 31, female, RN)

Consequently, participants stressed the additional role of nurses in acting as community health educators to enhance public health education and alertness. Owing to the lack of an effective vaccine or treatment for COVID-19 at the time, they also asserted that the government should take a greater role in reducing misinformation and disseminating more evidence-based information to maintain public vigilance and reduce the community spread of the disease:

> *"Now we know that the virus is spread by droplets…but people [the general public] don't have any clear information on what precautions to take against this…I always see people in the bus…touching everywhere and not being that aware."* (Participant 22, female, RN)

Theme 6 Advanced pandemic preparedness

More comprehensive and ongoing nursing education on outbreak management

While nurses in Hong Kong indicated feeling better prepared than their counterparts in other countries and compared to the 2003 SARS epidemic, the COVID-19 pandemic also revealed various areas of improvement. Participants reiterated the necessity for regular and continuous infection control training of nurses, particularly in maintaining their psychological preparation, awareness, and alertness to fight infectious disease outbreaks, and optimising their clinical skills associated with performing high-risk interventions, reducing cross-infection and contamination risks, and donning and doffing PPE. They also suggested the use of outbreak training simulations and experience sharing by frontline nurses to strengthen evidence-based training, and emphasised the promotion of teamwork, delegation, and communication amongst nurses during disease outbreaks:

> *"More nurse education on high-risk interventions, including how to reduce contact with droplets and protect ourselves, manage emotional health, perform [effective] division of labour, delegate things systematically to avoid 'overloading' ourselves, and improve teamwork is needed."* (Participant 23, male, RN)

Early resource planning and preparation

Most participants emphasised the importance of early, large-scale warning and preparation health systems and facilities to deal with infectious disease outbreaks. Although experiences in previous epidemics in Hong Kong had improved local reserves of resources, including PPE, ventilators, isolation and quarantine facilities, and negative pressure rooms, participants expressed the need to re-evaluate and update current practices. They also warned that adaptations to sudden increases in COVID-19 case numbers in Hong Kong hospitals had exposed inadequacies and risks in current measures:

> *"HA should set up more isolation facilities in advance. They may seem useless at the time, especially if we don't have any disease outbreak for many years, but you never know when there may be a sudden outbreak….When you convert general wards to isolation wards, you may jeopardise patient safety as they don't fit the required infection control criteria completely."* (Participant 19, female, RN)

Additionally, participants recounted that the severe PPE shortages experienced at the initial stages of the pandemic had raised the need to enhance local PPE production knowledge and establish local production lines of high-quality PPE, particularly masks:

> *"We need steady production of PPE in Hong Kong to cater to the sudden demand [during epidemics]…right now, even if we want to boost [PPE] production, we don't have the technology or know-how…need it in advance."* (Participant 30, female, NC)

DISCUSSION

Our study findings highlight the resilience and adaptability of nurses in tackling the numerous obstacles in the provision of effective nursing care during the COVID-19 pandemic. In the face of a lack of resources, particularly PPE and isolation facilities, nurses showed significant initiative and creativity in adapting to and overcoming such major obstacles. This is in line

with strategies used by healthcare providers when confronted with limited supplies, such as limiting patient contact and using the same respirator with multiple patients.[20]

Moreover, our findings emphasise the prevalence of self-care and self-protection measures, including greater awareness of personal infection control precautions, and more careful planning and preparation by nurses caring for COVID-19 patients. However, none of the nurses articulated using a clear set of guidelines regarding their own self-care and well-being, rather they largely utilised personal strategies based on their own knowledge and experience.[21] Nurses were highly adaptable in prioritising, accessing, and adjusting to the use of ever-changing COVID-19-specific nursing care protocols and guidelines. They were also aware of and responsive to the major specific needs of COVID-19 patients, particularly basic comfort and psychological well-being, and minimise the mental health burden so prevalent in this patient group.[22] Central to this was the use of clear communication approaches to enhance mutual nurse-patient understanding and alleviate hostility arising from patients' fear, anxiety, and insufficient knowledge. Interestingly, this was most prominent with regards to non-local patients, a growing population as a consequence of the international hub status of Hong Kong.

When personally confronted with their own feelings of despair and unease due to the ambiguity and unpredictability associated with the COVID-19 infection, nurses actively utilised effective cooperation and teamwork strategies to ensure safety and reassurance among team members. Regardless of the negative feelings and loneliness resulting from working at the frontlines of the pandemic, nurses strongly emphasised their sense of professional duty, pride, and responsibility, encouraged by the support of the hospital, colleagues, friends, and family. This is consistent with a qualitative study of 20 nurses in Henan, China which found the simultaneous and gradual existence of both negative emotions, such as fatigue, discomfort, and helplessness, especially in the early stage of the pandemic, and positive emotions, such as

confidence, calmness, relaxation, and happiness.[17] Additionally, a cross-sectional study of 325 nurses in the Philippines asserted the importance of perceived organisational and social support in lowering COVID-19-related anxiety in nurses.[23]

Our findings also revealed suggestions to improve measures for dealing with future outbreaks. Nurses desired to have their viewpoints taken into consideration in hospital management decisions about the pandemic, particularly when such decisions had consequences for nurses' safety and performance. The need for such a systematised organisational response to the pandemic is emphasised by a recent systematic review of 13 qualitative studies.[10]

To allow for a more targeted and well-prepared pandemic response, our findings emphasise the need to consistently update nurses' infection control education and ensure there are sufficient reserves of resources and isolation facilities in advance. This is supported by an online cross-sectional study of 637 primary health care nurses in Australia, which revealed seven key categories of perceived nurse support needs to provide quality clinical care during the pandemic: PPE, communication, funding, industrial issues, self-care, workplace factors and valuing nurses.[24] A cross-sectional study of 261 frontline nurses in the Philippines highlighted the importance of organisational measures to support nurses' mental health and reduce fear, including social support, psychological support services, more COVID-19-related training, and accurate and regular information and updates.[25] Interestingly, while most studies emphasised psychological support and coping strategies in nurses to alleviate their fear and psychological distress,[22-26] most nurses interviewed in our study appeared to focus largely on material or nursing care-specific support, particularly improved PPE management and training needs.

Finally, it was emphasised by participants that while nurses can assist in the fight against pandemics through effective nursing care, infectious disease outbreaks cannot be brought under control without the collective and concerted contributions of a well-educated

and well-informed community. Our findings support the need for multi-faceted responses against outbreaks with the involvement of multiple stakeholders, including nurse leaders, policymakers, hospital administrators, and the community.[21]

Limitations

Our study contributes to the limited literature on nurses' experiences during the COVID-19 pandemic in Hong Kong. A relatively large sample size of 39 compared to existing qualitative studies was utilised in our study to obtain a more comprehensive understanding of varied nursing experiences.[5,17,27] However, there are some limitations of the study.

Firstly, we used a purposive sample of registered nurses and are unable to generalise our findings. Secondly, our study only represents the experiences of nurses at the time of interview and may not reflect a rapidly changing scenario of the pandemic in Hong Kong. It would be interesting to conduct longitudinal studies exploring the experiences of nurses and other healthcare workers over the course of the COVID-19 pandemic.

CONCLUSIONS

Nurses have shown remarkable resilience and adaptability, despite resource and facility shortages and mental and physical health threats, when caring for COVID-19 patients. However, nurses need sufficient support from peers, managers, policy makers, and the local community to effectively prepare for and manage current and future outbreaks. The findings of this study can help inform future nursing practice, education, and policy-making to shape and strengthen an evidence-based response to global infectious disease outbreaks.

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Contributors

JPCC and SHSL conceived, designed, and supervised the study. CHYL and SKYL led the data collection process. RS and CHYL processed and analysed the data. JPCC, SHSL, RS, CHYL,

and DRT contributed to drafting the full article. All authors read and approved the final manuscript.

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Competing interests

None declared.

Patient consent for publication

Not required.

Ethics approval

This study received ethical approval from the Survey and Behavioural Research Ethics Committee of The Chinese University of Hong Kong (Reference no.: SBRE-19-594).

Data availability statement

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

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Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	1
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	2, 3
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	4, 5
Purpose or research question - Purpose of the study and specific objectives or questions	6
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	6, 7
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	6, 7
Context - Setting/site and salient contextual factors; rationale**	6, 7
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	6
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	6
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	6, 7

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	6, 7
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	7-10
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	6, 7
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	7
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	7

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	10-20
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	10-20

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	20-23
Limitations - Trustworthiness and limitations of findings	23

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	24
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	24

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

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Title page

Title: Nurses' experiences of caring for people diagnosed with COVID-19 in Hong Kong: A qualitative inquiry

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Abstract

Objectives: Nurses have been working at the frontlines of the coronavirus disease (COVID-19) pandemic. An understanding of their nursing experiences, the challenges they encountered, and the strategies they used to address them may inform efforts to better prepare and support nurses and public health measures when facing a resurgence of COVID-19 or future pandemics. This study aimed to explore the experiences of nurses who have provided care for people suspected or diagnosed with COVID-19 in Hong Kong.

Design: A qualitative study was conducted using individual, semi-structured interviews. All interviews were audio recorded and transcribed verbatim for thematic analysis.

Setting: Participants were recruited from acute hospitals and a public health department, namely the Department of Health, in Hong Kong from June 2020 to August 2020.

Participants: A purposive sample of registered nurses (n=39) caring for patients with COVID-19 in Hong Kong was recruited.

Results: Two-thirds of the nurses had a Master's degree, and over a third had 6 to 10 years of nursing experience. Around 40% of the nurses cared for COVID-19 patients in isolation wards, and a quarter performed COVID-19-related work. Most (90%) had training on COVID-19, and three-quarters had experience of working in infection control teams. Six key themes emerged: confronting facility and resource shortages; changes in usual nursing responsibilities and care modes; maintaining physical and mental health; need for effective and timely responses from relevant local authorities; role of the community in public health protection and management; and advanced pandemic preparedness.

Conclusions: Our study findings showed that nurses possessed resilience, self-care, and adaptability in confronting resource shortages, changing nursing protocols, and mental and physical health threats during the COVID-19 pandemic. Concurrent coordinated support from

the practice environment, local authorities and community, and advanced pandemic preparedness could optimise nursing responses to future infectious diseases.

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Strengths and limitations of this study

- A qualitative methodology elicited an in-depth analysis of Hong Kong nurses' experiences of taking care of confirmed or suspected COVID-19 patients during the COVID-19 pandemic.
- The study recruited 39 nurses from acute hospitals and public health departments across Hong Kong to reflect diverse perspectives.
- Purposive sampling was used to recruit participants, which may limit the generalisability of the findings to all nursing staff in Hong Kong.
- All interviews were conducted by phone to maintain social distancing during the COVID-19 pandemic.

BACKGROUND

In late December 2019, a number of cases of pneumonia with unknown aetiology were reported in Wuhan, China.[1] The first confirmed case of coronavirus disease (COVID-19) was reported in Hong Kong on 23rd January 2020.[2] Subsequently, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic on 11th March 2020 as a result of its rapid global spread.[3] By 16th March 2020, more than 120 million cases of COVID-19 had been confirmed worldwide, resulting in more than 2 million deaths across 192 countries/regions.[4] In Hong Kong, over 11,000 cases have been confirmed, with more than 200 deaths.[2]

Healthcare systems globally are facing tremendous challenges in combatting the COVID-19 pandemic. Unprecedented measures have been taken by healthcare authorities to cope with potential surges in patients. For instance, general wards have been set up as isolation wards, and nurses and other frontline healthcare workers without infectious diseases expertise have stepped up to provide care for COVID-19 patients.[5] To alleviate the risk of viral spread and cross infections among patients and staff within clinical settings, further measures, such as suspending elective surgeries, have been taken.[6,7]

Due to the widespread nature of the pandemic, nurses have been working relentlessly on the front line of care, with a large number, irrespective of specialty, deployed to manage patients with COVID-19. This includes nurses with limited infectious diseases expertise suddenly working in entirely unfamiliar and stressful environments, exposing their lives to great risks.[8] By the end of October 2020 more than 1500 nurses worldwide had lost their lives to the virus.[9] Regardless, nurses have consistently displayed commitment and compassion towards infection prevention, infection control, isolation, containment, and public health.[10] A systematic review of 13 qualitative studies on nurses' experiences during respiratory pandemics, including the COVID-19 pandemic, showed that their sense of duty, dedication to patient care, self-sacrifice, and professional collegiality were intensified during

the pandemics.[11] However, at the same time, the review also highlighted arising concerns about their personal and family safety, and physical and emotional vulnerability.[11]

Moreover, infectious disease outbreaks are known to exert significant psychological impacts on healthcare workers, as well as the general public.[12] Hong Kong gained considerable experience battling the severe acute respiratory syndrome (SARS) epidemic in 2003. At that time, 22% of all infected persons were healthcare workers, of whom eight lost their lives.[13,14] Previous studies on the SARS epidemic in Hong Kong have revealed that healthcare workers faced extraordinary stress and mental health problems due to factors such as risk of infection, stigmatisation, and understaffing at that time.[15,16] Qualitative studies on nurses responding to the COVID-19 pandemic in multiple countries, like Turkey,[17] Iran,[18] and Spain,[19] have similarly reported adverse psychosocial impacts, including anxiety and depressive symptoms, from the resulting mortality and unpredictability surrounding the pandemic. A study of 20 Chinese nurses additionally showed that during the COVID-19 pandemic, positive and negative emotions interweaved and coexisted in frontline nurses.[20] Negative emotions were dominant initially while positive emotions appeared gradually, with self-coping styles and psychological growth playing an imperative role in maintaining nurses' mental health. In Hong Kong, it can therefore be expected that uncertainty and fear have again magnified the impact of the disease on Hong Kong's healthcare system, regardless of the experience acquired from the SARS epidemic.

Despite the commitment and resilience of nurses, nursing responses to the COVID-19 pandemic have faced numerous barriers. A qualitative systematic review of nine studies determined that problems associated with insufficient information on COVID-19, unpredictability of nursing roles, lack of support, family concerns, and psychological distress particularly hindered the provision of quality nursing care.[21] Previous research has found that pivotal aspects of nursing's contribution to fighting COVID-19 include: the role of nurses

in health education with strategies focusing on infection prevention and early detection of symptoms, prevention of nosocomial infections, and surveillance; the implementation of appropriate precautions in nursing homes and protection of patients with long-term illnesses who are prone to infection; and ensuring the provision of personal protective equipment (PPE).[22] Another study in China also added reasonable work schedules, effective communication, psychological support, and intensive training for nurses who lacked experience in the management of infectious diseases.[5]

While critical aspects of nursing care may be largely universal, nurses' experiences are likely to differ between regions and countries due to the significant variations in the pandemic situations between them.[23] Hong Kong's COVID-19 response, which was led by strong community mobilisation in mask-wearing, personal hygiene, and social distancing originating as a remnant of the SARS epidemic and a high receptiveness to anti-epidemic measures, including border control and contact tracing, may be unique compared with other developed regions.[24,25] However, we have only found one published study on the experiences of Hong Kong school nurses during the COVID-19 pandemic.[26] Research on Hong Kong nurses' experiences in more frontline and acute clinical settings during the pandemic is therefore necessary to expand the global understanding of the preparation and support needed in healthcare responses to tackle future pandemics.

METHODS

Aims

This study aimed to explore the experiences of registered nurses caring for people suspected or diagnosed with COVID-19, including the challenges they encountered and the strategies they adopted to address them, and their views about the preparation and support of nurses and public health measures regarding future pandemics.

Participants

A purposive sample of 39 registered nurses with the following inclusion criteria was recruited: 1) currently or have experience providing direct nursing care to suspected and/or confirmed COVID-19 patients in hospitals or other clinical settings; 2) communicable in Cantonese; and 3) consented to participate in study. Participants were recruited from acute hospitals and a public health department, namely the Department of Health, in Hong Kong to allow for a breadth of diverse experiences of nurses at the frontline of the COVID-19 pandemic.

Ethical consideration

Ethical approval was obtained from the Survey and Behavioural Research Ethics Committee of The Chinese University of Hong Kong (Reference no.: SBRE-19-594), and the study followed the Declaration of Helsinki. Prior to data collection, participants were given a full explanation of the study objectives and procedures and informed of their right to agree or refuse to participate or withdraw from the study, following which written informed consent was obtained. All data were anonymous, used for research purposes only, and kept strictly confidential in a locked cabinet or via encryption, with access given only to the research team.

Data collection

A semi-structured interview guide was developed (Supplementary File 1). Eligible participants were interviewed by phone by a research assistant who was experienced in conducting qualitative interviews. Participants were invited to share their experiences caring for COVID-19 patients, challenges encountered, strategies adopted to address them, and views about the preparation and support of nurses and public health measures regarding future pandemics. Each interview was conducted in Cantonese and audio recorded. Participants' demographic and work characteristics were also collected, including age, gender, marital status, educational level, years of work experience, professional position, department/ward, time spent caring for people with COVID-19, previous infection control experience, training on COVID-19, and sleep quality and quantity.

Data analysis

Data were transcribed verbatim from the audio recordings by the third author (RS) who could understand both Cantonese and English. The third author then analysed all transcripts thematically based on the six phases of thematic analysis outlined by Braun and Clarke (2006).[27] The transcripts were coded and grouped under themes and sub-themes according to the aims of the study. The themes were carefully considered in relation to the overall data set, and consensus was reached via checking and discussion by team members, ensuring that the most representative themes and sub-themes were chosen. Illustrative quotes were translated from Cantonese to English to support the themes and sub-themes found.

To ensure qualitative rigour and trustworthiness, data were collected until data saturation was achieved, indicating that adequately rich data had been collected and we would be unlikely to find any new information upon continued data collection. A transparent audit trail was maintained through written reflexive notes and clear documentation of all coding decisions.

Patient and public involvement

This study focused on the experiences of nurses caring for COVID-19 patients. Hence, due to the nature of the study, patients or the public were not involved.

RESULTS

39 registered nurses were recruited and participated fully in the study. Interviews were conducted from June 2020 to August 2020 and lasted a median of 60 (range 35 to 89) minutes. Table 1 summarises participants' demographic and work characteristics. Six key themes emerged.

Table 1. Demographic and work characteristics of the 39 interviewed nurses

Characteristic	No. (%)
Age (years)	

20–29	12 (30.8)
30–39	17 (43.6)
40–49	5 (12.8)
50–59	5 (12.8)
Gender	
Male	12 (30.8)
Female	27 (69.2)
Marital status	
Single	21 (53.8)
Married	18 (46.2)
Children	
One	3 (7.7)
More than one	7 (17.9)
None	29 (74.4)
Education	
Bachelor's degree	10 (25.6)
Master's degree	26 (66.7)
Doctoral degree	3 (7.7)
Years of nursing experience	
1–5	11 (28.2)
6–10	14 (35.9)
11–15	4 (10.3)
>15	10 (25.6)
Position	
Registered nurse	23 (58.9)

Advanced practice nurse	8 (20.5)
Senior nursing officer	1 (2.6)
Ward manager	3 (7.7)
Nurse consultant	3 (7.7)
Department operations manager	1 (2.6)
Ward worked when caring for COVID-19 patients	
Isolation ward†	16 (41.0)
Intensive care unit‡	7 (20.6)
Accident and emergency department§	8 (23.5)
Medical and geriatric ward¶	1 (2.9)
Paediatric ward#	5 (14.7)
Other roles	2 (5.1)
Time spent doing COVID-19-related care or work (hours/week)	
1–10	6 (15.4)
11–20	9 (23.1)
21–30	2 (5.1)
31–40	10 (25.6)
>40	9 (23.1)
Difficult to measure	3 (7.7)
Time spent doing COVID-19-related care or work (months)	
1–2	8 (20.5)
3–4	10 (25.6)
5–6	20 (51.3)
7–8	1 (2.6)
Previous infection control team experience?	

Yes	29 (74.4)
No	10 (25.6)
Received COVID-19-related training?	
Yes	35 (89.7)
No	4 (10.3)
Have wash-out period?*	
Yes	6 (15.4)
No	31 (79.5)
Not applicable	2 (5.1)
Living situation during care of COVID-19 patients	
Hotel	19 (48.7)
Flat rental	3 (7.7)
No change	17 (43.6)
Sleep quality during care of COVID-19 patients	
Good	3 (7.7)
Normal	26 (66.7)
Poor	10 (25.6)
Sleep quantity during care of COVID-19 patients	
Increased	3 (7.7)
No change	32 (82.1)
Decreased	4 (10.3)

†Isolation wards are rooms equipped with negative pressure air extraction systems to prevent the spread of pathogens, including from suspected or confirmed COVID-19 patients. A full set of personal protective equipment must be worn when entering these wards.

‡Intensive care units are dedicated wards for the provision of intensive care, including to critically ill COVID-19 patients.

§Accident and emergency departments provide services for critically ill or injured people. People suspected with COVID-19 symptoms are commonly identified through enhanced surveillance in these facilities.

¶Medical and geriatric wards target the care of elderly patients. Older people admitted due to other health conditions may be identified as suspected COVID-19 cases.

#Paediatric wards provide care to minors under 18 years old. Children with suspected COVID-19 symptoms and their parents may be isolated and put under surveillance in these wards.

*A wash-out period is defined as a period of time of typically two to four weeks that is taken off from work after being deployed to take care of confirmed or suspected COVID-19 patients in isolation wards and before resuming previous clinical duties in other wards.

Theme 1: Confronting facility and resource shortages

All participants emphasised shortages of facilities and resources, namely PPE, isolation wards and beds, as the biggest challenges in the care of confirmed and suspected COVID-19 patients. Due to high caseloads, particularly from a large number of imported cases, participants encountered problems securing appropriate negative pressure and isolation rooms for high-risk individuals and procedures, and a lack of basic PPE, including face shields, masks and gloves. They commonly expressed feelings of powerlessness in their ability to fully care for patients:

> *"PPE is a very basic need. How can I properly take care of patients when I cannot even protect myself?"* (Participant 15, male, RN)

As a result of a lack of space in hospitals, participants described having no choice but to ask suspected individuals to wait outside in open areas or in corridors in the Accident and Emergency (A&E) Department prior to COVID-19 tests. They stressed the importance of being adaptable and having hospital measures to flexibly address increases in patient numbers, for

instance setting up enhanced surveillance wards and converting medical wards to isolation wards. At the same time, most participants acknowledged the limitations posed by such measures, with their failure to provide completely adequate isolation environments:

> *"As there weren't enough isolation wards, some general wards were converted to isolation wards…The problem is that the setting inside is not the same [in the converted wards]…we need separate places for entering and leaving in isolation wards as we need to de-gown before we can go out [of the ward]…patient flow is affected."* (Participant 19, female, RN)

They further revealed that PPE standards had been frequently downgraded in response to difficulties faced by hospitals in acquiring PPE stock. While understanding the need for these measures, participants expressed feeling that health worker and patient safety was being compromised. Most participants mentioned taking the initiative to enhance their personal precautions, for instance limiting interaction with confirmed and suspected patients, and reinforcing their alertness and awareness of infection control practices during patient care in order to minimise potential infection risks:

> *"To better manage the PPE resources that we have, I try to talk to patients using a walkie talkie from outside the [isolation] room instead of in person…When I wear PPE and go inside the [isolation] room, I try to be more careful and plan what I may need well so I don't need to leave the room to get anything and waste a set of PPE."* (Participant 28, female, nurse consultant (NC))

Theme 2 Changes in usual nursing responsibilities and care modes

Adapting to new and erratic procedural guidelines and protocols

Most participants expressed that the previous experiences of hospitals in handling cases during the 2003 SARS and the 2009 swine flu epidemics significantly directed the planning of hospital workflows and procedural guidelines during the COVID-19 pandemic. However, they also

mentioned the need to learn numerous new specific protocols and guidelines, including on triage criteria, the transport of patients to the intensive care unit, nasopharyngeal swab (NPS) and nasopharyngeal aspirate (NPA) procedures, safe handling of test specimens, and transfer and admission of suspected or confirmed cases under quarantine. They also reiterated the importance of nurses' awareness of environmental contamination risks and abiding by infection control practices more strictly, for instance the proper use of PPE and hand hygiene:

> *"I had to quickly learn how to take care of isolated patients…how to do infection control [well], like donning and doffing PPE and washing hands...I also had to learn to cooperate with my colleagues [to combat this pandemic]."* (Participant 15, male, RN)

Participants highlighted that coping with rapidly changing guidelines and protocols posed a major challenge. They frequently needed to ensure that they remained updated on modifications to infection control policies in response to PPE shortages, requirements of FTOCC (fever, travel history, occupational exposure, contact history, clustering) risk assessment, and new knowledge on disease pathology and symptoms to inform screening, treatment, and infection control:

> "*The guidelines we need to follow keep changing every day…so when I go to work, I first need to see what changes there are, for example which countries are on the high travel risk list…Initially, we used to use NPS for COVID-19 tests, but now, it has been changed to NPA…we needed to adapt to the new procedures very fast."* (Participant 16, male, RN)

Consequently, participants emphasised the importance of quick dissemination of evidence-based information from reliable and easily accessible sources, particularly text messaging groups with hospital and ward staff, change-of-shift meetings, and communication kits prepared by the Hospital Authority (HA), Hong Kong:

"We need to always keep ourselves updated, for example about PPE stocking, so we can modify our care practices…[To do this,] I usually look at emails from the hospital, our HA Chat [A secure platform for staff to send text, photo, voice, and video messages], the communication kit from HA …There's a lot of information out there...it can be difficult to screen and see which is the most important or trustworthy." (Participant 28, female, NC)

Re-focusing patient care towards psychological care and meeting patients' basic needs

With most COVID-19 cases admitted to hospitals being asymptomatic and relatively physically healthy, participants conveyed a greater emphasis of patient care on psychological well-being. They expressed the need to spend the majority of bedside care time assisting isolated patients to manage their fluctuating emotions, encouraging them, and alleviating their feelings of fear, sadness, and loneliness due to the uncertainty of their health outcomes, and being unable to see their family and friends:

"We need to help patients stay positive…[some patients] start crying and we need to go into the isolation room in full gear to help them calm down…They feel scared as they don't know what's going on…stressed as [there are] a lot of unknowns…need to spend some time with them." (Participant 2, female, advanced practice nurse (APN))

Some participants indicated that a lack of patient cooperation was a prevalent issue due to patients' insufficient understanding of the virus, and stress and frustration from receiving positive COVID-19 test results. They asserted that effective communication with patients, including clear explanations of their possible length of stay, treatment flow, and testing requirements for discharge, were vital in pacifying them and reducing their distress, especially for non-local patients admitted to hospital:

"You need to have two negative COVID-19 tests with the same type of clinical specimen 24 hours apart before you can be released from isolation…A patient kept getting

fluctuating results…[He] got very frustrated and said, 'Why didn't anyone tell me about this rule earlier?'…tried to leave the hospital…We called the police and he came back after talking to them…Communicating the rules and plans [to patients] early is very important…cannot assume they know why they are in hospital." (Participant 6, female, APN)

Besides psychological care, participants conveyed that meeting the basic needs of patients to allow them to have a more comfortable stay in hospital also constituted a major part of their patient care responsibilities. It was important for them to be flexible and understanding of the needs of patients who were isolated in hospital for long periods of time, particularly regarding their food and entertainment preferences, and basic amenities required, including Internet connectivity and toiletries:

"Due to prolonged hospitalisation, patients have some very simple needs, like Wi-Fi, TV…They don't want to eat hospital food…order delivery." (Participant 4, female, RN)

Some participants expressed that patient care additionally extended to family members. As close contacts, it was necessary to inform family members of their need to be quarantined, as well as regularly update them on the patient's condition and circumstances. Patients were also provided with video calling capabilities to maintain social contact:

"For elderly patients [without a phone with video calling capabilities], we give them a Tablet to use so that they can video call their family members." (Participant 7, female, ward manager (WM))

Theme 3 Maintaining physical and mental health

Tackling adverse impacts on nurses' physical and mental health

Most participants revealed that they stayed in hotels rather than at their homes to keep their families safe when taking care of suspected and confirmed COVID-19 cases. They disclosed strong feelings of loneliness and social isolation from their friends and families, spending large

amounts of time alone to avoid potentially infecting others. Some participants also conveyed being afraid of possible social rejection by friends as a concern as they may be seen as "dirty" due to their place of work. All of these resulted in negative thoughts and emotions in participants:

> *"Most of us [nurses] feel very alienated from society…We try to isolate ourselves from our family members and friends…have less social interaction with people as we don't want to infect them…I feel that I don't have much social support… feel a bit depressed."* (Participant 39, female, department operations manager (DOM))

Moreover, some participants expressed feeling fearful when taking care of patients, in particular during high-risk procedures, namely aerosol generating procedures. However, at the same time, most participants conveyed that regardless of all the negative feelings, they held a strong sense of professional responsibility to contribute to the fight against the COVID-19 pandemic, and faith in their own skills and knowledge to protect themselves and others:

> *"I found out I was pregnant while working in the isolation ward…My colleagues and family were worried about me, but I decided to continue working there…I had a friend with a similar experience and she was ok…if I wear full PPE properly and trust my skills, I can still do my job safely."* (Participant 35, female, APN)

As a result, participants indicated working harder to ensure their physical health via effective self-care and personal-protection practices, including greater care and alertness in infection control, and clear planning and preparation prior to conducting high-risk procedures:

> *"When performing high-risk aerosol generating procedures on confirmed cases, we need to be very clear on the steps we take…need to be smooth…very alert, especially during doffing of PPE, washing hands, and showering [afterwards]."* (Participant 32, male, RN)

In addition, participants further highlighted that family, friends, and peer support was essential in promoting their mental and emotional health, providing reassurance, and alleviating their worries and anxieties:

"My friends and family call me to tell me to be careful…I also have very supportive friends in the hospital who constantly ask if I need anything…I don't feel that lonely [because of them]." (Participant 6, female, APN)

Importance of teamwork and a supportive practice environment

Most participants shared that the support and cooperation of their team played an important role in helping them maintain their physical and mental health. With large numbers of new staff deployed from other wards, participants also expressed that it was necessary to work together to train them, and for more experienced and senior nurses to ensure their understanding of proper nursing interventions:

"We have very good team spirit…everyone is very supportive…We use a buddy system so that when one of us is going to take care of [infected] patients, there would be another person watching you to make sure you do all the [nursing] procedures safely." (Participant 5, female, RN)

Additionally, participants emphasised the benefit of a supportive hospital environment, particularly the management team. Some participants conveyed appreciation towards the hospital management team for the arrangement of rental allowances and subsidies from the HA to staff caring for COVID-19 patients. However, others asserted that improved PPE and understanding of frontline staff needs were required. They highlighted that explaining the rationale behind management decisions was imperative in reducing discontent and negative feelings among frontline staff:

"Frontline staff needs to be given more information on management decisions…if they can understand why different decisions are made, they would have fewer grievances and can be more supportive." (Participant 10, male, senior nursing officer (SNO))

Theme 4 Need for effective and timely responses from relevant local authorities

Most participants described the responses of governmental departments as an important factor in ensuring adequate public health measures during the COVID-19 pandemic. They stressed such departments had the ability to considerably impact the provision of adequate patient-centred care within manageable patient caseloads. Some participants criticised the slow and lacking response measures of the local authorities in relation to the establishment of protocols and guidelines, setting up of isolation wards, management of PPE shortages, and step-down arrangements for non-serious cases:

"Many things need to be prepared earlier, especially hospital negative pressure rooms…In my hospital, there was a time when we needed to urgently prepare the negative pressure room, but we noticed that there was some water leakage there and a little problem with the double doors of the room…these things should have been fixed earlier as we never know when there may be a sudden explosion in cases." (Participant 4, female, RN)

Most participants supported earlier and more enforced government responses to the pandemic consisting of more prompt restrictions on travel into the city, earlier screening, improved monitoring and management of quarantined cases, active promotion of mask-wearing, and surgical mask distribution to disadvantaged groups. Some participants also suggested that public health decision-making by government agencies necessitated greater involvement of frontline healthcare professionals, who are more aware of and better placed to make decisions:

"More frontline [healthcare] professionals should be involved in giving input to the government…the government should listen to their suggestions…tell people to wear masks earlier, control number of people on public transport in rush hour, and disseminate more information on how people can protect themselves." (Participant 2, female, APN)

Overall, participants attributed the lack of sufficient foresight and a severe underestimation of the disease by authorities as a prominent reason for the burden faced by nurses during the pandemic.

Theme 5 Role of the community in public health protection and management

Apart from the provision of patient-centred care to infected individuals, participants mentioned the value of collective community efforts in effectively controlling infectious disease outbreaks. They emphasised the importance of promoting the proper adoption of simple personal protective and hygiene measures, namely keeping hands clean by washing them or using hand sanitisers, wearing eye goggles and masks, social distancing, and ensuring cleanliness of the surrounding environment within the community. Some participants also highlighted the need for specific measures in the Chinese cultural context, such as avoiding tea and hotpot gatherings, and using serving chopsticks during meals:

"When people started wearing masks, we noticed that the number of patients coming in with other URIs [upper respiratory infections] also reduced…clearly, such measures are very important and effective." (Participant 31, female, RN)

Consequently, participants stressed the additional role of nurses in acting as community health educators to enhance public health education and alertness. Owing to the lack of an effective vaccine or treatment for COVID-19 at the time, they also asserted that the government should take a greater role in reducing misinformation and disseminating more evidence-based information to maintain public vigilance and reduce the community spread of the disease:

"Now we know that the virus is spread by droplets…but people [the general public] don't have any clear information on what precautions to take against this…I always see people in the bus…touching everywhere and not being that aware." (Participant 22, female, RN)

Theme 6 Advanced pandemic preparedness

More comprehensive and ongoing nursing education on outbreak management

While nurses in Hong Kong indicated feeling better prepared than their counterparts in other countries and compared to the 2003 SARS epidemic, the COVID-19 pandemic also revealed various areas of improvement. Participants reiterated the necessity for regular and continuous infection control training of nurses, particularly in maintaining their psychological preparation, awareness, and alertness to fight infectious disease outbreaks, and optimising their clinical skills associated with performing high-risk interventions, reducing cross-infection and contamination risks, and donning and doffing PPE. They also suggested the use of outbreak training simulations and experience sharing by frontline nurses to strengthen evidence-based training, and emphasised the promotion of teamwork, delegation, and communication amongst nurses during disease outbreaks:

"More nurse education on high-risk interventions, including how to reduce contact with droplets and protect ourselves, manage emotional health, perform [effective] division of labour, delegate things systematically to avoid 'overloading' ourselves, and improve teamwork is needed." (Participant 23, male, RN)

Early resource planning and preparation

Most participants emphasised the importance of early, large-scale warning and preparation health systems and facilities to deal with infectious disease outbreaks. Although experiences in previous epidemics in Hong Kong had improved local reserves of resources, including PPE, ventilators, isolation and quarantine facilities, and negative pressure rooms, participants

expressed the need to re-evaluate and update current practices. They also warned that adaptations to sudden increases in COVID-19 case numbers in Hong Kong hospitals had exposed inadequacies and risks in current measures:

> *"HA should set up more isolation facilities in advance. They may seem useless at the time, especially if we don't have any disease outbreak for many years, but you never know when there may be a sudden outbreak….When you convert general wards to isolation wards, you may jeopardise patient safety as they don't fit the required infection control criteria completely."* (Participant 19, female, RN)

Additionally, participants recounted that the severe PPE shortages experienced at the initial stages of the pandemic had raised the need to enhance local PPE production knowledge and establish local production lines of high-quality PPE, particularly masks:

> *"We need steady production of PPE in Hong Kong to cater to the sudden demand [during epidemics]…right now, even if we want to boost [PPE] production, we don't have the technology or know-how…need it in advance."* (Participant 30, female, NC)

DISCUSSION

To the best of our knowledge, this is the first study to qualitatively examine nurses' experiences of caring for COVID-19 patients in Hong Kong. Our study findings highlight the resilience and adaptability of nurses in tackling the numerous obstacles in the provision of effective nursing care during the COVID-19 pandemic. In the face of a lack of resources, particularly PPE and isolation facilities, nurses showed significant initiative and creativity in adapting to and overcoming such major obstacles. This is in line with previously reported strategies suggested by the WHO and the Centers for Disease Control and Prevention (CDC) that have been used by healthcare providers when confronted with limited supplies, such as limiting patient contact and using the same respirator with multiple patients.[28]

Moreover, our findings emphasise the prevalence of self-care and self-protection measures, including greater awareness of personal infection control precautions, and more careful planning and preparation by nurses caring for COVID-19 patients. However, none of the nurses articulated using a clear set of guidelines regarding their own self-care and well-being, rather they largely utilised personal strategies based on their own knowledge and experience.[29] The need for self-care support was similarly identified as a requirement to provide quality care in a previous qualitative study on Australian primary healthcare nurses' needs during the COVID-19 pandemic.[30]

Besides, nurses were highly adaptable in prioritising, accessing, and adjusting to the use of ever-changing COVID-19-specific nursing care protocols and guidelines. They were also aware of and responsive to the major specific needs of COVID-19 patients, particularly basic comfort and psychological well-being, and minimising the mental health burden so prevalent in this patient group.[31] Notably, the majority of nurses in this study emphasised their significant role in providing psychological support to COVID-19 patients as many patients admitted to hospital were asymptomatic or had mild symptoms and were relatively physically healthy, given Hong Kong's rules regarding the admission of all COVID-19 cases to reduce the community spread of the virus. This is in contrast with many studies from other places, including China,[32] and Italy,[33] among others, which highlight the tremendous challenges, fear, and psychological impact faced by nurses in caring for heavy workloads of seriously ill COVID-19 patients.

We found that the use of clear communication approaches was central in enhancing mutual nurse-patient understanding and alleviating hostility arising from patients' fear, anxiety, and insufficient knowledge. Interestingly, this was most prominent with regards to non-local patients, a growing population as a consequence of the international hub status of Hong Kong. Consistent to this, previous studies have also reported multiple incidences of workplace or

medical violence, including physical and verbal abuse, against healthcare workers during the COVID-19 pandemic, albeit largely from patients' relatives, due to a lack of knowledge about COVID-19 and its treatment, and dissatisfaction with hospital policies.[34,35] This further supports the importance of enhancing the communication skills of nurses to improve their resilience in these situations.

When personally confronted with their own feelings of despair and unease due to the ambiguity and unpredictability associated with the COVID-19 infection, nurses actively utilised effective cooperation and teamwork strategies to ensure safety and reassurance among team members. Regardless of the negative feelings and loneliness resulting from working at the frontlines of the pandemic, nurses strongly emphasised their sense of professional duty, pride, and responsibility, encouraged by the support of the hospital, colleagues, friends, and family. This is consistent with a qualitative study of 20 nurses' psychological experience in Henan, China, which found the simultaneous and gradual existence of both negative emotions, such as fatigue, discomfort, and helplessness, especially in the early stage of the pandemic, and positive emotions, such as confidence, calmness, relaxation, and happiness.[20] Additionally, a cross-sectional study of 325 nurses in the Philippines asserted that perceived organisational and social support were predictors of COVID-19-related anxiety in nurses.[36]

Our findings also revealed suggestions to improve measures for dealing with future outbreaks. Nurses desired to have their viewpoints taken into consideration in hospital management decisions about the pandemic, particularly when such decisions had consequences for nurses' safety and performance. The need for such a systematised organisational response to the pandemic is emphasised as a crucial way to reduce burnout and psychological distress in nurses by a recent systematic review of 13 qualitative studies.[11] To allow for a more targeted and well-prepared pandemic response, our findings emphasise the need to consistently update nurses' infection control education and ensure there are sufficient reserves of resources and

isolation facilities in advance. This is supported by an online cross-sectional study of 637 primary health care nurses in Australia, which revealed seven key categories of perceived nurse support needs to provide quality clinical care during the pandemic: PPE, communication, funding, industrial issues, self-care, workplace factors, and valuing nurses.[30] A cross-sectional study of 261 frontline nurses in the Philippines highlighted the importance of organisational measures to support nurses' mental health and reduce fear, including social support, psychological support services, more COVID-19-related training, and accurate and regular information and updates.[37] Interestingly, while most studies emphasised psychological support and coping strategies in nurses to alleviate their fear and psychological distress,[30,31,36-38] most nurses interviewed in our study appeared to focus largely on material or nursing care-specific support, particularly improved PPE management and training needs.

Finally, it was emphasised by participants that while nurses can assist in the fight against pandemics through effective nursing care, infectious disease outbreaks cannot be brought under control without the collective and concerted contributions of a well-educated and well-informed community. Our findings support the need for multi-faceted responses against outbreaks with the involvement of multiple stakeholders, including nurse leaders, policymakers, hospital administrators, and the community.[29]

Limitations

Our study contributes to the limited literature on nurses' experiences during the COVID-19 pandemic in Hong Kong. A relatively large sample size of 39 compared to existing qualitative studies was utilised in our study to obtain a more comprehensive understanding of varied nursing experiences.[5,18,20] However, there are some limitations of the study. Firstly, we used a purposive sample of registered nurses and are unable to generalise our findings.

Secondly, our study only represents the experiences of nurses at the time of interview and may not reflect a rapidly changing scenario of the pandemic in Hong Kong.

Implications for research and practice

Findings from this study may help to optimise evidence-based nursing responses for future pandemics by improving the preparedness of the nursing workforce in more effectively offering patient-centred nursing care. Nursing education could be enhanced by enriching the knowledge provided regarding responses against novel infectious diseases, PPE management during shortages, communication skills, and psychological patient care. Our findings also show the need for policy-makers to re-evaluate existing contingency plans regarding PPE, as well as the role that the nursing sector can play in anti-epidemic decisions on a larger scale.

Future studies may further explore the experiences of nurses and other healthcare workers over the course of the COVID-19 pandemic using longitudinal designs. Research may also be conducted on effective self-care strategies during pandemics and the organisational role in supporting them to enhance the resilience of nurses.

CONCLUSIONS

Nurses have shown remarkable resilience and adaptability, despite resource and facility shortages and mental and physical health threats, when caring for COVID-19 patients. However, nurses need sufficient support from peers, managers, policy makers, and the local community to effectively prepare for and manage current and future outbreaks. The findings of this study can help inform future nursing practice, education, and policy-making to shape and strengthen an evidence-based response to global infectious disease outbreaks.

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JPCC and SHSL conceived, designed, and supervised the study. CHYL and SKYL led the data collection process. RS and CHYL processed and analysed the data. JPCC, SHSL, RS, CHYL, and DRT contributed to drafting the full article. All authors read and approved the final manuscript.

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Patient consent for publication

Not required.

Ethics approval

This study received ethical approval from the Survey and Behavioural Research Ethics Committee of The Chinese University of Hong Kong (Reference no.: SBRE-19-594).

Data availability statement

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

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Semi-structured Interview Guide

8 aspects:

1. Nurses: Individuals, families, co-workers (impact on physical, psychological, social and work-related aspects)
   1.1. Individuals
   Use a word to describe the COVID-19 outbreak.

   How would you describe the impact of Covid-19?

   What are the roles and responsibilities of nurses during the Covid-19 outbreak?

   1.2. Families and co-workers
   Tell me about the changes in you and others (colleagues and family members) that you have made after this experience.

2. Patients and families (physical, psychological, social and financial impact)
   2.1. Tell me the symptoms of those who have infected COVID-19 (those you have cared for)

   2.2. Your perceived needs of COVID-19 patients

   2.3. Your perceived needs of COVID-19 patients' families

   2.4. Share the support received by patients and their families

3. Caring for COVID-19 patients (positive and negative experiences; difficulties and challenges; lessons learned from past epidemics)
   3.1. Nurse's background
   Tell me about your nursing background, years of experience, SARS experience or experience of other infectious disease pandemic.

   3.2. Decision
   Who assigned you to look after COVID-19 patients?

   When deciding to help out during the COVID-19 outbreak (for volunteers)

   3.3. Caring experiences
   Tell me your experiences about caring for people diagnosed with Covid-19

   Tell me one of the unforgettable experiences during the period of caring for people with Covid-19.

   What have you learned from this experience?

   3.4. Challenges
   Tell me more about the things that concerned you most during the period of caring for people with Covid-19.

What challenges did you encounter when you cared for people with Covid-19?

What strategies did you take to address these challenges?

What kind of support did you get when taking care of people with Covid-19?

4. Infection control measures and practices (what works and what does not work, challenges)
   4.1. What measures you perceived as most effective in combating COVID-19?

   4.2. What actions you perceived as most effective to safeguard individuals, families and communities during the COVID-19 pandemic?

5. Work environment and policies (positive and negative, what can be done differently)
   5.1. Work environment
   Tell me about your previous and currently workplace?

   5.2. Policies
   From your experience, what are the current needs of general public hospitals in addressing the potential emerging and re-emerging infectious diseases?

   Your perceived needs of healthcare providers

   5.3. Suggestion
   Where do you get information or guidance on the care of COVID-19 patients?

   Which approach do you think is most effective?

   From your experience, what are our current medical systems doing well?

   What would you suggest to enhance the preparation of nurses to better equip them to address future infectious diseases?

   Any messages you would like to give in dealing with the COVID-19 outbreak?

6. Community approaches to slow the spread of COVID-19 (most effective and hindrance)
   6.1. Tell me about your view on the effective community approaches

   6.2. From your experience, what are the current needs of the community in addressing the potential emerging and re-emerging infectious diseases?

7. Global approaches to combat COVID-19 (what works and what does not work, challenges)
   7.1. What kind of global approaches works and what does not work?

   7.2. From your experience, what are the current challenges of combat COVID-19 globally?

8. Government approaches to combat COVID-19 (what works and what does not work, challenges)
   8.1. What kind of government approaches works and what does not work?

   8.2. From your experience, what are the current needs and challenges of the government in addressing the potential emerging and re-emerging infectious diseases?

   8.3. Tell me about your view on the importance of public health for managing infectious diseases.

Do you have other experiences that you would like to share, but have not yet mentioned?

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	1
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	2, 3
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	4-6
Purpose or research question - Purpose of the study and specific objectives or questions	6
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	7, 8
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	7, 8
Context - Setting/site and salient contextual factors; rationale**	7
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	7, 8
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	7
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	7

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	7
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	8-12
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	8
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	8
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	8

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	12-22
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	12-22

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	22-26
Limitations - Trustworthiness and limitations of findings	25, 26

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	27
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	27

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
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Nurses' experiences of caring for people with COVID-19 in Hong Kong: A qualitative inquiry

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Title page

Title: Nurses' experiences of caring for people with COVID-19 in Hong Kong: A qualitative inquiry

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Word count: 5,039 words

Abstract

Objectives: Nurses are the largest group of healthcare workers on the frontline of efforts to control the coronavirus disease (COVID-19) pandemic. An understanding of their nursing experiences, the challenges they encountered, and the strategies they used to address them may inform efforts to better prepare and support nurses and public health measures when facing a resurgence of COVID-19 or new pandemics. This study aimed to explore the experiences of nurses caring for people with suspected or diagnosed COVID-19 in Hong Kong.

Design: A qualitative study was conducted using individual, semi-structured interviews. All interviews were audio recorded and transcribed verbatim for thematic analysis.

Setting: Participants were recruited from acute hospitals and a public health department in Hong Kong from June 2020 to August 2020.

Participants: A purposive sample of registered nurses (n=39) caring for people with COVID-19 in Hong Kong was recruited.

Results: Two-thirds of the nurses had a Master's degree, and over a third had 6 to 10 years of nursing experience. Around 40% of the nurses cared for people with COVID-19 in isolation wards, and a quarter performed COVID-19-related work. Most (90%) had training on COVID-19, and three-quarters had experience of working in infection control teams. Six key themes emerged: confronting resource shortages; changes in usual nursing responsibilities and care modes; maintaining physical and mental health; need for effective and timely responses from relevant local authorities; role of the community in public health protection and management; and advanced pandemic preparedness.

Conclusions: Our study found that nurses possessed resilience, self-care, and adaptability when confronting resource shortages, changing nursing protocols, and physical and mental health threats during the COVID-19 pandemic. However, coordinated support from the clinical

environment, local authorities and community, and advanced preparedness would likely improve nursing responses to future pandemics.

(Word count: 291 words)

Strengths and limitations of this study

- This is the first qualitative study to explore the experiences of registered nurses caring for people with suspected or confirmed COVID-19 in Hong Kong..
- The study recruited 39 registered nurses from acute hospitals and a public health department across Hong Kong to reflect diverse perspectives.
- Purposive sampling was used to recruit participants, and the findings may not reflect the experiences of all nurses.
- All interviews had to be conducted by phone to maintain social distancing.

BACKGROUND

In late December 2019, a number of cases of pneumonia with unknown aetiology were reported in Wuhan, China.[1] The first confirmed case of coronavirus disease (COVID-19) was reported in Hong Kong on 23 January 2020.[2] Subsequently, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic on 11 March 2020 as a result of its rapid global spread.[3] By 16 March 2020, more than 120 million cases of COVID-19 had been confirmed worldwide, resulting in more than 2 million deaths across 192 countries/regions.[4] In Hong Kong, to date over 11,000 cases have been confirmed, with more than 200 deaths.[2]

Healthcare systems globally are facing tremendous challenges in combatting the COVID-19 pandemic. Unprecedented measures have been taken by healthcare authorities to cope with potential surges in patients. For instance, general wards have been set up as isolation wards, and nurses and other frontline healthcare workers without infectious diseases expertise have stepped up to provide care for people with COVID-19.[5] To alleviate the risk of viral spread and cross infections among patients and staff within clinical settings, further measures, such as suspending elective surgeries, have been taken.[6,7]

Nurses are working relentlessly on the frontline of care, with a large number, irrespective of specialty, deployed to manage people with COVID-19. This includes nurses with limited infectious diseases expertise suddenly working in entirely unfamiliar and stressful environments, exposing them to significant risk.[8] By the end of October 2020 more than 1500 nurses worldwide had lost their lives to the virus.[9] Regardless, nurses have consistently demonstrated commitment and compassion, often in the face of misinformation and adversity.[10] A systematic review of 13 qualitative studies of nurses' experiences during respiratory pandemics, including COVID-19, found that although their professional sense of duty, dedication, self-sacrifice, and collegiality were intensifiedthough, concerns arose about their personal and family safety, and physical and emotional vulnerability.[11]

COVID-19 is known to exert a significant psychological toll on healthcare workers, as well as the general public.[12] In 2003, the severe acute respiratory syndrome (SARS) epidemic in Hong K, where 22% of all infected people were healthcare workers, eight of whom eight died.[13,14], also revealed that healthcare workers faced extraordinary stress and mental health problems due to factors such as risk of infection, stigmatisation, and understaffing.[15,16] Qualitative studies of nurses responding to the COVID-19 pandemic in Turkey,[17] Iran,[18] and Spain,[19] have reported adverse psychosocial impacts, including anxiety and depressive symptoms, from the resulting high mortality and unpredictability. A study of 20 Chinese front line nurses showed that during the COVID-19 pandemic, positive and negative emotions interweaved and coexisted[20], with negative ones being dominant initially and positive ones appearing gradually, with self-coping styles and psychological growth playing an imperative role in maintaining nurses' mental health.

Despite the commitment and resilience of nurses, nursing responses to the COVID-19 pandemic face numerous barriers. A qualitative systematic review of nine studies found that nurses' barriers to caring for people with COVID-19 included the unpredictability of nursing roles, lack of support, family concerns, and psychological distress.[21] Pivotal aspects to aid nursing's contribution to fighting COVID-19 include the role of nurses in health education, especially infection prevention and surveillance, the implementation of appropriate precautionary measures in nursing homes and protection of patients with long-term illnesses who are prone to infection, and the provision of personal protective equipment (PPE)[22], as well as reasonable work schedules, effective communication, psychological support, and intensive training for those who lack experience in managing infectious diseases.[5]

While critical aspects of nursing care may be largely universal, nurses' experiences are likely to differ between regions and countries due to the significant variations in the impact of the pandemic .[23] In Hong Kong, the COVID-19 response, led by strong community

mobilisation in mask-wearing, personal hygiene, and social distancing as a remnant of the SARS epidemic, and a high receptiveness to anti-epidemic measures, including border control and contact tracing, may be unique compared with other developed regions.[24,25] However, we have only found one published study on the experiences of Hong Kong school nurses during the COVID-19 pandemic.[26] No study has reported the experiences of nurses caring for people with COVID-19 in Hong Kong.

METHODS

Aims

This study aimed to explore the experiences of registered nurses caring for people with suspected or diagnosed COVID-19 during the first six months of the ongoing global pandemic, including the challenges they encountered and the strategies they adopted to address them, and their views about the preparation and support of nurses and public health measures regarding future pandemics.

Participants

A purposive sample of 39 registered nurses with the following inclusion criteria was recruited: 1) experience of providing direct nursing care to people with suspected and/or confirmed COVID-19 in hospital or other clinical settings; 2) able to communicate in Cantonese; and 3) consented to participate in study. Participants were recruited from acute hospitals and a public health department in Hong Kong to allow for a breadth of diverse experiences of nurses at the frontline of the COVID-19 pandemic.

Ethical consideration

Ethical approval was obtained from the Survey and Behavioural Research Ethics Committee of The Chinese University of Hong Kong (Reference no.: SBRE-19-594), and the study followed the principles of the Declaration of Helsinki. Prior to data collection, participants were given a full explanation of the study objectives and procedures and informed of their right

to agree or refuse to participate or withdraw from the study at any time, following which written informed consent was obtained. All data were anonymous, used for research purposes only, and kept strictly confidential in a locked cabinet or via encryption, with access given only to the research team.

Data collection

A semi-structured interview guide was developed (Supplementary File 1). Eligible participants were interviewed by phone by a research assistant experienced in conducting qualitative interviews. Participants were invited to share their experiences of caring for people with COVID-19, challenges encountered, strategies adopted to address them, and views about the preparation and support of nurses and public health measures regarding future pandemics. Each interview was conducted in Cantonese and audio recorded. Participants' demographic and work characteristics were also collected, including age, sex, marital status, educational level, years of work experience, professional position, department/ward, time spent caring for people with COVID-19, previous infection control experience, training on COVID-19, and sleep quality and quantity.

Data analysis

Data were transcribed verbatim from the audio recordings by the third author (RS) who was fluent in Cantonese and English. The third author then analysed all transcripts thematically based on the six phases of thematic analysis outlined by Braun and Clarke (2006).[27] The transcripts were coded and grouped under themes and sub-themes according to the aims of the study. The themes were considered carefully in relation to the overall data set, and consensus was reached through checking and discussion by team members, ensuring that the most representative themes and sub-themes were chosen. Illustrative quotes were translated from Cantonese to English to support the themes and sub-themes found.

To ensure qualitative rigour and trustworthiness, data were collected until data saturation was achieved, indicating that adequately rich data had been collected and we would be unlikely to find any new information upon continued data collection. A transparent audit trail was maintained through written reflexive notes and clear documentation of all coding decisions.

Patient and public involvement

As this study focused on the experiences of nurses caring for people with COVID-19, patients or the public were not involved.

RESULTS

Thirty-nine registered nurses were recruited and participated throughout the study. Interviews were conducted during June 2020 to August 2020 and lasted a median of 60 (range 35 to 89) minutes. Table 1 summarises participants' demographic and work characteristics. Six key themes emerged.

Table 1. Demographic and work characteristics of the 39 interviewed nurses

Characteristic	No. (%)
Age (years)	
20–29	12 (30.8)
30–39	17 (43.6)
40–49	5 (12.8)
50–59	5 (12.8)
Gender	
Male	12 (30.8)
Female	27 (69.2)
Marital status	
Single	21 (53.8)

Married	18 (46.2)
Children	
One	3 (7.7)
More than one	7 (17.9)
None	29 (74.4)
Education	
Bachelor's degree	10 (25.6)
Master's degree	26 (66.7)
Doctoral degree	3 (7.7)
Years of nursing experience	
1–5	11 (28.2)
6–10	14 (35.9)
11–15	4 (10.3)
>15	10 (25.6)
Position	
Registered nurse	23 (58.9)
Advanced practice nurse	8 (20.5)
Senior nursing officer	1 (2.6)
Ward manager	3 (7.7)
Nurse consultant	3 (7.7)
Department operations manager	1 (2.6)
Ward worked when caring for people with COVID-19	
Isolation ward†	16 (41.0)
Intensive care unit‡	7 (20.6)
Accident and emergency department§	8 (23.5)

Medical and geriatric ward¶	1 (2.9)
Paediatric ward#	5 (14.7)
Other roles	2 (5.1)
Time spent doing COVID-19-related care or work (hours/week)	
1–10	6 (15.4)
11–20	9 (23.1)
21–30	2 (5.1)
31–40	10 (25.6)
>40	9 (23.1)
Difficult to measure	3 (7.7)
Time spent doing COVID-19-related care or work (months)	
1–2	8 (20.5)
3–4	10 (25.6)
5–6	20 (51.3)
7–8	1 (2.6)
Previous infection control team experience?	
Yes	29 (74.4)
No	10 (25.6)
Received COVID-19-related training?	
Yes	35 (89.7)
No	4 (10.3)
Have wash-out period?*	
Yes	6 (15.4)
No	31 (79.5)
Not applicable	2 (5.1)

Living situation during care of people with COVID-19	
Hotel	19 (48.7)
Flat rental	3 (7.7)
No change	17 (43.6)
Sleep quality during care of people with COVID-19	
Good	3 (7.7)
Normal	26 (66.7)
Poor	10 (25.6)
Sleep quantity during care of people with COVID-19	
Increased	3 (7.7)
No change	32 (82.1)
Decreased	4 (10.3)

†Isolation wards are rooms equipped with negative pressure air extraction systems to prevent the spread of pathogens, including from people with suspected or diagnosed COVID-19. A full set of personal protective equipment must be worn when entering these wards.

‡Intensive care units are dedicated wards for the provision of intensive care, including to critically ill people with COVID-19.

§Accident and emergency departments provide services for critically ill or injured people. People suspected with COVID-19 symptoms are commonly identified through enhanced surveillance in these facilities.

¶Medical and geriatric wards target the care of elderly patients. Older people admitted due to other health conditions may be identified as suspected COVID-19 cases.

#Paediatric wards provide care to minors under 18 years old. Children with suspected COVID-19 symptoms and their parents may be isolated and put under surveillance in these wards.

*A wash-out period is defined as a period of time of typically two to four weeks that is taken off from work after being deployed to take care of people with suspected or diagnosed COVID-19 in isolation wards and before resuming previous clinical duties in other wards.

Theme 1: Confronting resource shortages

All participants emphasised a shortage of esources, invariably PPE, isolation wards and beds, as the biggest challenges in the care of people with suspected or confirmed COVID-19. Due to high caseloads, particularly from a large number of imported cases, participants encountered problems securing appropriate negative pressure and isolation rooms for high-risk individuals and procedures, and a lack of basic PPE, including face shields, masks and gloves. They commonly expressed feelings of frustration and powerlessness in their ability to care properly for patients:

> *"PPE is a very basic need. How can I properly take care of patients when I cannot even protect myself?"* (Participant 15, male, RN)

As a result of a lack of space in hospitals, participants described having no choice but to ask suspected individuals to wait outside in open areas or in corridors in the Accident and Emergency (A&E) Department prior to COVID-19 testing. They stressed the importance of being adaptable and having hospital measures in place to address flexibly envisaged increases in patient numbers, for instance setting up enhanced surveillance wards and converting medical wards to isolation wards. At the same time, most participants acknowledged the limitations posed by such measures, such as their likely failure to provide adequate isolation environments:

> *"As there weren't enough isolation wards, some general wards were converted to isolation wards…The problem is that the setting inside is not the same [in the converted wards]…we need separate places for entering and leaving in isolation wards as we need to de-gown before we can go out [of the ward]…patient flow is affected."* (Participant 19, female, RN)

They further revealed that PPE standards had been frequently downgraded in response to difficulties faced by hospitals acquiring PPE stock. While they understood the rationale for this, participants felt that health worker and patient safety was being compromised. Most participants mentioned using their own initiative to enhance personal precautions, such as minimising physical contact with patients and ensuring efficient use of equipment.:

> *"To better manage the PPE resources that we have, I try to talk to patients using a walkie talkie from outside the [isolation] room instead of in person…When I wear PPE and go inside the [isolation] room, I try to be more careful and plan what I may need well so I don't need to leave the room to get anything and waste a set of PPE."* (Participant 28, female, nurse consultant (NC))

Theme 2 Changes in usual nursing responsibilities and care modes

Adapting to new and erratic procedural guidelines and protocols

Most participants expressed that the experiences of the SARS and swine flu epidemics had influenced significantly hospital planning, including workflows and procedural guidelines, during the COVID-19 pandemic. However, they also mentioned the need to learn numerous new specific protocols and guidelines, including on triage criteria, transport of patients to intensive care, nasopharyngeal swab and aspirate (NPA) procedures, safe handling of test specimens, and transfer and admission of suspected or confirmed cases under quarantine. They also reiterated the importance of nurses' awareness of environmental contamination risks and abiding by infection control practices more strictly, for instance the proper use of PPE and hand hygiene:

> *"I had to quickly learn how to take care of isolated patients…how to do infection control [well], like donning and doffing PPE and washing hands...I also had to learn to cooperate with my colleagues [to combat this pandemic]."* (Participant 15, male, RN)

Participants highlighted that coping with rapidly changing guidelines and protocols posed a major challenge. They frequently needed to ensure that they remained updated on modifications to infection control policies in response to PPE shortages, requirements of FTOCC (fever, travel history, occupational exposure, contact history, clustering) risk assessment, and new knowledge on disease pathology and symptoms to inform screening, treatment, and infection control:

> "*The guidelines we need to follow keep changing every day…so when I go to work, I first need to see what changes there are, for example which countries are on the high travel risk list…Initially, we used to use NPS for COVID-19 tests, but now, it has been changed to NPA…we needed to adapt to the new procedures very fast."* (Participant 16, male, RN)

Consequently, participants emphasised the importance of rapid dissemination of evidence-based information from reliable and easily accessible sources, particularly text messaging groups with hospital and ward staff, change-of-shift meetings, and communication kits prepared by the Hospital Authority (HA):

> *"We need to always keep ourselves updated, for example about PPE stocking, so we can modify our care practices…[To do this,] I usually look at emails from the hospital, our HA Chat [A secure platform for staff to send text, photo, voice, and video messages], the communication kit from HA …There's a lot of information out there...it can be difficult to screen and see which is the most important or trustworthy."* (Participant 28, female, NC)

Re-focusing patient care on psychological aspects and meeting basic needs

With most people with COVID-19 admitted to hospital being asymptomatic and relatively physically healthy, participants urged a refocusing of patient on psychological well-being.

They expressed the need to spend most bedside care time assisting isolated patients to manage their fluctuating emotions, and alleviating their feelings of fear, sadness, and lonelinesss:

"We need to help patients stay positive…[some patients] start crying and we need to go into the isolation room in full gear to help them calm down…They feel scared as they don't know what's going on…stressed as [there are] a lot of unknowns…need to spend some time with them." (Participant 2, female, advanced practice nurse (APN))

Some participants indicated that a lack of patient cooperation was common due to patients' lack of understanding of the virus, and stress and frustration from receiving a positive COVID-19 test result. They asserted that effective communication with patients, including clear explanations of their possible length of stay, treatment flow, and testing requirements for discharge, were vital in reassuring them and reducing their distress:

"You need to have two negative COVID-19 tests with the same type of clinical specimen 24 hours apart before you can be released from isolation…A patient kept getting fluctuating results…[He] got very frustrated and said, 'Why didn't anyone tell me about this rule earlier?'…tried to leave the hospital…We called the police and he came back after talking to them…Communicating the rules and plans [to patients] early is very important…cannot assume they know why they are in hospital." (Participant 6, female, APN)

Besides psychological care, participants conveyed that meeting the basic needs of patients to ensure a more comfortable stay in hospital also constituted a major part of care. It was important for them to be flexible and receptive to the needs of patients who were isolated in hospital for long periods of time, particularly regarding their food and entertainment preferences, including Internet connectivity and toiletries:

"Due to prolonged hospitalisation, patients have some very simple needs, like Wi-Fi, TV…They don't want to eat hospital food…order delivery." (Participant 4, female, RN)

Some participants expressed that patient care additionally extended to family members. As close contacts, it was necessary to inform family members of their need to be quarantined, as well as regularly update them on the patient's condition and circumstances. Patients were also provided with video calling capabilities to maintain social contact:

"For elderly patients [without a phone with video calling capabilities], we give them a Tablet to use so that they can video call their family members." (Participant 7, female, ward manager (WM))

Theme 3 Maintaining physical and mental health

Tackling adverse impacts on nurses' physical and mental health

Most participants revealed that they stayed in hotels rather than at their homes to keep their families safe when taking care of people with COVID-19. They disclosed strong feelings of loneliness and social isolation from their friends and families, spending large amounts of time alone to avoid potentially infecting others. Some participants also conveyed being afraid of possible social rejection by friends as a concern as they may be seen as "dirty" due to their place of work. All of these resulted in negative thoughts and emotions in participants:

"Most of us [nurses] feel very alienated from society…We try to isolate ourselves from our family members and friends…have less social interaction with people as we don't want to infect them…I feel that I don't have much social support… feel a bit depressed." (Participant 39, female, department operations manager (DOM))

Moreover, some participants expressed feeling fearful when taking care of patients, in particular during high-risk procedures, especially involving aerosols. However, at the same time, most participants felt that regardless of these negative feelings, they held a strong sense of professional responsibility to contribute to the fight against the pandemic, and had a strong faith in their ability to protect themselves and others:

"I found out I was pregnant while working in the isolation ward…My colleagues and family were worried about me, but I decided to continue working there…I had a friend with a similar experience and she was ok…if I wear full PPE properly and trust my skills, I can still do my job safely." (Participant 35, female, APN)

As a result, participants indicated working harder to ensure their physical health through effective self-care and personal-protection practices, including taking greater care and alertness in infection control, and clear planning and preparation prior to conducting high-risk procedures:

"When performing high-risk aerosol generating procedures on confirmed cases, we need to be very clear on the steps we take…need to be smooth…very alert, especially during doffing of PPE, washing hands, and showering [afterwards]." (Participant 32, male, RN)

In addition, participants further highlighted that family, friends, and peer support was essential in promoting their mental health, providing reassurance, and alleviating their worries and anxieties:

"My friends and family call me to tell me to be careful…I also have very supportive friends in the hospital who constantly ask if I need anything…I don't feel that lonely [because of them]." (Participant 6, female, APN)

Importance of teamwork and a supportive practice environment

Most participants emphasised that the support and cooperation of their team played an important role in helping them maintain their physical and mental health. With large numbers of new staff deployed from other wards, participants also expressed that it was necessary to work together to train them, and for more experienced and senior nurses to ensure their understanding of nursing interventions:

"We have very good team spirit…everyone is very supportive…We use a buddy system so that when one of us is going to take care of [infected] patients, there would be another person watching you to make sure you do all the [nursing] procedures safely." (Participant 5, female, RN)

Additionally, participants emphasised the benefit of a supportive hospital environment, particularly the management team. Some participants appreciated the hospital management team for arranging staff rental allowances and subsidies, though. others asserted that improved PPE and understanding of frontline staff needs were required. Most highlighted that explaining the rationale behind management decisions was imperative in reducing discontent and negative feelings among frontline staff:

"Frontline staff needs to be given more information on management decisions…if they can understand why different decisions are made, they would have fewer grievances and can be more supportive." (Participant 10, male, senior nursing officer (SNO))

Theme 4 Need for effective and timely responses from relevant local authorities

Most participants described the responses of governmental departments as an important factor in ensuring adequate public health measures during the COVID-19 pandemic. While they stressed such departments had the ability to considerably enhance care provision within manageable patient caseloads, some criticised the inadequate response measures of local authorities in relation to the establishment of protocols and guidelines and isolation wards, management of PPE shortages, and step-down arrangements for non-serious cases:

"Many things need to be prepared earlier, especially hospital negative pressure rooms…In my hospital, there was a time when we needed to urgently prepare the negative pressure room, but we noticed that there was some water leakage there and a little problem with the double doors of the room…these things should have been fixed

earlier as we never know when there may be a sudden explosion in cases." (Participant 4, female, RN)

Most participants supported the introduction of earlier, enforced government responses to the pandemic: restrictions on travel into the city, early screening, monitoring and management of quarantined cases, active promotion of mask-wearing and surgical mask distribution to disadvantaged groups. Some participants suggested that public health decision-makers should have sought greater involvement of frontline healthcare professionals:

"More frontline [healthcare] professionals should be involved in giving input to the government…the government should listen to their suggestions…tell people to wear masks earlier, control number of people on public transport in rush hour, and disseminate more information on how people can protect themselves." (Participant 2, female, APN)

Overall, participants attributed the lack of sufficient foresight and a severe underestimation of the disease by authorities as a prominent cause of the burden faced by nurses during the pandemic.

Theme 5 Role of the community in public health protection and management

Apart from the provision of direct care to infected individuals, participants mentioned the value of collective community efforts in effectively controlling infectious disease outbreaks. They emphasised the importance of promoting the proper adoption of simple personal protective and hygiene measures, namely keeping hands clean by washing them or using hand sanitisers, wearing eye goggles and masks, social distancing, and ensuring cleanliness of the surrounding environment within the community. Some participants also highlighted the need for specific measures in the Chinese cultural context, such as avoiding tea and hotpot gatherings, and using serving chopsticks during meals:

"When people started wearing masks, we noticed that the number of patients coming in with other URIs [upper respiratory infections] also reduced…clearly, such measures are very important and effective." (Participant 31, female, RN)

Consequently, participants stressed the additional role of nurses in acting as community health educators to enhance public health education and alertness. Owing to the lack of an effective vaccine or treatment for COVID-19 at the time, they also asserted that the government should take a greater role in reducing misinformation and disseminating more evidence-based information to maintain public vigilance and reduce community spread of the disease:

"Now we know that the virus is spread by droplets…but people [the general public] don't have any clear information on what precautions to take against this…I always see people in the bus…touching everywhere and not being that aware." (Participant 22, female, RN)

Theme 6 Advanced pandemic preparedness

More comprehensive and ongoing nursing education on outbreak management

Participants reiterated the necessity for regular and continuous infection control training of nurses, particularly regarding their psychological preparation, awareness, and alertness to fight infectious disease outbreaks, and optimising their clinical skills in performing high-risk interventions, reducing cross-infection and contamination risks, and donning and doffing PPE. They also suggested the use of outbreak training simulations and experience sharing by frontline nurses to bolster such skills, and emphasised the promotion of teamwork, delegation, and communication amongst nurses during disease outbreaks:

"More nurse education on high-risk interventions, including how to reduce contact with droplets and protect ourselves, manage emotional health, perform [effective] division of labour, delegate things systematically to avoid 'overloading' ourselves, and improve teamwork is needed." (Participant 23, male, RN)

Early resource planning and preparation

Most participants emphasised the importance of early, large-scale warning and preparation health systems and facilities to deal with infectious disease outbreaks. Although experiences in previous epidemics in Hong Kong had improved local reserves of resources, including PPE, ventilators, isolation and quarantine facilities, and negative pressure rooms, participants expressed the need to re-evaluate and update current practices. They also warned that adaptations to sudden increases in COVID-19 case numbers in Hong Kong hospitals had exposed inadequacies and risks in current measures:

> *"HA should set up more isolation facilities in advance. They may seem useless at the time, especially if we don't have any disease outbreak for many years, but you never know when there may be a sudden outbreak…. When you convert general wards to isolation wards, you may jeopardise patient safety as they don't fit the required infection control criteria completely."* (Participant 19, female, RN)

Additionally, participants recounted that the severe PPE shortages experienced at the initial stages of the pandemic had highlighted the need to enhance local PPE production knowledge and establish local production lines of high-quality PPE, particularly masks:

> *"We need steady production of PPE in Hong Kong to cater to the sudden demand [during epidemics]…right now, even if we want to boost [PPE] production, we don't have the technology or know-how…need it in advance."* (Participant 30, female, NC)

DISCUSSION

To our knowledge, this is the first qualitative study to explore registered nurses' experiences of caring for people with COVID-19 in Hong Kong. Our findings highlight the resilience and adaptability of nurses in tackling numerous obstacles in the provision of effective nursing care during the pandemic. In the face of a lack of resources, particularly PPE and isolation facilities, nurses showed initiative and creativity in adapting to and overcoming such major obstacles.

This accords with strategies suggested by the WHO and Centers for Disease Control and Prevention (CDC) that have been used by healthcare workers when confronted with limited supplies, such as limiting patient contact and using the same respirator with multiple patients.[28]

Moreover, our findings emphasise the widespread need for and use of self-care and self-protection measures, including greater awareness of personal infection control precautions, and more careful planning and preparation by nurses caring for people with COVID-19. However, none of the nurses articulated using a clear set of guidelines regarding their own self-care and well-being; rather they used personal strategies based on their own knowledge and experience.[29] The need for self-care and support was similarly reported in a qualitative study of Australian primary healthcare nurses' needs during the COVID-19 pandemic.[30]

Nurses were highly adaptable in prioritising, accessing, and adjusting to the use of ever-changing COVID-19-specific nursing care protocols and guidelines. They were also aware of and responsive to the specific needs of people with COVID-19, particularly comfort and psychological well-being, and minimising the mental health burden so prevalent in this group.[31] Notably, most nurses emphasised they were able to provide psychological support as many of the patients were asymptomatic or had mild symptoms and were relatively physically healthy, given Hong Kong's strict policy regarding the admission of all COVID-19 cases to reduce the community spread of the virus. This is in contrast with studies from other countries such as China,[32] and Italy,[33] where nurses faced tremendous challenges in caring for heavy workloads of seriously ill people with COVID-19.

It was apparent that clear communication was central to enhancing mutual nurse-patient understanding and assuaging any hostility arising from patients' fear, anxiety, and misconceptions. Interestingly, this was most prominent regarding non-local patients, a growing population as a consequence of the international hub status of Hong Kong. Recent reports of

threats or acts of violence, including physical and verbal abuse, against healthcare workers during the COVID-19 pandemic, albeit largely from patients' relatives, due to a lack of knowledge about COVID-19 and its treatment, and dissatisfaction with hospital policies,[34,35] illustrate the importance of good communication skills among nurses.

When confronted with their own feelings of despair and unease due to the ambiguity and unpredictability associated with COVID-19, nurses emphasised effective cooperation and teamwork strategies as means to ensure safety and reassurance among colleagues. Regardless of such negative feelings and loneliness resulting from working at the frontline of the pandemic, nurses emphasised their sense of professional duty, pride, and responsibility, bolstered by support of colleagues, friends, and family. Consistent with this,, a cross-sectional study of 325 nurses in the Philippines asserted that perceived organisational and social support were predictors of COVID-19-related anxiety in nurses.[36]

Our findings also revealed suggestions to improve measures for dealing with future outbreaks. Nurses wished to have their viewpoints taken into consideration in hospital management decisions about the pandemic, particularly when such decisions had consequences for nurses' safety and performance. Such an organisational response may reduce burnout and psychological distress in nurses, as reported by a recent systematic review of 13 qualitative studies.[11] To allow for a more targeted and well-prepared pandemic response, our findings emphasise the need forconsistent updating of nurses' infection control education and the rapid availability of sufficient reserves of resources and isolation facilities. This is supported by an online cross-sectional study of 637 primary health care nurses in Australia, which identified seven key categories of perceived nurse support needs to provide quality clinical care during the pandemic: PPE, communication, funding, industrial issues, self-care, workplace factors, and valuing nurses.[30] A cross-sectional study of 261 frontline nurses in the Philippines highlighted the importance of organisational measures to support nurses' mental health and

reduce fear, including social support, psychological support services, COVID-19-related training, and accurate and regular information and updates.[37] Interestingly, while most studies emphasised the importance of psychological support and coping strategies to alleviate fear and distress among nurses,[30,31,36-38] our study found that nurses appeared to focus largely on material or nursing care-specific support, particularly improved PPE management and training.

Finally, it was emphasised by participants that while nurses can assist in the control of pandemics, the collective and concerted contributions of a well-educated and well-informed community are essential. Our findings support the need for multi-faceted responses involving multiple stakeholders, including nurses as well as policy makers, hospital administrators, and the local community.[29]

Limitations

The limitations of this study are that we used a purposive sample of registered nurses in acute hospital and a public health department and our findings may not reflect the experiences of all nurses in these settings. Also, because of social distancing, we had to conduct interviews by phone.

Implications for research and practice

Findings from this study may help to optimise nursing responses to future pandemics by improving the preparedness of nurses through the provision of appropriate education and training regarding responses against novel infectious diseases, PPE management during shortages, communication skills, and psychological patient care. In addition, policy makers and managers should regularly re-evaluate contingency plans regarding PPE and ensure the involvement of nurses.

Longitudinal studies of the experiences of nurses caring for people over the course of COVID-19 are recommended. These may include robust measures of stress, self-efficacy, personal control, for example.

CONCLUSIONS

Nurses have shown remarkable resilience and adaptability, despite resource shortages and mental and physical health threats, when caring for people with COVID-19. However, nurses need appropriate support from peers, managers, policy makers, and the local community to effectively prepare for and manage such pandemics. The findings of this study may help inform future nursing practice, education, and policy-making to shape and strengthen the response to global infectious disease outbreaks.

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Contributors

JPCC and SHSL conceived, designed, and supervised the study. CHYL and SKYL led the data collection process. RS and CHYL processed and analysed the data. JPCC, SHSL, RS, CHYL, and DRT contributed to drafting the full article. All authors read and approved the final manuscript.

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None declared.

Patient consent for publication

Not required.

Ethics approval

This study received ethical approval from the Survey and Behavioural Research Ethics Committee of The Chinese University of Hong Kong (Reference no.: SBRE-19-594).

Data availability statement

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

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Semi-structured Interview Guide

8 aspects:

1. Nurses: Individuals, families, co-workers (impact on physical, psychological, social and work-related aspects)
   1.1. Individuals
   Use a word to describe the COVID-19 outbreak.

   How would you describe the impact of Covid-19?

   What are the roles and responsibilities of nurses during the Covid-19 outbreak?

   1.2. Families and co-workers
   Tell me about the changes in you and others (colleagues and family members) that you have made after this experience.

2. Patients and families (physical, psychological, social and financial impact)
   2.1. Tell me the symptoms of those who have infected COVID-19 (those you have cared for)

   2.2. Your perceived needs of COVID-19 patients

   2.3. Your perceived needs of COVID-19 patients' families

   2.4. Share the support received by patients and their families

3. Caring for COVID-19 patients (positive and negative experiences; difficulties and challenges; lessons learned from past epidemics)
   3.1. Nurse's background
   Tell me about your nursing background, years of experience, SARS experience or experience of other infectious disease pandemic.

   3.2. Decision
   Who assigned you to look after COVID-19 patients?

   When deciding to help out during the COVID-19 outbreak (for volunteers)

   3.3. Caring experiences
   Tell me your experiences about caring for people diagnosed with Covid-19

   Tell me one of the unforgettable experiences during the period of caring for people with Covid-19.

   What have you learned from this experience?

   3.4. Challenges
   Tell me more about the things that concerned you most during the period of caring for people with Covid-19.

What challenges did you encounter when you cared for people with Covid-19?

What strategies did you take to address these challenges?

What kind of support did you get when taking care of people with Covid-19?

4. Infection control measures and practices (what works and what does not work, challenges)
   4.1. What measures you perceived as most effective in combating COVID-19?

   4.2. What actions you perceived as most effective to safeguard individuals, families and communities during the COVID-19 pandemic?

5. Work environment and policies (positive and negative, what can be done differently)
   5.1. Work environment
   Tell me about your previous and currently workplace?

   5.2. Policies
   From your experience, what are the current needs of general public hospitals in addressing the potential emerging and re-emerging infectious diseases?

   Your perceived needs of healthcare providers

   5.3. Suggestion
   Where do you get information or guidance on the care of COVID-19 patients?

   Which approach do you think is most effective?

   From your experience, what are our current medical systems doing well?

   What would you suggest to enhance the preparation of nurses to better equip them to address future infectious diseases?

   Any messages you would like to give in dealing with the COVID-19 outbreak?

6. Community approaches to slow the spread of COVID-19 (most effective and hindrance)
   6.1. Tell me about your view on the effective community approaches

   6.2. From your experience, what are the current needs of the community in addressing the potential emerging and re-emerging infectious diseases?

7. Global approaches to combat COVID-19 (what works and what does not work, challenges)
   7.1. What kind of global approaches works and what does not work?

   7.2. From your experience, what are the current challenges of combat COVID-19 globally?

8. Government approaches to combat COVID-19 (what works and what does not work, challenges)
   8.1. What kind of government approaches works and what does not work?

   8.2. From your experience, what are the current needs and challenges of the government in addressing the potential emerging and re-emerging infectious diseases?

   8.3. Tell me about your view on the importance of public health for managing infectious diseases.

Do you have other experiences that you would like to share, but have not yet mentioned?

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	1
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	2, 3
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	4-6
Purpose or research question - Purpose of the study and specific objectives or questions	6
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	7, 8
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	7, 8
Context - Setting/site and salient contextual factors; rationale**	6, 7
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	6, 8
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	6, 7
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	7

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	7
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	8-11
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	7, 8
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	7, 8
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	8

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	12-21
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	12-21

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	21-25
Limitations - Trustworthiness and limitations of findings	24

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	25
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	25

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
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Title page

Title: Nurses' experiences of caring for people with COVID-19 in Hong Kong: A qualitative inquiry

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Abstract

Objectives: Nurses are the largest group of healthcare workers on the frontline of efforts to control the coronavirus disease (COVID-19) pandemic. An understanding of their nursing experiences, the challenges they encountered, and the strategies they used to address them may inform efforts to better prepare and support nurses and public health measures when facing a resurgence of COVID-19 or new pandemics. This study aimed to explore the experiences of nurses caring for people with suspected or diagnosed COVID-19 in Hong Kong.

Design: A qualitative study was conducted using individual, semi-structured interviews. All interviews were audio-recorded and transcribed verbatim for thematic analysis.

Setting: Participants were recruited from acute hospitals and a public health department in Hong Kong from June 2020 to August 2020.

Participants: A purposive sample of registered nurses (n=39) caring for people with COVID-19 in Hong Kong was recruited.

Results: Two-thirds of the nurses had a Master's degree, and over a third had 6 to 10 years of nursing experience. Around 40% of the nurses cared for people with COVID-19 in isolation wards, and a quarter performed COVID-19-related work. Most (90%) had training on COVID-19, and three-quarters had experience of working in infection control teams. Six key themes emerged: confronting resource shortages; changes in usual nursing responsibilities and care modes; maintaining physical and mental health; need for effective and timely responses from relevant local authorities; role of the community in public health protection and management; and advanced pandemic preparedness.

Conclusions: Our study found that nurses possessed resilience, self-care, and adaptability when confronting resource shortages, changing nursing protocols, and physical and mental health threats during the COVID-19 pandemic. However, coordinated support from the clinical

environment, local authorities and community, and advanced preparedness would likely improve nursing responses to future pandemics.

(Word count: 291 words)

Strengths and limitations of this study

- This is the first qualitative study to explore the experiences of registered nurses caring for people with suspected or confirmed COVID-19 in Hong Kong..
- The study recruited 39 registered nurses from acute hospitals and a public health department across Hong Kong to reflect diverse perspectives.
- Purposive sampling was used to recruit participants, and the findings may not reflect the experiences of all nurses.

BACKGROUND

In late December 2019, a number of cases of pneumonia with unknown aetiology were reported in Wuhan, China.[1] The first confirmed case of coronavirus disease (COVID-19) was reported in Hong Kong on 23 January 2020.[2] Subsequently, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic on 11 March 2020 as a result of its rapid global spread.[3] By 16 March 2020, more than 120 million cases of COVID-19 had been confirmed worldwide, resulting in more than 2 million deaths across 192 countries/regions.[4] In Hong Kong, to date over 11,000 cases have been confirmed, with more than 200 deaths.[2]

Healthcare systems globally are facing tremendous challenges in combatting the COVID-19 pandemic. Unprecedented measures have been taken by healthcare authorities to cope with potential surges in patients. For instance, general wards have been set up as isolation wards, and nurses and other frontline healthcare workers without infectious diseases expertise have stepped up to provide care for people with COVID-19.[5] To alleviate the risk of viral spread and cross infections among patients and staff within clinical settings, further measures, such as suspending elective surgeries, have been taken.[6,7]

Nurses are working relentlessly on the frontline of care, with a large number, irrespective of specialty, deployed to manage people with COVID-19. This includes nurses with limited infectious diseases expertise suddenly working in entirely unfamiliar and stressful environments, exposing them to significant risk.[8] By the end of October 2020 more than 1500 nurses worldwide had lost their lives to the virus.[9] Regardless, nurses have consistently demonstrated commitment and compassion, often in the face of misinformation and adversity.[10] A systematic review of 13 qualitative studies of nurses' experiences during respiratory pandemics, including COVID-19, found that although their professional sense of duty, dedication, self-sacrifice, and collegiality were intensified, though concerns arose about their personal and family safety, and physical and emotional vulnerability.[11]

COVID-19 is known to exert a significant psychological toll on healthcare workers, as well as the general public.[12] In 2003, the severe acute respiratory syndrome (SARS) epidemic in Hong Kong, where 22% of all infected people were healthcare workers, eight of whom eight died,[13,14] also revealed that healthcare workers faced extraordinary stress and mental health problems due to factors such as risk of infection, stigmatisation, and understaffing.[15,16] Qualitative studies of nurses responding to the COVID-19 pandemic in Turkey,[17] Iran,[18] and Spain,[19] have reported adverse psychosocial impacts, including anxiety and depressive symptoms, from the resulting high mortality and unpredictability. A study of 20 Chinese frontline nurses showed that during the COVID-19 pandemic, positive and negative emotions interweaved and coexisted,[20] with negative ones being dominant initially and positive ones appearing gradually, with self-coping styles and psychological growth playing an imperative role in maintaining nurses' mental health.

Despite the commitment and resilience of nurses, nursing responses to the COVID-19 pandemic face numerous barriers. A qualitative systematic review of nine studies found that nurses' barriers to caring for people with COVID-19 included the unpredictability of nursing roles, lack of support, family concerns, and psychological distress.[21] Pivotal aspects to aid nursing's contribution to fighting COVID-19 include the role of nurses in health education, especially infection prevention and surveillance, the implementation of appropriate precautionary measures in nursing homes and protection of patients with long-term illnesses who are prone to infection, and the provision of personal protective equipment (PPE),[22] as well as reasonable work schedules, effective communication, psychological support, and intensive training for those who lack experience in managing infectious diseases.[5]

While critical aspects of nursing care may be largely universal, nurses' experiences are likely to differ between regions and countries due to the significant variations in the impact of the pandemic.[23] In Hong Kong, the COVID-19 response, led by strong community

mobilisation in mask-wearing, personal hygiene, and social distancing as a remnant of the SARS epidemic, and a high receptiveness to anti-epidemic measures, including border control and contact tracing, maybe unique compared with other developed regions.[24,25] However, we have only found one published study on the experiences of Hong Kong school nurses during the COVID-19 pandemic.[26] No study has reported the experiences of nurses caring for people with COVID-19 in Hong Kong.

METHODS

Aims

This study aimed to explore the experiences of registered nurses caring for people with suspected or diagnosed COVID-19 during the first six months of the ongoing global pandemic, including the challenges they encountered and the strategies they adopted to address them, and their views about the preparation and support of nurses and public health measures regarding future pandemics.

Participants

A purposive sample of 39 registered nurses with the following inclusion criteria was recruited: 1) experience of providing direct nursing care to people with suspected and/or confirmed COVID-19 in hospital or other clinical settings; 2) able to communicate in Cantonese; and 3) consented to participate in the study. Participants were recruited from acute hospitals and a public health department in Hong Kong to allow for a breadth of diverse experiences of nurses at the frontline of the COVID-19 pandemic.

Ethical consideration

Ethical approval was obtained from the Survey and Behavioural Research Ethics Committee of The Chinese University of Hong Kong (Reference no.: SBRE-19-594), and the study followed the principles of the Declaration of Helsinki. Prior to data collection, participants were given a full explanation of the study objectives and procedures and informed of their right

to agree or refuse to participate or withdraw from the study at any time, following which written informed consent was obtained. All data were anonymous, used for research purposes only, and kept strictly confidential in a locked cabinet or via encryption, with access given only to the research team.

Data collection

A semi-structured interview guide was developed (Supplementary File 1). Eligible participants were interviewed by phone by a research assistant experienced in conducting qualitative interviews. Participants were invited to share their experiences of caring for people with COVID-19, challenges encountered, strategies adopted to address them, and views about the preparation and support of nurses and public health measures regarding future pandemics. Each interview was conducted in Cantonese and audio recorded. Participants' demographic and work characteristics were also collected, including age, sex, marital status, educational level, years of work experience, professional position, department/ward, time spent caring for people with COVID-19, previous infection control experience, training on COVID-19, and sleep quality and quantity.

Data analysis

Data were transcribed verbatim from the audio recordings by the third author (RS) who was fluent in Cantonese and English. The third author then analysed all transcripts thematically based on the six phases of thematic analysis outlined by Braun and Clarke (2006).[27] The transcripts were coded and grouped under themes and sub-themes according to the aims of the study. The themes were considered carefully in relation to the overall data set, and consensus was reached through checking and discussion by team members, ensuring that the most representative themes and sub-themes were chosen. Illustrative quotes were translated from Cantonese to English to support the themes and sub-themes found.

To ensure qualitative rigour and trustworthiness, data were collected until data saturation was achieved, indicating that adequately rich data had been collected and we would be unlikely to find any new information upon continued data collection. A transparent audit trail was maintained through written reflexive notes and clear documentation of all coding decisions.

Patient and public involvement

As this study focused on the experiences of nurses caring for people with COVID-19, patients or the public were not involved.

RESULTS

Thirty-nine registered nurses were recruited and participated throughout the study. Interviews were conducted during June 2020 to August 2020 and lasted a median of 60 (range 35 to 89) minutes. Table 1 summarises participants' demographic and work characteristics. Six key themes emerged.

Table 1. Demographic and work characteristics of the 39 interviewed nurses

Characteristic	No. (%)
Age (years)	
20–29	12 (30.8)
30–39	17 (43.6)
40–49	5 (12.8)
50–59	5 (12.8)
Gender	
Male	12 (30.8)
Female	27 (69.2)
Marital status	
Single	21 (53.8)

Married	18 (46.2)
Children	
One	3 (7.7)
More than one	7 (17.9)
None	29 (74.4)
Education	
Bachelor's degree	10 (25.6)
Master's degree	26 (66.7)
Doctoral degree	3 (7.7)
Years of nursing experience	
1–5	11 (28.2)
6–10	14 (35.9)
11–15	4 (10.3)
>15	10 (25.6)
Position	
Registered nurse	23 (58.9)
Advanced practice nurse	8 (20.5)
Senior nursing officer	1 (2.6)
Ward manager	3 (7.7)
Nurse consultant	3 (7.7)
Department operations manager	1 (2.6)
Ward worked when caring for people with COVID-19	
Isolation ward†	16 (41.0)
Intensive care unit‡	7 (20.6)
Accident and emergency department§	8 (23.5)

Medical and geriatric ward¶	1 (2.9)
Paediatric ward#	5 (14.7)
Other roles	2 (5.1)
Time spent doing COVID-19-related care or work (hours/week)	
1–10	6 (15.4)
11–20	9 (23.1)
21–30	2 (5.1)
31–40	10 (25.6)
>40	9 (23.1)
Difficult to measure	3 (7.7)
Time spent doing COVID-19-related care or work (months)	
1–2	8 (20.5)
3–4	10 (25.6)
5–6	20 (51.3)
7–8	1 (2.6)
Previous infection control team experience?	
Yes	29 (74.4)
No	10 (25.6)
Received COVID-19-related training?	
Yes	35 (89.7)
No	4 (10.3)
Have wash-out period?*	
Yes	6 (15.4)
No	31 (79.5)
Not applicable	2 (5.1)

Living situation during care of people with COVID-19	
Hotel	19 (48.7)
Flat rental	3 (7.7)
No change	17 (43.6)
Sleep quality during care of people with COVID-19	
Good	3 (7.7)
Normal	26 (66.7)
Poor	10 (25.6)
Sleep quantity during care of people with COVID-19	
Increased	3 (7.7)
No change	32 (82.1)
Decreased	4 (10.3)

†Isolation wards are rooms equipped with negative pressure air extraction systems to prevent the spread of pathogens, including from people with suspected or diagnosed COVID-19. A full set of personal protective equipment must be worn when entering these wards.

‡Intensive care units are dedicated wards for the provision of intensive care, including to critically ill people with COVID-19.

§Accident and emergency departments provide services for critically ill or injured people. People suspected with COVID-19 symptoms are commonly identified through enhanced surveillance in these facilities.

¶Medical and geriatric wards target the care of elderly patients. Older people admitted due to other health conditions may be identified as suspected COVID-19 cases.

#Paediatric wards provide care to minors under 18 years old. Children with suspected COVID-19 symptoms and their parents may be isolated and put under surveillance in these wards.

*A wash-out period is defined as a period of time of typically two to four weeks that is taken off from work after being deployed to take care of people with suspected or diagnosed COVID-19 in isolation wards and before resuming previous clinical duties in other wards.

Theme 1: Confronting resource shortages

All participants emphasised a shortage of resources, invariably PPE, isolation wards and beds, as the biggest challenges in the care of people with suspected or confirmed COVID-19. Due to high caseloads, particularly from a large number of imported cases, participants encountered problems securing appropriate negative pressure and isolation rooms for high-risk individuals and procedures, and a lack of basic PPE, including face shields, masks, and gloves. They commonly expressed feelings of frustration and powerlessness in their ability to care properly for patients:

> *"PPE is a very basic need. How can I properly take care of patients when I cannot even protect myself?"* (Participant 15, male, RN)

As a result of a lack of space in hospitals, participants described having no choice but to ask suspected individuals to wait outside in open areas or in corridors in the Accident and Emergency (A&E) Department prior to COVID-19 testing. They stressed the importance of being adaptable and having hospital measures in place to address flexibly envisaged increases in patient numbers, for instance setting up enhanced surveillance wards and converting medical wards to isolation wards. At the same time, most participants acknowledged the limitations posed by such measures, such as their likely failure to provide adequate isolation environments:

> *"As there weren't enough isolation wards, some general wards were converted to isolation wards…The problem is that the setting inside is not the same [in the converted wards]…we need separate places for entering and leaving in isolation wards as we need to de-gown before we can go out [of the ward]…patient flow is affected."* (Participant 19, female, RN)

They further revealed that PPE standards had been frequently downgraded in response to difficulties faced by hospitals acquiring PPE stock. While they understood the rationale for this, participants felt that health worker and patient safety was being compromised. Most participants mentioned using their own initiative to enhance personal precautions, such as minimising physical contact with patients and ensuring efficient use of equipment.:

> *"To better manage the PPE resources that we have, I try to talk to patients using a walkie talkie from outside the [isolation] room instead of in person…When I wear PPE and go inside the [isolation] room, I try to be more careful and plan what I may need well so I don't need to leave the room to get anything and waste a set of PPE."* (Participant 28, female, nurse consultant (NC))

Theme 2 Changes in usual nursing responsibilities and care modes

Adapting to new and erratic procedural guidelines and protocols

Most participants expressed that the experiences of the SARS and swine flu epidemics had influenced significantly hospital planning, including workflows and procedural guidelines, during the COVID-19 pandemic. However, they also mentioned the need to learn numerous new specific protocols and guidelines, including triage criteria, transport of patients to intensive care, nasopharyngeal swab and aspirate (NPA) procedures, safe handling of test specimens, and transfer and admission of suspected or confirmed cases under quarantine. They also reiterated the importance of nurses' awareness of environmental contamination risks and abiding by infection control practices more strictly, for instance, the proper use of PPE and hand hygiene:

> *"I had to quickly learn how to take care of isolated patients…how to do infection control [well], like donning and doffing PPE and washing hands...I also had to learn to cooperate with my colleagues [to combat this pandemic]."* (Participant 15, male, RN)

Participants highlighted that coping with rapidly changing guidelines and protocols posed a major challenge. They frequently needed to ensure that they remained updated on modifications to infection control policies in response to PPE shortages, requirements of FTOCC (fever, travel history, occupational exposure, contact history, clustering) risk assessment, and new knowledge on disease pathology and symptoms to inform screening, treatment, and infection control:

> "*The guidelines we need to follow keep changing every day…so when I go to work, I first need to see what changes there are, for example, which countries are on the high travel risk list…Initially, we used to use NPS for COVID-19 tests, but now, it has been changed to NPA…we needed to adapt to the new procedures very fast."* (Participant 16, male, RN)

Consequently, participants emphasised the importance of rapid dissemination of evidence-based information from reliable and easily accessible sources, particularly text messaging groups with hospital and ward staff, change-of-shift meetings, and communication kits prepared by the Hospital Authority (HA):

> *"We need to always keep ourselves updated, for example about PPE stocking, so we can modify our care practices…[To do this,] I usually look at emails from the hospital, our HA Chat [A secure platform for staff to send text, photo, voice, and video messages], the communication kit from HA …There's a lot of information out there...it can be difficult to screen and see which is the most important or trustworthy."* (Participant 28, female, NC)

Re-focusing patient care on psychological aspects and meeting basic needs

With most people with COVID-19 admitted to hospital being asymptomatic and relatively physically healthy, participants urged a refocusing of patient on psychological well-being.

They expressed the need to spend most bedside care time assisting isolated patients to manage their fluctuating emotions, and alleviating their feelings of fear, sadness, and loneliness:

"We need to help patients stay positive…[some patients] start crying and we need to go into the isolation room in full gear to help them calm down…They feel scared as they don't know what's going on…stressed as [there are] a lot of unknowns…need to spend some time with them." (Participant 2, female, advanced practice nurse (APN))

Some participants indicated that a lack of patient cooperation was common due to patients' lack of understanding of the virus, and stress and frustration from receiving a positive COVID-19 test result. They asserted that effective communication with patients, including clear explanations of their possible length of stay, treatment flow, and testing requirements for discharge, were vital in reassuring them and reducing their distress:

"You need to have two negative COVID-19 tests with the same type of clinical specimen 24 hours apart before you can be released from isolation…A patient kept getting fluctuating results…[He] got very frustrated and said, 'Why didn't anyone tell me about this rule earlier?'…tried to leave the hospital…We called the police and he came back after talking to them…Communicating the rules and plans [to patients] early is very important…cannot assume they know why they are in hospital." (Participant 6, female, APN)

Besides psychological care, participants conveyed that meeting the basic needs of patients to ensure a more comfortable stay in hospital also constituted a major part of care. It was important for them to be flexible and receptive to the needs of patients who were isolated in hospital for long periods of time, particularly regarding their food and entertainment preferences, including Internet connectivity and toiletries:

"Due to prolonged hospitalisation, patients have some very simple needs, like Wi-Fi, TV…They don't want to eat hospital food…order delivery." (Participant 4, female, RN)

Some participants expressed that patient care additionally extended to family members. As close contacts, it was necessary to inform family members of their need to be quarantined, as well as regularly update them on the patient's condition and circumstances. Patients were also provided with video calling capabilities to maintain social contact:

"For elderly patients [without a phone with video calling capabilities], we give them a Tablet to use so that they can video call their family members." (Participant 7, female, ward manager (WM))

Theme 3 Maintaining physical and mental health

Tackling adverse impacts on nurses' physical and mental health

Most participants revealed that they stayed in hotels rather than at their homes to keep their families safe when taking care of people with COVID-19. They disclosed strong feelings of loneliness and social isolation from their friends and families, spending large amounts of time alone to avoid potentially infecting others. Some participants also conveyed being afraid of possible social rejection by friends as a concern as they may be seen as "dirty" due to their place of work. All of these resulted in negative thoughts and emotions in participants:

"Most of us [nurses] feel very alienated from society…We try to isolate ourselves from our family members and friends…have less social interaction with people as we don't want to infect them…I feel that I don't have much social support… feel a bit depressed." (Participant 39, female, department operations manager (DOM))

Moreover, some participants expressed feeling fearful when taking care of patients, in particular during high-risk procedures, especially involving aerosols. However, at the same time, most participants felt that regardless of these negative feelings, they held a strong sense of professional responsibility to contribute to the fight against the pandemic, and had a strong faith in their ability to protect themselves and others:

"I found out I was pregnant while working in the isolation ward…My colleagues and family were worried about me, but I decided to continue working there…I had a friend with a similar experience and she was ok…if I wear full PPE properly and trust my skills, I can still do my job safely." (Participant 35, female, APN)

As a result, participants indicated working harder to ensure their physical health through effective self-care and personal-protection practices, including taking greater care and alertness in infection control, and clear planning and preparation prior to conducting high-risk procedures:

"When performing high-risk aerosol-generating procedures on confirmed cases, we need to be very clear on the steps we take…need to be smooth…very alert, especially during doffing of PPE, washing hands, and showering [afterwards]." (Participant 32, male, RN)

In addition, participants further highlighted that family, friends, and peer support was essential in promoting their mental health, providing reassurance, and alleviating their worries and anxieties:

"My friends and family call me to tell me to be careful…I also have very supportive friends in the hospital who constantly ask if I need anything…I don't feel that lonely [because of them]." (Participant 6, female, APN)

Importance of teamwork and a supportive practice environment

Most participants emphasised that the support and cooperation of their team played an important role in helping them maintain their physical and mental health. With large numbers of new staff deployed from other wards, participants also expressed that it was necessary to work together to train them, and for more experienced and senior nurses to ensure their understanding of nursing interventions:

"We have very good team spirit…everyone is very supportive…We use a buddy system so that when one of us is going to take care of [infected] patients, there would be another person watching you to make sure you do all the [nursing] procedures safely." (Participant 5, female, RN)

Additionally, participants emphasised the benefit of a supportive hospital environment, particularly the management team. Some participants appreciated the hospital management team for arranging staff rental allowances and subsidies, though others asserted that improved PPE and understanding of frontline staff needs were required. Most highlighted that explaining the rationale behind management decisions was imperative in reducing discontent and negative feelings among frontline staff:

"Frontline staff needs to be given more information on management decisions…if they can understand why different decisions are made, they would have fewer grievances and can be more supportive." (Participant 10, male, senior nursing officer (SNO))

Theme 4 Need for effective and timely responses from relevant local authorities

Most participants described the responses of governmental departments as an important factor in ensuring adequate public health measures during the COVID-19 pandemic. While they stressed such departments had the ability to considerably enhance care provision within manageable patient caseloads, some criticised the inadequate response measures of local authorities in relation to the establishment of protocols and guidelines and isolation wards, management of PPE shortages, and step-down arrangements for non-serious cases:

"Many things need to be prepared earlier, especially hospital negative pressure rooms…In my hospital, there was a time when we needed to urgently prepare the negative pressure room, but we noticed that there was some water leakage there and a little problem with the double doors of the room…these things should have been fixed

earlier as we never know when there may be a sudden explosion in cases." (Participant 4, female, RN)

Most participants supported the introduction of earlier, enforced government responses to the pandemic: restrictions on travel into the city, early screening, monitoring and management of quarantined cases, active promotion of mask-wearing, and surgical mask distribution to disadvantaged groups. Some participants suggested that public health decision-makers should have sought greater involvement of frontline healthcare professionals:

"More frontline [healthcare] professionals should be involved in giving input to the government…the government should listen to their suggestions…tell people to wear masks earlier, control number of people on public transport in rush hour, and disseminate more information on how people can protect themselves." (Participant 2, female, APN)

Overall, participants attributed the lack of sufficient foresight and a severe underestimation of the disease by authorities as a prominent cause of the burden faced by nurses during the pandemic.

Theme 5 Role of the community in public health protection and management

Apart from the provision of direct care to infected individuals, participants mentioned the value of collective community efforts in effectively controlling infectious disease outbreaks. They emphasised the importance of promoting the proper adoption of simple personal protective and hygiene measures, namely keeping hands clean by washing them or using hand sanitisers, wearing eye goggles and masks, social distancing, and ensuring cleanliness of the surrounding environment within the community. Some participants also highlighted the need for specific measures in the Chinese cultural context, such as avoiding tea and hotpot gatherings, and using serving chopsticks during meals:

"When people started wearing masks, we noticed that the number of patients coming in with other URIs [upper respiratory infections] also reduced…clearly, such measures are very important and effective." (Participant 31, female, RN)

Consequently, participants stressed the additional role of nurses in acting as community health educators to enhance public health education and alertness. Owing to the lack of an effective vaccine or treatment for COVID-19 at the time, they also asserted that the government should take a greater role in reducing misinformation and disseminating more evidence-based information to maintain public vigilance and reduce community spread of the disease:

"Now we know that the virus is spread by droplets…but people [the general public] don't have any clear information on what precautions to take against this…I always see people in the bus…touching everywhere and not being that aware." (Participant 22, female, RN)

Theme 6 Advanced pandemic preparedness

More comprehensive and ongoing nursing education on outbreak management

Participants reiterated the necessity for regular and continuous infection control training of nurses, particularly regarding their psychological preparation, awareness, and alertness to fight infectious disease outbreaks, and optimising their clinical skills in performing high-risk interventions, reducing cross-infection and contamination risks, and donning and doffing PPE. They also suggested the use of outbreak training simulations and experience sharing by frontline nurses to bolster such skills, and emphasised the promotion of teamwork, delegation, and communication amongst nurses during disease outbreaks:

"More nurse education on high-risk interventions, including how to reduce contact with droplets and protect ourselves, manage emotional health, perform [effective] division of labour, delegate things systematically to avoid 'overloading' ourselves, and improve teamwork is needed." (Participant 23, male, RN)

Early resource planning and preparation

Most participants emphasised the importance of early, large-scale warning and preparation health systems and facilities to deal with infectious disease outbreaks. Although experiences in previous epidemics in Hong Kong had improved local reserves of resources, including PPE, ventilators, isolation and quarantine facilities, and negative pressure rooms, participants expressed the need to re-evaluate and update current practices. They also warned that adaptations to sudden increases in COVID-19 case numbers in Hong Kong hospitals had exposed inadequacies and risks in current measures:

> *"HA should set up more isolation facilities in advance. They may seem useless at the time, especially if we don't have any disease outbreak for many years, but you never know when there may be a sudden outbreak…. When you convert general wards to isolation wards, you may jeopardise patient safety as they don't fit the required infection control criteria completely."* (Participant 19, female, RN)

Additionally, participants recounted that the severe PPE shortages experienced at the initial stages of the pandemic had highlighted the need to enhance local PPE production knowledge and establish local production lines of high-quality PPE, particularly masks:

> *"We need steady production of PPE in Hong Kong to cater to the sudden demand [during epidemics]…right now, even if we want to boost [PPE] production, we don't have the technology or know-how…need it in advance."* (Participant 30, female, NC)

DISCUSSION

To our knowledge, this is the first qualitative study to explore registered nurses' experiences of caring for people with COVID-19 in Hong Kong. Our findings highlight the resilience and adaptability of nurses in tackling numerous obstacles in the provision of effective nursing care during the pandemic. In the face of a lack of resources, particularly PPE and isolation facilities, nurses showed initiative and creativity in adapting to and overcoming such major obstacles.

This accords with strategies suggested by the WHO and Centers for Disease Control and Prevention (CDC) that have been used by healthcare workers when confronted with limited supplies, such as limiting patient contact and using the same respirator with multiple patients.[28]

Moreover, our findings emphasise the widespread need for and use of self-care and self-protection measures, including greater awareness of personal infection control precautions, and more careful planning and preparation by nurses caring for people with COVID-19. However, none of the nurses articulated using a clear set of guidelines regarding their own self-care and well-being; rather they used personal strategies based on their own knowledge and experience.[29] The need for self-care and support was similarly reported in a qualitative study of Australian primary healthcare nurses' needs during the COVID-19 pandemic.[30]

Nurses were highly adaptable in prioritising, accessing, and adjusting to the use of ever-changing COVID-19-specific nursing care protocols and guidelines. They were also aware of and responsive to the specific needs of people with COVID-19, particularly comfort and psychological well-being, and minimising the mental health burden so prevalent in this group.[31] Notably, most nurses emphasised they were able to provide psychological support as many of the patients were asymptomatic or had mild symptoms and were relatively physically healthy, given Hong Kong's strict policy regarding the admission of all COVID-19 cases to reduce the community spread of the virus. This is in contrast with studies from other countries such as China,[32] and Italy,[33] where nurses faced tremendous challenges in caring for heavy workloads of seriously ill people with COVID-19.

It was apparent that clear communication was central to enhancing mutual nurse-patient understanding and assuaging any hostility arising from patients' fear, anxiety, and misconceptions. Interestingly, this was most prominent regarding non-local patients, a growing population as a consequence of the international hub status of Hong Kong. Recent reports of

threats or acts of violence, including physical and verbal abuse, against healthcare workers during the COVID-19 pandemic, albeit largely from patients' relatives, due to a lack of knowledge about COVID-19 and its treatment, and dissatisfaction with hospital policies,[34,35] illustrate the importance of good communication skills among nurses.

When confronted with their own feelings of despair and unease due to the ambiguity and unpredictability associated with COVID-19, nurses emphasised effective cooperation and teamwork strategies as means to ensure safety and reassurance among colleagues. Regardless of such negative feelings and loneliness resulting from working at the frontline of the pandemic, nurses emphasised their sense of professional duty, pride, and responsibility, bolstered by support of colleagues, friends, and family. Consistent with this,, a cross-sectional study of 325 nurses in the Philippines asserted that perceived organisational and social support were predictors of COVID-19-related anxiety in nurses.[36]

Our findings also revealed suggestions to improve measures for dealing with future outbreaks. Nurses wished to have their viewpoints taken into consideration in hospital management decisions about the pandemic, particularly when such decisions had consequences for nurses' safety and performance. Such an organisational response may reduce burnout and psychological distress in nurses, as reported by a recent systematic review of 13 qualitative studies.[11] To allow for a more targeted and well-prepared pandemic response, our findings emphasise the need for consistent updating of nurses' infection control education and the rapid availability of sufficient reserves of resources and isolation facilities. This is supported by an online cross-sectional study of 637 primary health care nurses in Australia, which identified seven key categories of perceived nurse support needs to provide quality clinical care during the pandemic: PPE, communication, funding, industrial issues, self-care, workplace factors, and valuing nurses.[30] A cross-sectional study of 261 frontline nurses in the Philippines highlighted the importance of organisational measures to support nurses' mental health and

reduce fear, including social support, psychological support services, COVID-19-related training, and accurate and regular information and updates.[37] Interestingly, while most studies emphasised the importance of psychological support and coping strategies to alleviate fear and distress among nurses,[30,31,36-38] our study found that nurses appeared to focus largely on material or nursing care-specific support, particularly improved PPE management and training.

Finally, it was emphasised by participants that while nurses can assist in the control of pandemics, the collective and concerted contributions of a well-educated and well-informed community are essential. Our findings support the need for multi-faceted responses involving multiple stakeholders, including nurses as well as policy makers, hospital administrators, and the local community.[29]

Limitations

The limitations of this study are that we used a purposive sample of registered nurses in acute hospitals and a public health department, and our findings may not reflect the experiences of all nurses in these settings. In addition, all the recruited participants were nurses from Hong Kong, so this study only explored the situation of the pandemic in the region. Also, as our findings represent the experiences of nurses at the time of the interviews, they are unable to address the dynamic nature of the global pandemic. Finally, to avoid close contact with healthcare workers providing direct care to people with COVID-19, we had to conduct interviews by phone.

Implications for research and practice

Findings from this study may help to optimise nursing responses to future pandemics by improving the preparedness of nurses through the provision of appropriate education and training regarding responses against novel infectious diseases, PPE management during shortages, communication skills, and psychological patient care. In addition, policy makers and

managers should regularly re-evaluate contingency plans regarding PPE and ensure the involvement of nurses.

Longitudinal studies of the experiences of nurses caring for people over the course of COVID-19 are recommended. These may include robust measures of stress, self-efficacy, personal control, for example.

CONCLUSIONS

Nurses have shown remarkable resilience and adaptability, despite resource shortages and mental and physical health threats, when caring for people with COVID-19. However, nurses need appropriate support from peers, managers, policy makers, and the local community to effectively prepare for and manage such pandemics. The findings of this study may help inform future nursing practice, education, and policy-making to shape and strengthen the response to global infectious disease outbreaks.

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Contributors

JPCC and SHSL conceived, designed, and supervised the study. CHYL and SKYL led the data collection process. RS and CHYL processed and analysed the data. JPCC, SHSL, RS, CHYL, and DRT contributed to drafting the full article. All authors read and approved the final manuscript.

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Competing interests

None declared.

Patient consent for publication

Not required.

Ethics approval

This study received ethical approval from the Survey and Behavioural Research Ethics Committee of The Chinese University of Hong Kong (Reference no.: SBRE-19-594).

Data availability statement

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

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Semi-structured Interview Guide

8 aspects:

1. Nurses: Individuals, families, co-workers (impact on physical, psychological, social and work-related aspects)
   1.1. Individuals
   Use a word to describe the COVID-19 outbreak.

   How would you describe the impact of Covid-19?

   What are the roles and responsibilities of nurses during the Covid-19 outbreak?

   1.2. Families and co-workers
   Tell me about the changes in you and others (colleagues and family members) that you have made after this experience.

2. Patients and families (physical, psychological, social and financial impact)
   2.1. Tell me the symptoms of those who have infected COVID-19 (those you have cared for)

   2.2. Your perceived needs of COVID-19 patients

   2.3. Your perceived needs of COVID-19 patients' families

   2.4. Share the support received by patients and their families

3. Caring for COVID-19 patients (positive and negative experiences; difficulties and challenges; lessons learned from past epidemics)
   3.1. Nurse's background
   Tell me about your nursing background, years of experience, SARS experience or experience of other infectious disease pandemic.

   3.2. Decision
   Who assigned you to look after COVID-19 patients?

   When deciding to help out during the COVID-19 outbreak (for volunteers)

   3.3. Caring experiences
   Tell me your experiences about caring for people diagnosed with Covid-19

   Tell me one of the unforgettable experiences during the period of caring for people with Covid-19.

   What have you learned from this experience?

   3.4. Challenges
   Tell me more about the things that concerned you most during the period of caring for people with Covid-19.

What challenges did you encounter when you cared for people with Covid-19?

What strategies did you take to address these challenges?

What kind of support did you get when taking care of people with Covid-19?

4. Infection control measures and practices (what works and what does not work, challenges)
   4.1. What measures you perceived as most effective in combating COVID-19?

   4.2. What actions you perceived as most effective to safeguard individuals, families and communities during the COVID-19 pandemic?

5. Work environment and policies (positive and negative, what can be done differently)
   5.1. Work environment
   Tell me about your previous and currently workplace?

   5.2. Policies
   From your experience, what are the current needs of general public hospitals in addressing the potential emerging and re-emerging infectious diseases?

   Your perceived needs of healthcare providers

   5.3. Suggestion
   Where do you get information or guidance on the care of COVID-19 patients?

   Which approach do you think is most effective?

   From your experience, what are our current medical systems doing well?

   What would you suggest to enhance the preparation of nurses to better equip them to address future infectious diseases?

   Any messages you would like to give in dealing with the COVID-19 outbreak?

6. Community approaches to slow the spread of COVID-19 (most effective and hindrance)
   6.1. Tell me about your view on the effective community approaches

   6.2. From your experience, what are the current needs of the community in addressing the potential emerging and re-emerging infectious diseases?

7. Global approaches to combat COVID-19 (what works and what does not work, challenges)
   7.1. What kind of global approaches works and what does not work?

   7.2. From your experience, what are the current challenges of combat COVID-19 globally?

8. Government approaches to combat COVID-19 (what works and what does not work, challenges)
   8.1. What kind of government approaches works and what does not work?

   8.2. From your experience, what are the current needs and challenges of the government in addressing the potential emerging and re-emerging infectious diseases?

   8.3. Tell me about your view on the importance of public health for managing infectious diseases.

Do you have other experiences that you would like to share, but have not yet mentioned?

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	1
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	2, 3
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	4-6
Purpose or research question - Purpose of the study and specific objectives or questions	6
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	7, 8
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	7, 8
Context - Setting/site and salient contextual factors; rationale**	6, 7
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	6, 8
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	6, 7
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	7

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	7
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	8-11
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	7, 8
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	7, 8
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	8

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	12-21
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	12-21

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	21-25
Limitations - Trustworthiness and limitations of findings	24

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	25
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	25

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
DOI: 10.1097/ACM.0000000000000388