

Process of Attaining Self-care for Chronic Respiratory Failure Patients Receiving Home Noninvasive Positive Pressure Ventilation Therapy

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Key Words :

Noninvasive positive pressure ventilation therapy
Chronic respiratory failure
Self-care
Semi-structured interview
The modified grounded theory approach

ABSTRACT

The objective of this study was to investigate how chronic respiratory failure (CRF) patients on noninvasive positive pressure ventilation (NPPV) therapy attain self-care in order to continue home care following hospital discharge. Participants were 10 CRF patients receiving home NPPV therapy. Semi-structured interviews were conducted and data were analyzed using the modified grounded theory approach. The results revealed the following factors in the process of attaining self-care: 1) 'difficulties associated with NPPV; 2) 'facilitation of independent behavior'; 3) 'independent behavior'; 4) 'awareness of controlled NPPV use' where NPPV was not used during the daytime even when the patient had dyspnea; and 5) 'awareness of proactive NPPV use' where NPPV was proactively used. 'Awareness of controlled NPPV use' was triggered when "resistance at the start of NPPV" was prolonged. "Understanding the effectiveness" of NPPV influenced 'awareness of proactive NPPV use.' The study indicated the importance of assisting the patients before discharge to understand the effectiveness of NPPV in developing motivation of its proactive use.

I. Introduction

Noninvasive positive pressure ventilation (NPPV) is a method of positive pressure ventilation that can be given via nasal or face masks, which is widely used for patients of type II respiratory failure caused by alveolar hypoventilation and chronic respiratory failure with hypercapnia¹⁾. It is usually introduced through understanding and cooperation of patients themselves below the level of consciousness. Mask could be removed for making conversation and eating meals, therefore, patients can perform daily activities as patients with home oxygen therapy (HOT) do. The introduction of NPPV has improved the prognosis and especially quality of life (QOL) of patients¹⁾.

Researches on the survival rate of patients with NPPV and the probability of continuing NPPV have been conducted in many countries, whose results vary according to a type of disease^{2)~4)}. According to Tsuboi's report, the probability of continuing NPPV among patients with pulmonary tuberculosis sequelae was 80% at 3 years and 65% at 5 years, relatively higher compared with the survival rate among patients with HOT (74% at 3 years and 58% at 5 years)⁵⁾. On the other hand, the probability of continuing NPPV among patients with chronic obstructive pulmonary disease was 54% at 3 years and 24% at 5 years. This result differs little from the survival rate among patients with HOT⁵⁾ but NPPV is still tailored to be used because clinical improvement is observed on disease with hypercapnia.

The necessary time required for home NPPV therapy is less than 15 hours for 94% of patients⁶⁾. Respiratory status of most patients becomes stable with night use or intermittent use during the day or night, managing NPPV therapy by themselves and enjoying a good QOL.

Yet, if their daily life is disrupted by acute exacerbation or an exacerbation of underlying disease, the transition from NPPV to invasive positive pressure ventilation (IPPV) which requires tracheal intubation is considered for their treatment

after asking the intentions of patients and their family members. Most of those who started IPPV are compelled to be bedridden in a hospital, making their prognosis and QOL poor⁷⁾. It is, therefore, considered that patients themselves must avoid acute exacerbation and receive home treatment for a long period for the success of NPPV therapy⁸⁾.

Kozu⁹⁾ revealed everyday-life experiences and thoughts of patients with chronic respiratory failure who received home oxygen therapy and NPPV therapy. Takekawa and others¹⁰⁾ clarified that patients with chronic respiratory failure who receive NPPV therapy keep their feelings of self-esteem and vitality by receiving social support from others and live a life albeit with ambivalent feelings. Thierry Petitjean, et al¹¹⁾, noted that patients with chronic respiratory failure would suffer respiratory failure in one or two days if they discontinued NPPV therapy, showing the importance of continuing NPPV for maintaining home care treatment.

However, NPPV complications include mask intolerance¹²⁾, dry mouth⁶⁾, and abdominal distention¹³⁾, implying that there is a possibility that these physical distress and the development of psychological distress caused by wearing a mask subconsciously disrupt self-care, making it difficult to maintain home care treatment.

Self-care refers to the attempt to engage in activities directed at oneself or his/her environment by himself/herself in order to regulate one's own functions and development, aiming for the maintenance of life, health, and well-being¹⁴⁾. There are some studies focusing on feelings and cognition of NPPV patients but there is little research on their self-care, therefore, it remains to be known what kinds of self-care is conducted for preventing deterioration of disease conditions and how home care treatment is maintained.

This study, therefore, attempts to clarify how patients with chronic respiratory failure who receive NPPV acquire self care after discharge from hospital in order to maintain home care treatment.

II. Research Methods

1. Subjects and Extraction of Them

Subjects are 10 patients with chronic respiratory failure who attended an outpatient department at Hospital A and

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received home NPPV therapy. Those who had communicative problems due to dementia or others were excluded from analysis. Those who satisfied the requirements were introduced from doctors when they visited the hospital, and only those who agreed to participate in the research were included as subjects (see Table 1 on a summary of subjects).

Hospital A has 300 beds and provides secondary medical care in the southern part of Prefecture B. Among a total of 3,680 outpatients who visited the Department of Respiratory Medicine at Hospital A, 13 patients received home NPPV therapy. The number of chronic respiratory failure patients who received home NPPV therapy in Prefecture B was about 100.

2. Research Period

From May to December 2010.

3. Methods of Collecting Data

We explained the purpose and content of this research to subjects and conducted semi-structured interviews with those who agreed to participate in it. The content of an interview was recorded using an IC recorder with their consent. It was about what occurred in home care since they received explanations about NPPV therapy from a doctor. They were asked to talk specifically about the following two points.

①What kinds of problems did you face after starting NPPV therapy and how did you deal with them?

②What kinds of things do you care about in daily activities where NPPV therapy is conducted.

Each interview was lasted for one hour and was conducted in a room of the hospital where privacy is protected. In cases where a subject requested, an interview was conducted in his/her home at an appropriate date and time. Information on subjects' disease and treatment process was acquired by reading their medical record.

4. Research Methods

Modified Grounded Theory Approach (M-GTA)^{15), 16)} was used for the analysis of data.

M-GTA is useful for clarifying human interaction. Some patients receive home care treatment with NPPV therapy in order not to worsen respiratory status. There are a variety

of interactions with others such as family members, medical experts, and the providers of NPPV. M-GTA is considered to be an appropriate research method because it is best suited for explaining human behaviors and interactions with others.

M-GTA sets the analytical theme and the analytically-focused person. The setting of the analytical theme refers to the narrowing down of research theme in order to perform detailed data analysis. Analytical theme of this research was: "What kind of daily activities do you conduct in order not to develop the disease?" The analytically-focused person was "patients with chronic respiratory failure who receive home NPPV therapy."

The analytical procedure is as follows:

①The content of interviews recorded in an IC recorder was transcribed verbatim.

②Concepts, the smallest unit of analysis, was generated by focusing on parts related to the analytical theme from verbatim transcripts. Analytical sheets were used for writing down concepts, definitions of concepts, variation, and notes on a theory.

③Concepts and definitions were modified, removed, or generated newly in order to describe their relations with additional variations accurately.

④Constant comparison analysis was conducted by focusing on the similarities and differences with other interview data in order to avoid arbitrary interpretation. Concepts were identified by examining whether interpretation, definitions, and the names of concepts were closely related to data.

⑤Categories were generated through the examination of the interrelationship between concepts in parallel to the work on the generation of new concepts after about 13 concepts were generated.

⑥A figure describing "the self-care acquisition process of chronic respiratory failure patients receiving home care treatment with NPPV therapy" was created by using concepts and categories.

In this research subjects were added in the process of data analysis for attaining theoretical saturation. The attempt to add subjects was stopped once the analysis of the data of 10 subjects was completed because we judged that new concepts would not be likely to be generated.

Table 1. Outline of Subjects

Case Number	Age	Sex	Disease	Duration of NPPV therapy	Hours for NPPV prescription	Type of a mask	The use of HOT	Certification of long-term care need	Family living together
1	78	Male	COPD	1 year	8 hours at night	Oral & nasal	Yes	No	Yes
2	85	Female	Pulmonary tuberculosis sequelae	8 years & 10 months	8 hours at night	Oral & nasal	Yes	No	Yes
3	83	Male	Thoracoplasty for empyema	2 years & 1 month	8 hours at night	Nasal	No	No	Yes
4	81	Male	Sleep apnea syndrome	7 months	8 hours at night	Oral & nasal	Yes	No	Yes
5	88	Female	Alveolar hypoventilation	5 years & 7 months	8 hours at night	Nasal	No	No	Yes
6	60	Male	Kyphoscoliosis after tuberculous spondylitis	2 years	8 hours at night	Nasal	No	No	Yes
7	73	Male	COPD	10 years & 4 months	8 hours at night	Oral & nasal	Yes	Yes (level 4)	Yes
8	70	Female	Pulmonary tuberculosis sequelae	9 months	8 hours at night	Oral & nasal	Yes	No	Yes
9	68	Female	Alveolar hypoventilation	6 years & 1 month	8 hours at night	Oral & nasal	No	No	Yes
10	88	Female	Pulmonary tuberculosis sequelae	1 year & 8 months	8 hours at night	Oral & nasal	Yes	No	Yes

5. Assurance of Plausibility

There are following methods by which researchers check and verify plausibility of qualitative research: "searching for negative case and alternative explanations," "peer review," "the audit or decision trail," "thick description," and "reflexivity."¹⁷⁾

On "searching for negative case and alternative explanations" constant comparison analysis was conducted with the perspective of the similarities and differences with other data in order not to interpret data arbitrarily.

On "peer review," we were supervised by a faculty member in adult nursing who was familiar with M-GTA on the setting of analytical theme, generation of concepts and the making of figures and storyline.

On "peer review," "the audit or decision trail," "thick description," and "reflexivity" we wrote down what we noticed, questions, and the reasons for modifying concepts while generating concepts. In addition, we created an analytical note, organized our ideas and the meanings of content taken from what subjects had told, and examined whether interpretation, definitions, and the names of concepts were closely related to data.

6. Ethical Considerations

This research was approved by the ethics committee of Faculty of Medicine, University C. We explained to subjects the purpose and content of this research in a written form and verbally and asked those who agreed to participate in the research to sign the letter of consent. We also explained to them that participation in the research is voluntary, they do not have to answer questions they do not want, they can decline to participate in the research at any time, and those who declined to participate in the research do not suffer any

disadvantages in medical care. All obtained data were kept under lock and key. We also explained to them that data were not used for purposes other than this research, all the recorded data were erased after the research was completed, and their identities were kept anonymous when we present our research results in an academic conference or as an article.

III. Results

Categories, concepts, and in-vivo concepts that treats words and expressions in data as concepts were shown in [], < >, and " ", respectively. The analysis of interviews with 10 chronic respiratory failure patients receiving home care treatment with NPPV therapy generated 5 categories and 13 concepts. A storyline which verbalized analytical results and a figure that explained it is shown in Figure 1.

1. Storyline

There were following categories on the process of attaining self-care among chronic respiratory failure patients receiving home NPPV therapy: [difficulties associated with NPPV], [facilitation of independent behavior], [independent behavior], [awareness of proactive NPPV use], and [awareness of controlled NPPV use].

There are <intolerance at the time of introduction> and <a feeling of difficulty in wearing a mask> in [difficulties associated with NPPV]. Patient's responses changed from <intolerance at the time of introduction> at the time of doctor's explanation on NPPV therapy to <a feeling of difficulty in wearing a mask> when he/she put a mask on his/her face when doing NPPV therapy. At the same time

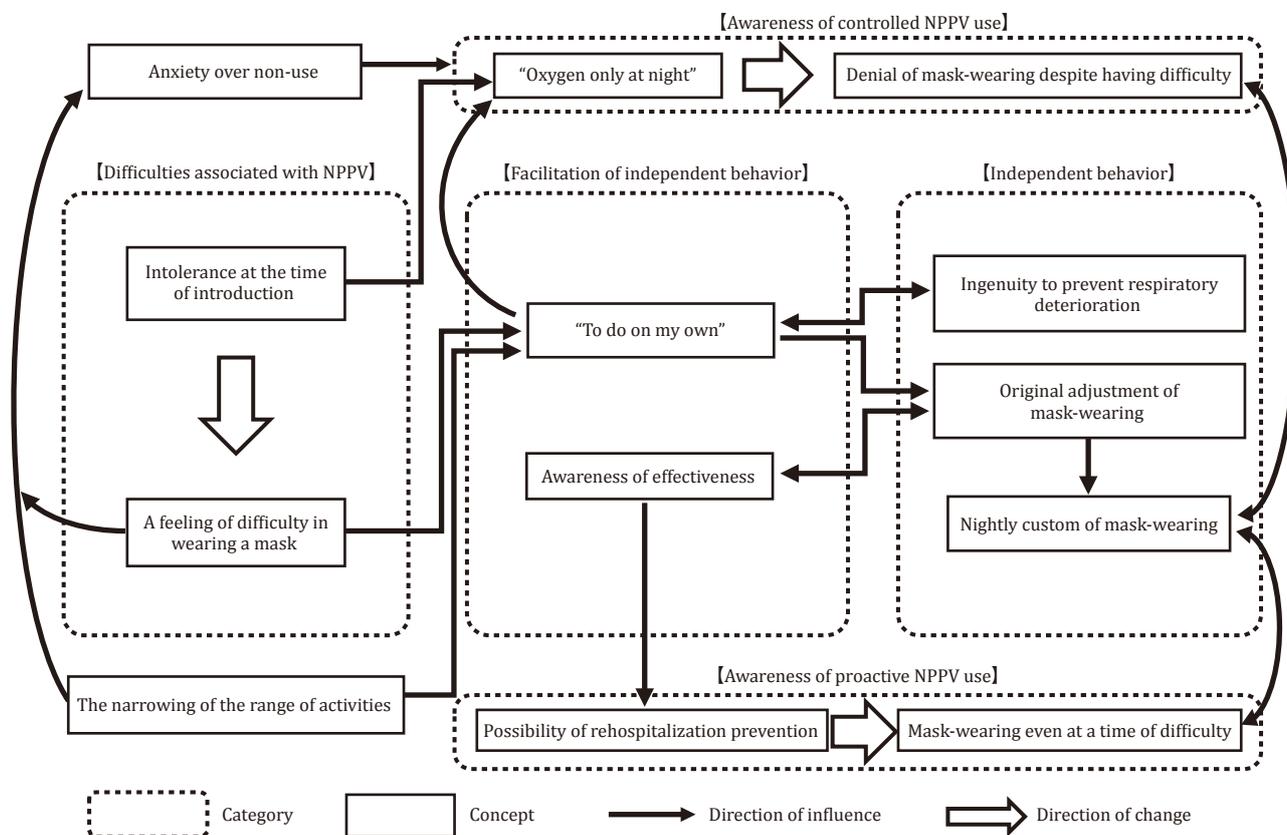


Figure 1. The process of attaining self-care among chronic respiratory failure patients receiving home NPPV therapy

patients felt <the narrowing of the range of activities> associated with the deterioration of respiratory status than he/she was before. Due to <a feeling of difficulty in wearing a mask> and <the narrowing of the range of activities> they received support from their family members but they also started to recognize the need <“to do on my own”> and find out <original adjustment of mask-wearing> gradually. They also reassured awareness of <“to do on my own”> through a recognition that NPPV therapy can be done by themselves from an <original adjustment of mask-wearing>. In addition, awareness of <“to do on my own”> affected an <ingenuity to prevent respiratory deterioration>, making a patient engage in a <habituated preventive behavior> through the trial-and-error process. They raised <awareness of effectiveness> of NPPV therapy by making an <original adjustment of mask-wearing>.

[Facilitation of independent behavior], which is composed of <“to do on my own”> and <awareness of effectiveness>, was awareness of a factor leading to [independent behavior], which is composed of <ingenuity to prevent respiratory deterioration>, <original adjustment of mask-wearing>, and <nightly custom of mask-wearing>.

[Awareness of proactive NPPV use] was influenced by <awareness of effectiveness> on NPPV therapy. There were <possibility of rehospitalization prevention> and <mask-wearing even at a time of difficulty> in [Awareness of proactive NPPV use]. Patients recognized <possibility of rehospitalization prevention> by receiving NPPV therapy and their awareness changed into <mask-wearing even at a time of difficulty> in which NPPV was used even during the daytime. On the other hand, <the narrowing of the range of activities> contributed to awareness of <anxiety over non-use> by having <a feeling of difficulty in wearing a mask>.

On [awareness of controlled NPPV use] patients dealt with <anxiety over non-use>, <intolerance at the time of introduction>, and <“to do on my own”>, whose awareness of NPPV therapy changed into <“oxygen only at night”> and <denial of mask-wearing despite having difficulty>. There is <nightly custom of mask-wearing> on the basis of <mask-wearing even at a time of difficulty> and <denial of mask-wearing despite having difficulty>.

2. Each Category And Concept

a. Category of Difficulties Associated with NPPV

In [difficulties associated with NPPV] NPPV therapy is conducted at the stage of the explanation of NPPV introduction, showing difficulties associated with home care. It is composed of two concepts: <intolerance at the time of introduction> and <a feeling of difficulty in wearing a mask>.

<Intolerance at the time of introduction> was defined as a feeling of unwillingness toward NPPV therapy held at the stage of doctor's explanation on NPPV therapy before its implementation.

“It started about four years ago. (When my doctor told me about it) I thought I don't like it, it's embarrassing and troublesome.” (Case 2)

“When a doctor told me that I had to receive NPPV, I replied, ‘I don't need it.’ But he insisted it...” (Case 3)

“They say that I should receive NPPV therapy because it is shorter in use than nose oxygen but I felt scared at using mask oxygen at first.” (Case 5)

<A feeling of difficulty in wearing a mask> was defined as a

variety of difficulties associated with the use of mask-wearing in home NPPV therapy.

“Well, let me see it was hard until getting used to it. I was so bad about using it. Well, I had a lot of trouble until I adjusted myself to it. Yeah, about one month... well, I got a pain on this place (the root of nose).” (Case 1)

“It hurts. There was a mark for long periods. I tried hard to give myself a massage but it did not disappear because I was squeezed so hard.” (Case 2)

“Well, it's somehow difficult. It's agonizing because this place (around mask) is compressed. It's difficult. So I sometimes pulled off a mask because I had difficulty in a dream although I was not conscious of it at all.” (Case 3)

“It's difficult to breathe when I use it. I had a pain around here (the root of nose) as if I got a hole in my nose.” (Case 7)

b. Category of Facilitation of Independent Behavior

[Facilitation of independent behavior] refers to a variety of awareness seen as promotional factors leading to [independent behavior]. It is composed of two concepts: <“to do on my own”> and <awareness of effectiveness>.

<“To do on my own”> was defined as the life with the feeling that I have to do on my own as much as possible because nobody except me can know how to receive NPPV therapy.

“If I told that there was something wrong with the NPPV equipment, my uncle fixed it anyhow but I did not ask anybody about how to wear the device. I mean, he thinks that's his job.” (Case 2)

“Saliva or something... around here... it was around my mouth. Threads go bad. Threads or something strange come unstuck. So I clean after I use it every day... everyday by myself. I could do it without any trouble.” (Case 5)

“I have to protect my body. Nobody knows it.” (Case 8)

<Awareness of effectiveness> was defined as the awareness that respiratory status becomes stable by receiving NPPV therapy and the feeling that it is necessary to do it.

“(Before changing the setting) when I inhaled I felt that the frontal part was stuck lately, but (after changing the setting) the feeling of being stuck disappeared. I felt a tug toward the equipment. So, I feel it might be good. I feel easy. And as I feel calm, I could walk a bit faster.” (Case 6)

“I'm accustomed to it. At first I felt strange but I became increasingly accustomed to it and felt well. I felt strange before doing it. My breathing is also getting well. It starts to fit my body.” (Case 8)

c. Category of Independent Behavior

[Independent Behavior] is a behavior affected by the concepts of [facilitation of independent behavior] and doing for patients by themselves in home care. It is composed of three concepts: <original adjustment of mask-wearing>, <ingenuity to prevent respiratory deterioration>, and <nightly custom of mask-wearing>.

<Original adjustment of mask-wearing> is defined as the situations in which a patient is gradually accustomed to the difficulty of mask-wearing in NPPV therapy and adjusts the degree of tightening a mask in his/her own way.

“Well, I have to do it by myself. Other people can't adjust the equipment properly. I have to do it by myself. Well, it's delicate. It's difficult to adjust the degree of tightening a mask. I had others do it but it did not work. It sometimes worked but there was no way to continue to work.” (Case 1)

“Well, yeah, I do it by myself. I got out of the hospital after

I was accustomed to it. Nobody can do it for me. Even nurses do not know the degree of tightening a mask. I could not know the place where leaking occurs, so I asked her about procedures and the ways for avoiding leakage. It took about half a year to be accustomed to it." (Case 2)

<Ingenuity to prevent respiratory deterioration> was defined as the objective or subjective realization that one's own breathing is good and behaviors for preventing the deterioration of respiratory status.

"I do abdominal breathing every day. At least 50 times in the morning. Yes, every morning. Abdominal breathing... After I do abdominal breathing I do calisthenics at 6:30. Yes, radio calisthenics. 365 days a year. I never miss a day. I have done calisthenics without fail for a long time. Oxygen levels go up after doing calisthenics. They go up to 100. Then, I raise the level of an oxygen concentrator by 3. Yes, when I do calisthenics, oxygen levels go up. Well, in this way breathing in and out repeatedly. This raises oxygen levels because the pace of breathing becomes faster." (Case 1)

"I receive vaccine as soon as possible when necessary. I can know it. I need a dose of vaccine if I catch a cold. Especially, you know, I need to be careful not to get phlegm in my throat because it's very difficult to spit it out. Phlegm is like, let me see, it becomes like rubber." (Case 4)

<Nightly custom of mask-wearing> was defined as the wearing of a NPPV mask as a daily routine with no pain.

"My doctor tells me to wear it every day but I think nobody follows his prescription. I wear it when I am in bed without fail." (Case 6)

"I do not miss it. I always do it punctually. All night. I haven't missed it. Every night I do it." (Case 5)

"I'm always on time. It is earlier now... Around 8 or 9PM I lie down and listen to music until I wear a mask. Then around 9:30PM I put on a mask. Then I wake up in the morning." (Case 4)

d. Category of Awareness of Proactive NPPV Use

[Awareness of proactive NPPV use] shows awareness that attempts to keep one's own respiratory status properly by using NPPV proactively. It is composed of two concepts: <possibility of rehospitalization prevention> and <mask-wearing even at a time of difficulty>.

<Possibility of rehospitalization prevention> was defined as the self-awareness of the effectiveness of NPPV therapy and the realization that "I do not have to be rehospitalized if I receive properly" NPPV therapy by myself although in the light of own experience a patient considers that he/she might be rehospitalized if his/her conditions get worse.

"Things like that... I have to be hospitalized if symptoms are bad in such a way. But I do not need to be hospitalized because the symptoms subside if I wear a mask." (Case 1)

"I'm thinking that I would have to go to the hospital if I do not receive NPPV therapy. I was told that my breathing was getting normal if I wear a mask." (Case 8)

<Mask-wearing even at a time of difficulty> was defined as the awareness that I have to wear the NPPV mask for coping with the appearance of respiratory symptoms.

"Yes, I feel better. When I get out of breath, I rushed to wear the mask. Then, the symptoms subside in five minutes. Well, it's very good." (Case 1)

"I do a variety of things depending on circumstances. I sometimes think I had better wear the mask. I do it in the daytime when my symptoms are very bad. I employ others,

so I can do that. So, sometimes I wear the mask for about 30 minutes. Yes, during the day. Then, I somehow feel relaxed." (Case 6)

e. Category of Awareness of Controlled NPPV Use

[Awareness of controlled NPPV use] refers to awareness that NPPV is used only at night with the feeling that I use it as little as possible and not be used when respiratory symptoms appear. It is composed of two concepts: <"oxygen only at night"> and <denial of mask-wearing despite having difficulty>.

<"Oxygen only at night"> is defined as the feeling that a patient can undergo NPPV without lowering the quality of life if a patient undergoes NPPV only at night.

"I do not like to use it but a doctor say it can be done in a short time in my case. Well, I do not like to use it all day. I just do not like it." (Case 3)

"Anyway, oxygen I use (NPPV) is not so terrible. Oxygen just only at night. Of course, I do not know how it can be serious. It may be that those who use it even during the day may feel terrible. But I'm not sure about it." (Case 5)

"I do not use it for long. About nightly mask. Whatever happens, I use it as usual." (Case 10)

<Denial of mask-wearing despite having difficulty> was defined as the awareness that controlling one's breathing and keeping quiet, not using NPPV is a way of coping at the time of dyspnea.

"Well, anyway sleeping is the best. Any place, for instance, on a veranda and even on tiles of bathroom. Tile floors would be hard, but I should lie down." (Case 2)

"I do not walk steadily. When I become uncomfortable, I remain standing for about 3 minutes, then I get a bit better." (Case 9)

f. The Narrowing of the Range of Activities

<The narrowing of the range of activities> was defined as a decline in the amount of activity and the narrowing of the range of activities due to the deterioration of physical symptoms such as shortness of breath and dyspnea although a patient used to be active.

"I am making efforts to sleep comfortably as much as possible whenever I have free time. I really sleep so much time. There's nothing easier than sleeping. But I do not undertake physical activity if I always sleep. So, I try to walk between a living room and a bedroom in the house. It might be better if I walk outside a little on clear days. It's good when I am walking but I wheeze the moment I stopped walking and sat down." (Case 2)

"I get out of breath a bit when I squat on the ground and weed my garden. I also get out of breath when I walk for a long time. I could do that but I can't now. How long do I have to walk from here? Well, I get fed up with walking for 300m or 400m. I can't walk very much now. I think my legs are weakened, therefore, I get out of breath." (Case 3)

g. Anxiety over Non-use

<Anxiety over non-use> was defined as the hesitancy of not using NPPV because of the anxiety that symptoms of respiratory failure might be worsened if NPPV is not used.

"I worried that what would happen if I do not use NPPV. I worry that I might get out of breath." (Case 3)

"If I'm not able to use NPPV by myself, if my father is not able to help me to use NPPV, if nobody can't put on the

respiratory equipment, is a hole made in the throat?" (Case 9)

IV. Discussion

1. About the Category of Difficulties Associated with NPPV

In [difficulties associated with NPPV] <intolerance at the time of introduction> which a patient held when a doctor talked about NPPV changed into <a feeling of difficulty in wearing a mask> by actually using NPPV. Takekawa¹⁰⁾ and Doi showed a pain associated with the introduction of NPPV therapy as a category of internal experience. Kouzu⁹⁾ also mentions the struggle with the equipment as a category of a daily life experience. This research also revealed that awareness a patient has toward NPPV involves change. In addition, <a feeling of difficulty in wearing a mask> is a patient's awareness felt during the period in which he/she attempts to accept NPPV therapy, a transition from <a feeling of difficulty in wearing a mask>.

Richard S. Lazarus notes that a stressful event is a potential stressor in stress and coping theory, whose interpretation determines that it becomes a stressor. This research showed that doctor's explanation of NPPV initiation becomes a stressful event by a patient's interpretation affected by his/her level of understanding, affecting whether he/she can accept NPPV therapy.

When it is not explained well, <intolerance at the time of introduction> is intensified and the use of NPPV therapy is rejected, often resulting in the minimum use of NPPV, that is, <"oxygen only at night">. It is, therefore, considered that it is important to figure out patients' level of understanding and acceptance after doctor's explanation and provide explanations on their worries and questions about <intolerance at the time of introduction> at an early stage for prompting them to receive NPPV.

<A feeling of difficulty in wearing a mask> strongly showed problems of masks such as pain at the root of nose, the mask's pressure on the patient's face, and breathing discrepancy. <A feeling of difficulty in wearing a mask> is a matter to which patients want nurses to give much attention. According to Akiyo Suzuki¹⁹⁾ and others, it is important that nurses pay attention to patient's complaints of complications, detect their difficulties accurately, and help them. It is considered that nurses must care about <a feeling of difficulty in wearing a mask> and deal with each patient's feeling of difficulty in order to make patients acquire skills of an <original adjustment of mask-wearing> promptly.

2. About the Categories of Independent Behavior and Facilitation of Independent Behavior

Patients had [difficulties associated with NPPV] in the past but engaged in <ingenuity to prevent respiratory deterioration>, <original adjustment of mask-wearing>, <nightly custom of mask-wearing> as an [independent behavior].

They talked about behaviors such as oral rinse to prevent infection and everyday radio calisthenics as an <ingenuity to prevent respiratory deterioration>. Patients using NPPV is in respiratory distress with hypercapnia. It is considered that deterioration of their respiratory status would immediately bring major challenges to their survival. Respiratory trace infection is the most popular causes of the acute exacerbation of respiratory failure, which necessitates infection prevention and early treatment⁸⁾. It is considered that patients exhibited

an <ingenuity to prevent respiratory deterioration> from their own belief that patients must prepare for the possibility of death and prevent respiratory deterioration.

As an <original adjustment of mask-wearing> some patients talked about an appropriate way of wearing a mask which only he/she can know, showing the influence of the awareness of <"to do on my own">. As <a feeling of difficulty in wearing a mask> they are aware of the things <"to do on my own"> and acquired skills of an <original adjustment of mask-wearing> through the associations with family members in home care. <"To do on my own"> is awareness of taking care of one's own affairs by oneself because only he/she can know how to use NPPV properly, which affected <original adjustment of mask-wearing> and <ingenuity to prevent respiratory deterioration> in an [independent behavior]. Strengthen the awareness of <"to do on my own"> is considered to be one of [facilitation of independent behavior] because it is expected to promote an [independent behavior].

On the other hand, on the awareness of <"to do on my own"> patients told that they sometimes did not follow family members' opinions on the use of NPPV. It is considered that they try to manage things that only the users of NPPV can know, so that they tend to neglect and refuse to accept their advice. The results showed that there is a possibility that patients may rely too much on their own judgment and undergo medical care by their own one-sided interpretation. Strengthening awareness of <"to do on my own"> promotes an [independent behavior] but it was suggested that patients may conduct inappropriate self-care based on an erroneous interpretation.

Connie M. Dennis notes that one characteristic of self-care is that it might be therapeutic (effective) or nontherapeutic (ineffective). Self-care is conducted by patients themselves, therefore, their correct understanding of proper way of care affects the ways they conduct self-care. Therefore, it is suggested that although awareness of <"to do on my own"> is indispensable for promoting an [independent behavior], nurses must make an effort not only to strengthen their awareness of <"to do on my own"> but also to help them to listen to family's opinions and conduct self-care with correct knowledge.

Patients was influenced by an <original adjustment of mask-wearing> and had an <awareness of effectiveness> of NPPV therapy. As content of <awareness of effectiveness> patients told that they felt the necessity to undergo NPPV after being aware that their respiratory status became stable by receiving it. It was found that <awareness of effectiveness> and an <original adjustment of mask-wearing> influence one another. It is considered that <awareness of effectiveness> enhances the willingness of an <original adjustment of mask-wearing>.

In a <nightly custom of mask-wearing> all patients noted that the wearing of a NPPV mask was incorporated into daily activities as a night routine. It was found that patients thought about wearing it in home care, was influenced by an <original adjustment of mask-wearing>, wore it by setting aside a regular time within a specified time arranged by doctors.

3. About the Categories of the Awareness of Controlled NPPV Use and the Awareness of Proactive NPPV Use

[Awareness of controlled NPPV use] was composed of <"oxygen only at night"> and the <denial of mask-wearing despite having difficulty>. <"Oxygen only at night"> is

awareness that the night use of NPPV prescribed by a doctor does not decrease patient's quality of life, which is influenced by <anxiety over non-use>, <intolerance at the time of introduction> and <"to do on my own">.

Ruth Wu²¹⁾ mentioned a non-activity as one form of disease behavior, resulting from hesitancy to face with the suffering from disease. This research revealed that <intolerance at the time of introduction> is a factor that dissuade patients from using NPPV positively. It is considered that they therefore decided not to use NPPV during the day as much as possible and changed their awareness of <"oxygen only at night"> into <denial of mask-wearing despite having difficulty>. In <denial of mask-wearing despite having difficulty> they say that they control their breathing and rest in bed without receiving NPPV when they have breathing problems.

Previous studies also revealed that patients with chronic respiratory disease conduct breathing control and action coordination as management of breathing difficulties²²⁾. According to a NPPV guideline⁸⁾, although home NPPV therapy is usually used in cases of chronic respiratory failure it is used to cure breathing difficulties and hypercapnia caused by sleep-disordered breathing, respiratory muscle loading, and respiratory control disorder. It also mentioned a decrease in respiratory symptoms and a decrease in the work of breathing as a short-time goal of NPPV therapy. NPPV patients expect to improve breathing difficulties immediately after receiving NPPV. Therefore, it is important for them to engage in activities that promote the use of NPPV during the hospital stay, making them have awareness that they can prevent the worsening of respiratory status by themselves under doctor's guidance.

Awareness of <"to do on my own"> brings about passive use of NPPV and the neglect of family's urge to use NPPV leads to [awareness of controlled NPPV use]. Therefore, we need to advise them to listen to family's opinions, not just making own judgment.

On the other hand, there is a possibility that they may misinterpret doctor's explanation, so that they have [awareness of controlled NPPV use] by believing that NPPV can be used only at night. In this case it is necessary that medical experts should allay their misunderstanding.

It was found that there is [awareness of proactive NPPV use] which is distinct from [awareness of controlled NPPV use] on awareness of NPPV use during dyspnea. <Awareness of effectiveness> on NPPV therapy is a promotional factor of [awareness of proactive NPPV use]. Kozu⁹⁾ notes that awareness of the improvement of physical conditions affects patient's recognition that NPPV therapy is needed. Kameda and others²³⁾ also points out that patients who have positive image of NPPV consider that it is good for their health and use it without any hesitation.

On the other hand, self-efficacy is named as a component of supporting the self-management of chronic disease patients²⁴⁾. This research shows that <awareness of effectiveness> by conducting <original adjustment of mask-wearing> affects [awareness of proactive NPPV use] as self-efficacy. According to Sato and others²⁵⁾, it is important to enhance patient's self-efficacy in order to promote their behavioral transformation. The experience of success and verbal encouragement is indispensable for achieving that purpose. It is considered that symptomatic improvement by using NPPV and its affirmation from medical professionals bring about their <awareness of effectiveness>, which leads to the enhancement of their

self-efficacy. Therefore, it is important that medical staffs check how patients breathe and their change of physical conditions while listening to their complaints since they are in a hospital whereby they have <awareness of effectiveness> of NPPV therapy, which, in turn, enhances [awareness of proactive NPPV use].

4. The Implications of Nursing Practice for Promoting the Use of NPPV

This research revealed that [difficulties associated with NPPV] is one of a variety of processes in which patients accept NPPV therapy. <A feeling of difficulty in wearing a mask> shows that nurses must help them wear a mask properly in order to make them acquire skills of an <original adjustment of mask-wearing>.

The following self-care awareness on the use of NPPV was also shown: [awareness of controlled NPPV use] in which NPPV is not used during the day even if they have breathing difficulties and [awareness of proactive NPPV use] in which NPPV is used during the day with no hesitation if they have breathing difficulties. It was also suggested that it is important for nurses to check whether patients breathe properly and their changes of physical conditions in order to make them have <awareness of effectiveness> of NPPV therapy because it affects their [awareness of proactive NPPV use].

5. The Limitations of This Research and the Tasks Ahead

The explanatory power of this research is limited to self-care of patients with chronic respiratory failure undergoing home NPPV therapy. Therefore, the results of this research can be applied to cases of "care of patients with chronic respiratory failure undergoing home NPPV therapy." It must also be noted that the length of time of receiving home NPPV therapy did not affect self-care concepts in the analysis of this research.

This research clarified the awareness and accompanying behaviors of patients with chronic respiratory failure undergoing home NPPV therapy, and thereby showed concrete measures to give guidance to them during the hospital stay and in outpatient visits. Based on insights gained from this research, we must help patients with chronic respiratory failure undergoing home NPPV therapy to undergo NPPV therapy properly and induce their awareness of its effectiveness and analyze its effectiveness.

V. Conclusion

1. There were following categories on the process of attaining self-care among chronic respiratory failure patients receiving home NPPV therapy: [difficulties associated with NPPV], [facilitation of independent behavior], [independent behavior], [awareness of controlled NPPV use] in which NPPV is not used during the day even if patients have breathing difficulties, and [awareness of proactive NPPV use] in which NPPV is used during the day with no hesitation if they have breathing difficulties.
2. [Difficulties associated with NPPV] is a process of accepting NPPV therapy. <Intolerance at the time of introduction> affected [awareness of controlled NPPV use] when NPPV therapy was not accepted properly.
3. <"To do on my own"> became a trigger to hold [awareness of controlled NPPV use] while at the same time it affected <original adjustment of mask-wearing>.
4. <Awareness of effectiveness> on NPPV therapy affected

[awareness of proactive NPPV use].

These findings suggested that patients with chronic respiratory failure undergoing home NPPV therapy start to have awareness to use NPPV positively if nurses could successfully help them to have <awareness of effectiveness> since they were hospitalized.

Acknowledgements

We thank the subjects and the staff at Hospital A.

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