

**Original Article**

# Terminal Cancer Patients' Wishes and Influencing Factors Toward the Provision of Artificial Nutrition and Hydration in Taiwan

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**Abstract**

*Identifying the concerns of terminal cancer patients and respecting their wishes is important in clinical decision-making concerning the provision of artificial nutrition and hydration (ANH). The aim of this study was to discover terminal cancer patients' wishes and determine influencing factors toward the provision of ANH. One hundred and ninety-seven patients with terminal cancer, admitted to a palliative care unit in Taiwan over a two-year period, completed a questionnaire interview, which included demographic characteristics, knowledge and attitudes on ANH, the health locus of control, subjective norms, and the wishes to use ANH. One hundred and fifty-four patients (78.2%) used ANH in the past month. A knowledge test on issues related to ANH showed the rates of accurate responses were ranked as: peripheral intravenous route can only provide hydration (48.7%), excessive artificial nutrition may increase the proliferation of cancer cells (32%), ANH can prolong life expectancy for all patients (17.3%), and ANH can prevent all patients from starving to death (5.6%). The strongest attitude of patients toward the potential benefit of ANH was "it can provide the body need with nutrition and hydration when inability to eat or drink occurs." Otherwise, the strongest attitude toward the potential burdens of ANH was "gastrostomy makes the illness worse." One hundred and twenty-two of 197 patients (62.9%) expressed their wishes to have ANH. The results of logistic regression analysis showed that the experience of using a nasogastric tube and intravenous fluids, and subjective norms were the most significant variables related to the wishes of patients to use ANH (odds ratio [OR] = 11.11, 95% confidence interval [CI] = 3.20–38.64; OR = 2.51, 95% CI = 1.22–5.15, OR = 1.30, 95% CI = 1.05–1.60, respectively). However, the use of artificial nutrition was negatively affected by the knowledge of ANH (OR = 0.53, 95% CI = 0.37–0.84). In conclusion, Taiwanese patients with terminal cancer have insufficient knowledge about ANH and still believe in the benefits of ANH,*

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*especially in avoiding dehydration or starvation. The findings of this study indicate the importance of medical professional training and decision-making in the initial consideration of using ANH. By improving the knowledge about ANH among patients, more appropriate decisions can be achieved.* J Pain Symptom Manage 2004;27:206–214.  
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### Key Words

Wishes, nutrition, hydration, terminal cancer

## Introduction

Decisions about the provision of artificial nutrition and hydration (ANH) in the final days of a patient's life should consider not only the physiological aspects and physical value of nutrition and hydration, but also the symbolic nature and cultural significances of food and fluids. Clinical ethics in the decision to use ANH require the respect for both the needs of a patient's body and the choice of the patient's mind, especially the informed decision of the patient.<sup>1</sup>

Previous studies have suggested that excessive supply with fluid and nutrition may increase body loading and result in discomfort for the terminal patient.<sup>1–5</sup> Otherwise, aggressive nutritional therapy has no benefit on tumor response or survival.<sup>6,7</sup> Moreover, aggressive nutritional therapy was reported in an animal study to significantly increase tumor growth.<sup>8</sup> Unfortunately, there is also currently no evidence that suggests that aggressive nutrition therapy can improve the quality of life, which is recognized to be the most important outcome for terminal patients.<sup>9–12</sup> However, psychological distress may result if deterioration in cognition prevents a patient from expressing his or her wishes. Some studies suggested that dehydration may contribute to an agitated delirium or terminal restlessness that could be eased by gentle hydration.<sup>1,10</sup>

Several articles have also emphasized the importance of the symbolic nature of food in relation to the provision of nutrition and hydration in terminal illness.<sup>13</sup> According to Scanlon et al., food has symbolic meaning that transcends the physical benefits it provides.<sup>14</sup> Beauchamp et al. observed that denying food and water to anyone for any reason seems the antithesis of expressing care and compassion.<sup>15</sup> Meilaender stresses that food and drink are the sort of care

that all human beings owe to each other.<sup>16</sup> Otherwise, Green highlights "what could be any more inextricably bound to life itself than offering hungry persons food and thirsty persons water?"<sup>17</sup> Connelly notes that survival itself may depend on the cultivation of basic emotions that is reinforced by giving food and drink to those in need.<sup>18</sup>

Besides the symbolic nature of food, some influencing factors such as demographics, prior experiences in using ANH, and the knowledge and attitudes toward ANH may influence the use of nutrition and hydration in terminal illness and are worthy of exploration.<sup>19–21</sup> In Taiwan, the decision to use or forego artificial nutrition and hydration remains a perplexing and emotional issue in the care of terminal cancer patients. A previous study in Taiwan showed that about one-quarter of palliative care patients has encountered the ethical conflicts of using nutrition and hydration during hospitalization.<sup>22</sup> To provide better education and communication for appropriate support for nutrition and hydration, exploring the relating factors toward the wishes of using ANH in these terminally ill patients will be valuable. The aims of this study were to discover the wishes of terminal cancer patients and determine the influencing factors toward the use of ANH.

## Methods

### Patients

All consecutive cancer patients, admitted to the hospice and palliative care unit of the National Taiwan University Hospital between August 2000 and July 2002, were enrolled in the study. Patients whose cancers were not responsive to curative treatment were identified in an initial assessment performed by members of the admissions committee. Eligibility criteria

for the patients in this study were: (1) the patient was not severely cognitively impaired and can communicate, (2) the patient gave informed consent or verbally agreed to participate, and (3) the patient was well enough to be interviewed. The patients' physicians and the primary nurses determined eligibility. Patients chose whether to complete the questionnaires without assistance or by having the questions read aloud by the interviewers or caregivers. The selection of patients and the design of this study were approved both by the National Science Council in Taiwan and the ethics committee of the hospital. By the end of the study period, 197 patients had completed the questionnaire interviews.

### Measurement

A structured questionnaire consisting of six parts was used for the interview of all of the subjects. The six parts of the questionnaire included questions on demographic characteristics, knowledge and attitudes on ANH, the health locus of control, subjective norms, and the wishes to use ANH. The entire six-part questionnaire was tested for content validity by a panel composed of two physicians, two nurses, one dietitian, one psychologist, and one social worker, all of whom were experienced in the care of the terminally ill. Each item in the questionnaire was appraised from "very inappropriate and not relevant (1)" to "very appropriate and relevant (5)." A "content validity index" (CVI) was used to determine the validity of the structured questionnaire and yielded a CVI of 0.930. In addition, 10 patients filled out the questionnaire to confirm the questionnaire's face validity and ease of application.

Demographic characteristics assessed by the questionnaire included gender, age, education, primary tumor sites, and experiences in the use of ANH (including hydration, nutrition, nasogastric (NG) tube, and gastrostomy). The other five parts included:

1. *Knowledge of ANH.* This measure assessed the knowledge about the use of ANH (9 items). This 9-item measure was designed with careful scrutiny of the literature in this area. All of the items were also grounded on the basis of real life experiences of the investigators involved in palliative care. The scoring system of this

scale was "true (1)" and "false/unknown (0)." A Kuder-Richardson formula 20 (KR-20) was used to assess internal consistency of this knowledge measure and showed a coefficient of 0.71 for the final 7 items.

2. *Attitude (belief and evaluation) about ANH.* Designed with careful scrutiny of the available literature, this part included the perception of the threats, the benefits, and the barriers in the provision of ANH. The measure was 19 items using 5-point Likert scales – from "strongly disagree (1)" to "strongly agree (5)." Bartlett's test (BT) of sphericity and Kaiser-Meyer-Olkin (KMO) test were used to determine whether belief data were suitable for exploratory factor analysis. In this measure, the value of the BT was 852.94, significant value was 0.00, and the KMO value was 0.708. Therefore, the measure was suitable for exploratory factor analysis. The draft items were analyzed using principal component factor analysis followed by orthogonal varimax rotation. The number of principal components to be extracted was determined by examining the eigenvalues ( $>1$ ) and Cattell's Scree test. Meanwhile, the cut point of factor loading was set at 0.3. Items with low factor loading ( $<0.3$ ) were deleted from each subscale. Finally, the beliefs measure was constructed using the benefits and burdens, perceived from the terminal patients in using ANH, after deleting two items. Internal consistency was demonstrated, with the Cronbach's alpha coefficient range of 0.69 to 0.78, in the subscales of beliefs. The importance of each item was also evaluated by the patients.
3. *Health Locus of Control.* This measure referred to the Multidimensional Health Locus of Control scale (MHLC) originally designed by Wallston and Devellis in 1978.<sup>23</sup> This has been used in Taiwan in the past<sup>23,24,25</sup> and modified in this study based on care experiences. It is an 18-item measure using a Likert scale, from "strongly disagree (1)" to "strongly agree (6)." Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) test were used to determine whether the study data of the health locus of control were suitable for exploratory factor analysis. The value of

the BT for the data was 952.19, significant value was 0.00, and the KMO value was 0.711. Therefore, the scale was also suitable for exploratory factor analysis. The same procedure of exploratory factor analysis used in the belief on ANH was used. Finally, six items were deleted and the sub-domains were reconstructed to two factors and named "Chance external" and "Internal and powerful others" health locus of control factors. The internal consistency was demonstrated with Cronbach's alpha coefficient ranging from 0.68 to 0.81 in the subscales of this measure.

4. *Subjective Norms.* This part is composed of both "perceived beliefs of significant others' opinions" and "the motivation to comply with significant others' opinions" to use ANH. The measure has 7 items, including the influences by physicians, nurses, spouses, sons, daughters, friends, or others, on a 5-point Likert scale: from "strongly unaffected (1)" to "strongly affected (5)."
5. *Wishes.* This identified the terminal patients' wishes for using ANH, including the use of intravenous hydration and nutrition (including electrolytes).

### Statistical Analysis

All data were analyzed using the SPSS 11.0 statistical software. A frequency distribution was used to describe the demographic data and the distribution of each variable. Mean values and standard deviations were used to analyze the degree of each variable in the knowledge of ANH, beliefs and evaluations on the use of ANH, health locus of control, and subjective norm measures. Each item of the above measures was entered into the model as independent variables and the wishes to use ANH as the dependent variable. Univariate analysis was performed between the wishes and possible wish-related variables by Chi-square test, one-way ANOVA, Scheffe's test, independent sample t-test, and Pearson correlation coefficient. A *P* value of less than 0.05 was considered significant. Afterward, backward stepwise logistic regression analysis was carried out to determine the relative values of the variables related to

the wishes. Calibration of the models was assessed using the Hosmer and Lemeshow Goodness-of-Fit test. It evaluated the degree of correspondence between the probabilities of wishes and the actual wishes.

## Results

### Demographic Characteristics

Table 1 shows the demographic characteristics of the 197 patients. Patients were mainly

Table 1  
Demographic Characteristics (n = 197)

Variables	n (%)
Gender	
Male	102 (51.8)
Female	95 (48.2)
Age group (Mean: 62.71 years, S.D. = 15.803 years)	
≤30	9 (4.6)
31-40	5 (2.5)
41-50	32 (16.2)
51-65	47 (23.9)
>65	104 (52.8)
Educational level	
None	20 (10.2)
Elementary school	48 (24.4)
Junior school	33 (16.8)
High school	47 (23.9)
College/university	49 (24.9)
Primary cancer sites	
Lung	46 (23.4)
Liver	24 (12.2)
ENT	23 (11.7)
Colon/rectal	15 (7.6)
Stomach	12 (6.1)
Uncertain	12 (6.1)
Pancreas	10 (5.1)
Breast	9 (4.6)
Esophagus	6 (3.0)
Musculoskeletal	5 (2.5)
Others	35 (17.8)
Have ever used ANH in past month?	
ANH used	
Yes	154 (78.2)
No	43 (21.8)
Intravenous fluid used	
Yes	140 (71.1)
No	57 (28.9)
Intravenous nutrition used	
Yes	89 (45.2)
No	108 (54.8)
Nasogastric tube used	
Yes	43 (21.8)
No	154 (78.2)
Gastrostomy used	
Yes	8 (4.1)
No	189 (95.9)
Do you understand what ANH is?	
Yes	115 (58.4)
No	82 (41.6)

above 65 years old (52.8%) with a mean age of 62.7 years ( $SD = +15.8$  years). The formal education of half of the respondents was junior high school or below (51.4%). The primary sites of cancer in the patients were lung (23.4%), liver (12.2%), head/neck (11.7%), and colorectal (7.6%). More than three quarters of the patients (78.2%) used ANH in the past month. With regard to the details of ANH used, the percentages of using intravenous hydration, intravenous nutrition, nasogastric tube, and gastrostomy were 71.1%, 45.5%, 21.8%, and 4.1%, respectively. Meanwhile, 115 of the 197 patients (58.4%) said they understood what ANH is.

### *Knowledge of ANH*

With regard to ANH knowledge, the mean percentage of accurate responses was only 24.4%. The accurate answers to the knowledge of ANH was ranked as "peripheral intravenous fluids can only provide hydration" (48.7%), "excessive artificial nutrition may increase the proliferation of cancer cells" (32.0%), "ANH symbolizes the care of families" (26.4%), "ANH will be helpful to all patients in any disease stage" (24.9%), "ANH can prolong life expectancy" (17.2%), "ANH can increase physical strength for all patients" (16.3%), and "ANH can prevent all patients from starving to death" (5.6%) (Table 2).

### *Variables Related to the Wish to Use ANH*

Table 3 shows that the possible factors related to one's wishes include beliefs on ANH, the health locus of control, and the prevailing subjective norms. The mean score of beliefs toward ANH was 2.90 ( $SD = 0.34$ , range 1–5). The two sub-concepts of beliefs were: the perception of "benefit" of using ANH and "burdens" of using ANH. Their mean scores were 3.81 and 2.38,

respectively. These indicate positive beliefs towards using ANH. The items with high scores in terms of perceived benefits about ANH include: "ANH can meet the body's needs for nutrition and fluid, when the inability to eat or drink occurs" (4.17), "need to use ANH when vomiting or anorexic" (4.15), "able to prevent dehydration" (4.09), and "able to increase physical strength" (3.64). Concerning the importance evaluated by patients, "ANH can meet the body's needs of nutrition and fluid, when inability to eat or drink occurs" (4.04) is recognized to be the most important benefit.

The items with high scores in terms of the perceived burdens about using ANH are: "gastrostomy will make the illness worse" (2.73), "make blood vessels harder" (2.49), "unnecessary to use ANH if it is not helpful in the control of illness" (2.49), and "using NG tube to make a bad image" (2.47). Concerning the importance evaluated by patients, "unnecessary to use ANH if it is not helpful in the control of illness" (3.66) and "NG tube makes me uncomfortable" (3.64) were the two important concerns that burden patients.

The mean scores of the two subscales of Health Locus of Control, "Chance external" and "Internal and powerful others" were 2.85 and 3.86, respectively. These indicate that the patients in the study were inclined to believe in overcoming everything either by themselves or by support from the medical staff and their families.

Subjective norms to the use of ANH came from the influences of the terminal cancer patients' significant others. The physician and nurse was the most often cited "significant other" (mean 3.70 and 3.66, respectively). The total mean of subjective norms was 3.62 (range 1–5), which shows that the terminal patients were moderately influenced by subjective norms, especially from the medical staff.

Table 2  
Knowledge of Artificial Nutrition and Hydration ( $n = 197$ )

Variables	Correct response $n$ (%)	Wrong response $n$ (%)	Not clear $n$ (%)
Peripheral intravenous route can only provide hydration	96 (48.7)	14 (7.1)	87 (44.2)
Excessive ANH may increase the proliferation of cancer cells	63 (32.0)	29 (14.7)	105 (53.3)
ANH symbolizes the care of families	52 (26.4)	120 (60.9)	5 (12.7)
ANH is helpful to all patients at any stage of disease	49 (24.9)	117 (59.4)	31 (15.7)
ANH can prolong life for all patients	34 (17.2)	130 (66.0)	33 (16.8)
ANH can increase physical strength for all patients	32 (16.3)	136 (69.0)	29 (14.7)
ANH can prevent all patients from starving to death	11 (5.6)	175 (88.8)	11 (5.6)



Table 3  
Variables Related to Wishes of Terminal Cancer  
Patients to Use ANH ( $n = 197$ )

Variables	Mean ( $\pm$ SD)	Range
Beliefs: perception of using ANH	2.90 $\pm$ 0.34	1–5
Factor I: perception of benefit	3.81 $\pm$ 0.52	1–5
Factor II: perception of threats	2.38 $\pm$ 0.45	1–5
Health locus of control	3.35 $\pm$ 0.46	1–6
Factor I: chance external	2.85 $\pm$ 0.63	1–6
Factor II: internal and powerful others	3.86 $\pm$ 0.56	1–6
Subjective norms for the use of ANH	3.62 $\pm$ 0.81	1–5
Knowledge of ANH	0.27 $\pm$ 0.19	0–1

### *The Wish and Its Important Influencing Factors Toward the Use of ANH*

More than sixty percent (62.9%) of terminal cancer patients expressed their wishes to use ANH, leaving 23.9% and 13.2% in the unwished and unclear groups, respectively (Table 4). The majority of those belonging to these unwished and unclear groups were willing to receive hydration and nutrition (75.8% and 91.1%, respectively).

The results of stepwise logistic regression analysis in Table 5 reveal that, when other variables remain unchanged, the higher the score for “have ever used NG tube and IV fluids in recent one month” and “subjective norms,” the higher the probability of wishing to receive ANH (OR = 11.11, 95% CI = 3.20–38.64,  $P < 0.001$ ; OR = 2.51, 95% CI = 1.22–5.15,  $P < 0.05$ ; OR = 1.30, 95% CI = 1.05–1.60,  $P < 0.05$ ), respectively. For the fitness of the model, the  $P$ -value of the Hosmer and Lemeshow Goodness-of-Fit test was 0.303. However, regarding

Table 4  
Subjective Wishes to Use ANH ( $n = 197$ )

Wishes to use ANH	% ( $n$ )
Yes	62.9 (124)
No	23.9 (47)
Unclear	13.2 (26)
Details of ANH wish to use ( $n = 124$ )	
Hydration	
Yes	75.8 (94)
No	24.2 (30)
Nutrition	
Yes	91.1 (113)
No	8.9 (11)
Electrolyte	
Yes	37.9 (47)
No	62.1 (77)

the sub-models, the wish for using artificial nutrition (including electrolyte) was negatively affected by the knowledge of ANH (OR = 0.53, 95% CI = 0.37–0.84,  $P < 0.01$ ). For the fitness of the model, the  $P$ -value of the Hosmer and Lemeshow Goodness-of-Fit test was 0.990. These findings indicate that, when other variables remain unchanged, the higher the score for “the knowledge of ANH,” the lower the probability of wishing to receive artificial nutrition. Otherwise, concerning the wish for using artificial hydration, it is not suitable to perform stepwise logistic regression analysis because only one variable has a significant difference in the univariate analysis.

### *Discussion*

Patient autonomy should be respected and this has been emphasized in hospice and palliative care. Autonomy requires the respect for the patient's right to self-determination that will allow each to judge what is best, weighing the benefits and harm, in the patient's own case.<sup>26</sup> However, there have been relatively few studies that deal with the concerns of terminal patients, and this is the first one to investigate the issues regarding ANH from the patient's perspective. This study not only identified the terminal cancer patients' wishes to use ANH, but also determined the influencing factors in their wishes. Thus, the results of the study would be helpful in providing efficient education and communication among patients, families, and medical professionals for reaching a more appropriate decision.

It is interesting in the study that although 154 study patients (78.2%) used ANH in the past month, only 115 of these (58.4%) said they understand what ANH is. These results indicate an ethical concern. Despite medical staff endeavors to provide adequate nutrition or hydration in the principle of beneficence, inappropriate hydration and nutrition may further increase the terminal patient's distress, violating the principle of non-maleficence. With regard to foregoing or giving assisted nutrition and hydration, it will be a moral responsibility to explain the causes of impairment to eating or drinking and the potential benefits and burdens in the use of ANH to the patients and to their families, although some evidence of these

Table 5  
**Models for Significant Influencing Variables Toward the Wish  
 to Use ANH and Artificial Nutrition by Logistic Regression Analysis**

Use of ANH			Wishes/No wish		
Significant variables	$\beta$	S.E.	OR	95% CI of OR	P-value
Have ever used NG tube in past month	2.408	0.636	11.114	(3.196–38.646)	0.000
Have ever used IV fluids in past month	0.919	0.367	2.507	(1.221–5.148)	0.012
Subjective norms	0.262	0.107	1.300	(1.054–1.603)	0.014
Hosmer and Lemeshow Goodness-of-Fit test P-value 0.303					
Use of artificial nutrition			Wishes/No wish		
Significant variable	$\beta$	S.E.	OR	95% CI of OR	P-value
Knowledge of ANH	−0.642	0.229	0.526	(0.336–0.842)	0.005
Hosmer and Lemeshow Goodness-of-Fit test P-value 0.990					

benefits or burdens remains inconclusive. Moreover, legally, ANH has been recognized as a medical treatment, which can be refused by a competent adult or a surrogate decision-maker appointed through an advance directive in the principle of autonomy.<sup>11</sup>

As to the knowledge of ANH, the low percentage of accurate responses indicates that knowledge about AHN is insufficient among terminal cancer patients. This is also believed to occur commonly in medical professionals.<sup>27,28</sup> “ANH can prolong life for all patients,” “ANH can increase physical strength for all patients,” and “to prevent all patients from starving to death” are the items with the lowest percentage of accurate answers, which correspond with the local cultural significance. Difficulty in eating or drinking often leads to anxiety in the patient’s loved ones, who worry that the terminal patient will starve to death, becoming a “starving soul” after death. Such concerns in Taiwan drive families to requests for food or fluids that might cause greater discomfort for patients and make necessary their stay in the hospital rather than at home.<sup>7</sup>

Some studies also show the use ANH has no significant influence on survival, which could be explained with reference to the “terminal common pathway” in cancer patients and which may validate the ethical nature of withholding ANH.<sup>6,7</sup> The ethical training of medical professionals and the process of communication with patients or families should re-focus on emphasizing the fact that the inability to eat or drink in terminal cancer patients is always due to the natural course of the disease and the outcome of death will be due to the deterioration of systemic organs rather than starvation. Otherwise,

only 63 patients (32.0%) recognized that excessive ANH might increase the proliferation of cancer cells, which is also an important educational need for better communication and decision-making.

In our clinical practice, continuing explanation of the reasons for foregoing ANH could often be accepted by families. However if conflicts arise, when people disagree about whether to withhold or withdraw ANH, a defined therapeutic trial of ANH for a set period of time (two or three days) is used. We encourage family and caregivers together to observe for the desired change. If the goals are not met by the end of the therapeutic trial, ANH can be stopped. This solution process is similar to the guidelines proposed by Jenkins and Bruera.<sup>29</sup> Furthermore, since the majority of Taiwanese are Buddhists, they usually believe that a “good death” can only be achieved in a Buddhist care model, especially in the very terminal stage. The staff in the study hospice always gently explained that in Buddhism, excessive nutrition or hydration is inappropriate to enlightenment and inspiration, both of which are helpful in achieving a better afterlife. Families usually understand and accept this explanation, and it relieves their anxieties to some extent.<sup>7</sup> However, it is worthwhile to mention that in Oriental culture, it is actually common practice not to disclose the truth of illness, especially to a terminal cancer patient, on the basis of non-maleficence. This mutual pretense prevails and increases the barriers of communication with patients about the details of using ANH.<sup>21</sup>

Approximately three-quarters of study patients recognized that ANH could symbolize the care of families (accurate response rate: 26.4%).

Although this item is somewhat related to attitudes, the finding may have some important implications. First, many patients may be able to take more food or water by mouth after improved oral hygiene, a change in food type, or assistance with family-patient interaction. Use of ANH too early may replace the family's delicate care and make the relationship between the patient and family more aloof. Improving quality of life by encouraging more interaction between patient and family is an essential part of palliative care. Second, it may imply and aggravate the potential worries of patients of being abandoned by the family.

As to the beliefs concerning NH, patients tended to believe the benefits of ANH (benefit vs. burden: 3.81 vs. 2.38). ANH was believed to be a better method to meet the body's needs for nutrition and fluid according to the findings of our belief survey. However, they believed ANH can only avoid malnutrition or dehydration, rather than the effects of ANH can improve the control of illness, or increase energy or physical power. Despite that, the worry about becoming a "starving soul" still drives patients and families to request the use of ANH. Concerning the burdens of ANH, patients strongly perceived that "gastrostomy will make illness worse (2.73)," "make blood vessels harder (2.49)," and "unnecessary to use ANH if it is not helpful in the control of illness (2.49)." However, the most important concern evaluated by patients was "unnecessary to use ANH if it is not helpful in the control of illness." These findings indicate that patients will become concerned about burdens, especially if ANH is unhelpful to the improvement of illness. Hence, it is ethically necessary for medical professionals to assess the benefit/burden of ANH and inform patients more correctly, which will be helpful for patients to make an appropriate judgment.

In the study, the experiences of using NG tube and IV fluids, and subjective norms were found to be predicting or explained variables for patients' wishes of using ANH. Among these variables, the experience of using NG tube was the most powerful predictor, with an odds ratio of 11.11. However, the use of an NG tube was also evaluated to be the important burden by our patients. The reasons of this finding may be related to the actual need due to the disease patterns or patients' demographic characteristics.

In the study, all of the head/neck cancer patients with experience with NG tubes expressed their wishes to use ANH. Furthermore, as a significant variable, the experiences of using ANH may also indicate the importance of initial decision-making in considering the use of ANH.

With regard to subjective norm, which is a significant variable for using ANH, medical professionals, including physicians and nurses, are the most influential persons. This reveals the important role of medical professionals in the process of decision-making for the use of ANH, although the families' concerns are recognized to be the major barriers in deciding the use of ANH in the context of local cultural background.

Further analysis of the use of artificial nutrition reveals that the knowledge of ANH, or lack of it, was the significant negative predicting variable for wishing to use artificial nutrition. From an educational point of view, we found that more evidence and good teaching materials on ANH might be helpful in promoting the knowledge of patients and further improving communication.

Certain caveats should be mentioned in relation to this study. First, some variables were not included in the study, such as symptom distress, religion, and health insurance. These could be influential. Second, the study was conducted in one unit. Even though these patients in the study hospital came from different areas in Taiwan, the generalizability of the findings is still of concern.

In conclusion, Taiwanese patients with terminal cancer have insufficient ANH knowledge even though they still believe in the benefits of ANH, especially to avoid dehydration or to prevent them from starving to death. Past experiences in using IV fluids and NG tubes, and the medical staffs' opinions, were the significant influencing factors in the patients' wishes concerning ANH, implying the importance of the professional training and initial decision-making in the consideration of using ANH. Otherwise, by increasing knowledge about ANH among patients, we can improve communication and make it easier to reach a more appropriate decision in the use of artificial nutrition.

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