A descriptive phenomenological study of critically ill elderly patients' experiences of treatment using high-flow nasal cannula after extubation

Watchara Tabootwong, Yoongtong Nathmontri and Chonticha Chantakeeree

Abstract

Purpose – *This study aims to describe the experiences of critically ill elderly patients (CIEPs) who were treated using the high-flow nasal cannula (HFNC) after extubation.*

Design/methodology/approach – *A descriptive phenomenological approach was conducted to interview eleven CIEPs using face-to-face semi-unstructured interviews. Participants were selected through purposive sampling. Data were analyzed using Giorgi's method.*

Findings – *Experiences of CIEPs included their fears of failure, getting comfortable and uncomfortable, as well as asking for assistance. Fears of failure were described as involving worsening symptoms related to their diseases and failure of HFNC leading to the need for reintubation. While receiving HFNC, their breathing was comfortable, and they were free from intubation. However, they were uncomfortable because of the sensation of burning in the nasal passages. Additionally, they asked for assistance from nurses in managing their symptoms, and the alarms of HFNC oxygen therapy devices resulted in fears of HFNC failure.*

Originality/value – *The paper indicates that CIEPs experienced physical and psychological impacts from HFNC oxygen therapy (e.g. burning sensation in the nose and fear of failure). Although they had comfortable breathing, being uncomfortable also occurred. Therefore, health-care professionals should support what CIEPs need and develop a program or guidelines for managing the complications of HFNC – neither burning noses nor psychological issues enhance the comfort of CIEPs – by considering age-related changes.*

Keywords *Aged, Airway extubation, Cannular, Critical illness, Oxygen, Phenomenology*

Paper type *Research paper*

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Introduction

The high-flow nasal cannula (HFNC) is a medical device to assist patients with difficulty breathing from diseases such as chronic obstructive pulmonary disease (Nishimura, 2015; Nedel *et al.*, 2016) and acute hypoxemic respiratory failure (Nishimura, 2019). Meanwhile, HFNC has been performed to assist hospitalized older COVID-19 patients with respiratory failure (Willems *et al.*, 2021) as well as critically ill elderly patients (CIEPs) after surgery and extubation (Yu *et al.*, 2017). Saradna *et al.* (2018) reported that over half of extubated patients (52.5%) were transitioned to HFNC, particularly CIEPs 80 years and over due to hypoxemia.

HFNC oxygen therapy can support breathing for CIEPs by delivering heated and humidified gas with flow rates up to 60 L/min (Saradna *et al.*, 2018). HFNC can assist CIEPs in reducing the work of breathing as well as enhancing quality sleep and feelings of safety

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(Storgaard *et al.*, 2020). In addition, the use of HFNC for CIEPs after extubation can reduce or prevent reintubation (Yu *et al.*, 2017). However, a burning sensation in the nose from heated gas, pressure sore from the nasal cannula at the nasal septum and bloating due to gas, are common complications of using HFNC (Nedel *et al.*, 2016). In addition, CIEPs may feel that HFNC disturbs their activities of daily living (Storgaard *et al.*, 2020).

CIEPs have risks of reintubation after extubation and more complications from using HFNC compared to younger patients because of frailty and multiple pathologies (Ko *et al.*, 2020). Previous studies have been conducted on nursing care for adult patients with acute hypoxic respiratory failure receiving HFNC (Nedel *et al.*, 2016) as well as the experiences of receiving HFNC in hospitalized patients or critically ill surgical patients (Dhillon *et al.*, 2017; Wang *et al.*, 2020). Thus, to deeply understand what CIEPs feel or experience receiving HFNC oxygen therapy, this descriptive phenomenological research was conducted in the respiratory care unit because few previous studies focused on CIEPs who underwent HFNC after extubation. It is hoped that the findings from this study can be used by nursing teams and researchers to develop guidelines for the support of CIEPs with HFNC with appropriate and effective methods, in accordance with the characteristics and needs of CIEPs.

Methods

This descriptive phenomenological study was conducted in the respiratory care unit between December 2021 and June 2022. Approval for this study was obtained from the research ethics committee of the hospital (COA NO. 028/2565).

Participant recruitment

After approval by the research ethics committee, the second researcher (YS) who worked in the respiratory care unit contacted potential participants to explain the purpose of the study and asked them to be involved. If they were willing to participate, they were given a fact sheet for the study. Some participants could not read the fact sheet due to their vision problems, so the researcher (YS) read it to them. Ethical considerations, voluntary participation and identity protection were explained. In addition, participants had the opportunity to ask further questions and were able to consult with primary family members for help in making decisions and consenting to be a participant. All participants who remained willing to participate in this study signed their informed consent before the collection of data.

Sampling method

Purposive sampling was used to recruit 11 participants. The inclusion criteria were as follows:

- patients in the respiratory care unit with experience in the use of HFNC oxygen therapy after extubation for more than two days;
- 60 years of age or older;
- able to communicate in Thai;
- self-evaluated as having the ability to participate in this study; and
- vital signs stable and normal oxygen saturation ($\geq$95%).

Moreover, the confusion assessment method of the intensive care unit was used to screen for delirium in elderly patients before interviewing. Elderly patients who did not have the experience of endotracheal tube insertion before receiving HFNC, and those who had symptoms of confusion, were excluded. The recruitment of participants continued until data saturation, which meant that 11 CIEPs were interviewed and data from participants had redundancy.

Data collection

Each participant was screened and interviewed on their bed in a private room in the respiratory care unit. After verifying informed consent, a demographic data form was used to collect data. Then the following semi-structured interview guide was discussed:

- What was the reason for using HFNC?
- What do you think HFNC is?
- How do you feel about the use of HFNC after extubation?
- What kind of support do you need?
- What kinds of experiences do you have while using HFNC?

The interviews took 30–40 min and were audio recorded. In addition, the field notes were written, following each interview, of the participant's moods, gestures and facial expressions.

Trustworthiness of the findings

Trustworthiness of the findings was tested using the parameters of credibility, dependability, confirmability and transferability (Polit and Beck, 2017). To establish the credibility of the findings, the research team had experience in doing qualitative research and providing care for CIEPs. Data were collected from CIEPs who had direct experience with the use of HFNC after extubation. To enhance dependability, Thai transcripts were originally used for data analysis to reduce the loss of meaning. Analyzed data were discussed with the research team to reach a consensus on the themes to establish confirmability. To determine the transferability of the findings, the process of doing descriptive research was written up to describe it to readers or other researchers, and thus transfer the findings to relevant groups (Holloway and Galvin, 2017). Furthermore, the consolidated criteria for reporting qualitative studies were used to assure transferability (Tong *et al.*, 2007).

Data analysis

The descriptive phenomenological data analysis technique of Giorgi *et al.* (2017) was used to guide data analysis. The resulting analytical process entailed:

- multiple readings of all transcriptions to obtain a sense of the whole data about CIEPs' experiences in the use of HFNC. That is, the researchers read the transcriptions in Thai several times, along with listening to the digital voice recorder, so as to check transcription accuracy and to become further immersed in the data;
- discriminating meaning units and focusing on the phenomena that were described by all participants;
- examining participants' everyday expressions regarding the phenomenon that was investigated so as to transform these into more general categories; and
- synthesizing the transformed meaning units into a general structure of experiences of CIEPs while using HFNC.

In other words, initial codes were reviewed, revised and combined to organize the themes of this study.

Findings

Most of the participants were male (72.73%), with an average age of 67.55 ± 6.90 years (ranging from 61 to 79 years). Majority of religious beliefs were Buddhist (81.82%) and they

graduated at the level of primary school (63.64%). They were diagnosed with respiratory failure, sepsis, chronic obstructive pulmonary disease, lung cancer, hemoptysis, pneumonia and asthma. Duration of intubation ranged from two to seven days and the duration of HFNC oxygen therapy ranged from two to three days. The characteristics of participants are presented in Table 1.

The experiences of CIEPs who underwent HFNC oxygen therapy are presented in Table 2. Four themes emerged from the data as follows:

Fears of failure

Participants who were CIEPs with postextubation HFNC oxygen therapy described their fears of failure. That is, they were afraid of worsening symptoms related to their diseases. If their symptoms were worse, it meant the treatment using HFNC oxygen therapy had failed, which, in turn, might necessitate reintubation because of dyspnea. Participants gave the following examples:

> P2: This device (HFNC) helps my breathing, but I feel afraid that my symptoms may be worse because of my disease. It may [have] failed.

> P10: I feel afraid. I am afraid that I [will have] [endotracheal] tube [inserted] again. Intubation, it will [cause] suffering from pain and uncommunication.

In addition, CIEPs described that the HFNC oxygen device had alarms. Its alarms made them feel afraid regarding failed HFNC oxygen device because they could not see the device, only hear it. Participants gave the following descriptions:

Table 1 Characteristics of participants ($N = 11$)

Demographic data	*Frequency*	*%*
Age	Range from 61 to 79 years (Mean = 67.55; SD = 6.90)	
Sex		
Male	8	72.73
Female	3	27.27
Education		
Primary school	7	63.64
Vocational certificate	1	9.09
Bachelor's degree	2	18.18
Master's degree	1	9.09
Religion		
Buddhist	9	81.82
Islam	2	18.18
Diagnosis		
Respiratory failure	3	27.27
Sepsis	2	18.18
Lung cancer	2	18.18
Chronic obstructive pulmonary disease	1	9.09
Hemoptysis	1	9.09
Pneumonia	1	9.09
Asthma	1	9.09
Duration of intubation	Ranged from two to seven days (Mean = 3.27; SD = 1.85)	
Duration of HFNC oxygen therapy after extubation	Ranged from two to three days (Mean = 2.18; SD = 0.40)	

Source: Table by author

Table 2 Experiences of treatment using HFNC in CIEPs

Themes	*Subtheme*
Fear of failure	■ Worsening symptoms ■ HFNC failure
Getting comfortable and uncomfortable	■ The comfort of breathing due to freedom from intubation, pain and the pressure of mechanical ventilation ■ Uncomfortable feelings of burning in nasal passages
Asking for assistants	■ Symptoms management ■ Technological management

Source: Table by author

P4: If HFNC was disconnected from this device, it would alarm. I am afraid because I can't see it.

P7: At this time, I did not have dyspnea because HFNC oxygen device helps breathing, but I am afraid that it may have problems and it does not help [with] self-breathing. I can't see why it alarms, but I heard its voice.

Getting comfortable and uncomfortable

While receiving HFNC, CIEPs described it as helping them achieve comfortable breathing because they were free from intubation, pain and the pressure of mechanical ventilation. Participants gave the following descriptions:

P3: While I wear this oxygen line, I do not feel cramped. It is comfortable breathing like my brain is clear. I am not suffer[ing] from intubation. It is free from pain.

P6: It [HFNC] can help my breathing. My breathing is comfortable. While inhaling, my breathing did not have resistance. When I used mechanical ventilation, it pushed air forcefully.

However, CIEPs also described uncomfortable feelings of burning in their nasal passages resulting from airway dryness because the humidifier was not filled with water. Participants gave the following descriptions:

P5: While dry air is running to inside of nose, it will be hot. If it is hot, I will feel that it is burning in my noses. I feel like this because oxygen is driven forcefully.

P8: If there is water in the tank, burning nose will not occur. It would be burning if water from this tank is empty. I felt discomfort [in my] nose.

Asking for assistants

CIEPs asked for assistance with symptoms and technological management. Specifically, they needed assistance in managing their symptoms (e.g. burning sensation in nose, coughing and throat irritation) while getting treatment using HFNC after extubation. Participants provided the following examples:

P2: I need to see nurses to help me [understand] why I cough. I asked for help from a nurse and housekeeper, but they walked through, and they ignore me.

P5: I feel annoyed because of burning nose and throat irritation. High airflow made feeling of burning nose. I asked a nurse to temporarily take [it] off [HFNC]. I needed to rest.

Asking CIEP participants about the technological management of patient safety, they responded that the louder noise of HFNC oxygen therapy devices sometimes frightened them. They thought their lives were in danger when the alarm sounded and that they needed attention to be saved. Therefore, they asked for assistance from nurses to check

and manage alarms. If they obtained assistance, it would help them feel safe. Participants gave the following descriptions:

> P2: I need nurses [to] check why HFNC oxygen device alarmed. I feel afraid. I asked for help from them to adjust device's alarm [so] my life should be saved.

> P11: I do not know what[the] matter is. This device [HFNC oxygen device] alarmed and I though that the plug is disconnected. I asked for help from nurses. They had to check and adjust this device.

Discussion

The findings of this descriptive phenomenological study comprised fear of failure, getting comfortable and uncomfortable and asking for assistance. Regarding the fear of failure, CIEPs felt afraid of worsening symptoms, reintubation and HFNC failure. Fear was defined as feelings of being unable to achieve a goal or being uncertain (Beckers *et al*., 2013). Fear in CIEPs arose with the uncertainty of treatment during the use of the HFNC oxygen device after extubation as their symptoms would worsen or improve. This confirms the findings of Abshire *et al*. (2015) that fear related to treatment decisions about the direction of care and procedures that had to be performed to assist patients.

Another finding concerned getting comfortable after extubation. The HFNC oxygen therapy assisted breathing for CIEPs; that is, they obtained comfortable breathing because it was free from intubation as if it was freedom from pain. This finding seems to be consistent with other research which found that HFNC resulted in better oxygenation for patients after extubation. The HFNC assisted in decreasing the respiratory rate, and the use of HFNC was associated with better comfort (Maggiore *et al*., 2014). With comfortable breathing, HFNC is associated with reduced inspiratory effort, reduced minute ventilation with stable arterial $PaCO_2$ and improved oxygenation (Goligher and Slutsky, 2017). Therefore, CIEPs perceived a feeling of comfort. Comfort is a dynamic state of alleviating emotional and physical distress as well as pain (Wensley *et al*., 2020). With HFNC oxygen delivery devices, the inspired gases are warmed and humidified, thereby improving comfort for CIEPs as well (Ko *et al*., 2020). On the other hand, CIEPs were uncomfortable because of the burning sensation in the nose resulting from airway dryness. This finding can be explained by the fact that low levels of humidification during a long period of using HFNC are associated with less comfort and more feelings of oral and nasal dryness (Frat *et al*., 2017).

Based on fear of failure and uncomfortable feelings, the findings revealed that CIEPs asked for assistance from nurses about their symptoms and the technological management of patients' safety. Adverse events in the critical care unit often occur among critically ill patients who are older adults, have multimorbidity and more severe illness. Therefore, it is not surprising that elderly patients are more likely to experience adverse events than younger patients. Those adverse events may result from failures in care provision which includes procedural and care management (Sauro and Stelfox, 2022). This reason is associated with the finding of this study; that is, CIEPs often asked for assistance involving the management of their symptoms and technological management while receiving HFNC oxygen devices from the nursing team. Another reason to explain this finding is that nurses observe the condition of the patient through the monitor and know the patient's problems from the alarms of the monitor (Limbu *et al*., 2019). It is not surprising that CIEPs asked for help from their nursing team to perform direct care and improve their safety.

Conclusion

This descriptive phenomenological study manifested showed that CIEPs experienced fear of failure in recovering from their diseases or symptoms along with HFNC failure. However,

complications of HFNC oxygen therapy affected produced uncomfortable feelings among CIEPs because of airway dryness and burning of the noses. While obtaining care using HFNC oxygen therapy, CIEPs often asked for assistance in managing their adverse events as well as their symptoms and the technological management of their condition, which were situations that they faced during the period of HFNC oxygen therapy. Therefore, the nursing team should respond to CIEPs' needs to support and supervise their care for CIEPs. Direct care is more essential for CIEPs with HFNC after extubation than supervised care through monitors. Moreover, to reduce the fear of failure and discomfort in CIEPs, nursing teams should develop guidelines in assisting CIEPs by effective methods, such as a physical and psychological symptoms management program for CIEPs as well as educational interventions to train registered nurses in promoting CIEPs' comfort.

Strengths and limitations of the study

This study was systematically conducted by using a descriptive phenomenological approach. The findings can be used to develop other research methods regarding the care of elderly patients with HFNC oxygen devices. However, this study was conducted in a respiratory care unit with only 11 participants, so generalization of the findings may be impossible because of the small sample size. Further research is needed with a larger sample size or various settings in critical care units and general wards, where there are elderly patients with treatments using HFNC. In addition, researcher bias may occur while collecting data because they were collected by only one researcher (YS), who worked in the respiratory care unit. Therefore, in further phenomenological research, investigator triangulation should be conducted.

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