Original Article

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Impact of an educational program on oncology nurses' attitudes and behaviors toward care of the dying

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Abstract

Objectives. Care of the dying is an essential part of holistic cancer nursing. Improving nurses' attitudes and behaviors regarding care of the dying is one of the critical factors in increasing the quality of nursing service. This study aims to examine the impact of an educational program based on the CARES tool on nurses' attitudes and behaviors toward care of the dying.

Methods. A quasi-experimental study with pre- and post-intervention measures was conducted. A total of 222 oncology nurses from 14 hospitals in Beijing, China, were enrolled using a convenient sampling method. This online educational course developed based on the CARES framework comprised 7 modules and 10 sessions. Each session was carried out twice a week over 30–60 min. Data were collected using a sociodemographic characteristics questionnaire, the Frommelt Attitude Towards Care of the Dying Scale (FATCOD) and the Nurses' Practice Behavior Toward Care of the Dying Questionnaire (NPBTCOD). Reassessment of attitudes and behaviors was conducted when completed the learning and 6 months after the learning, respectively. The sociodemographic characteristics of the nurses were analyzed using descriptive statistics, and differences in attitudes and behaviors were reported and compared by the paired t-test.

Results. All the 222 oncology nurses completed educational courses, and 218 nurses (98.20%) completed the pre- and post-attitudes evaluation and 213 (95.9%) nurses completed the pre- and post-behaviors evaluation. The mean (SD) FATCOD score before and after the educational program was 108.83 (12.07) versus 115.09 (14.91), respectively ($t = -8.546$, $p \geq 0.001$). The mean (SD) NPBTCOD score before and after the educational program was 69.14 (17.56) versus 73.40 (18.96), respectively ($t = -3.231$, $p = 0.001$).

Significance of results. This educational intervention was found to be an effective method for improving oncology nurses' attitudes and behaviors toward caring for dying patients.

Introduction

Cancer is a leading cause of death, accounting for almost 10 million deaths worldwide and more than 3 million deaths in China in 2020 (Sung et al. 2021; WHO 2022). Cancer patients in the last hours and days of life may experience multiple sufferings, as well as significant emotional, spiritual, and social distress that significantly affect their quality of life (Tsai et al. 2006; Verkissen et al. 2021). Hospice care is end–of–life care provided by a multidisciplinary team providing medical, psychological, and spiritual support to dying patients and their families. The goal of care is to help people who are dying die in peace, comfort, and dignity (Lu et al. 2018). Evidence shows that hospice care can directly improve outcomes and support better and more appropriate health care use for people in the last stages of cancer (Currow et al. 2020).

Modern hospice care was introduced into China in the late 1980s. Despite some efforts and attempts to develop hospice care we have made during the past few decades in China, several

findings (Economist Intelligence Unit, 2015; Finkelstein et al. 2022; Ling et al. 2020; Liu et al. 2021a) show that many cancer patients are struggling with poor quality of life due to unmet care needs during their last days and hours of life. Thus, improving the quality of end-of-life care provided to cancer patients in China is imperative.

Nurses usually have more interaction with patients in the actively dying phase and their family members than other health-care workers do, so they are an important part of the multidisciplinary team and play important roles and functions in hospice care practice. That is, developing a professionally trained nursing workforce is a potential solution to improve the quality of death of cancer patients. However, clinical nurses often do not know what to do and how to do when it comes to caring for the dying, and this results in nurses feeling stress and a sense of abandonment. Our previous study (Hou et al. 2023a) also showed that 70.7% of oncology nurses had not received end-of-life care training or education. These results suggest that there is still a lack of educational resources and researches for the care of the dying in China. Although some medical institutes and nursing associations have included the care of the dying in their end-of-life care training courses in recent years, the content is limited in terms of systematization, richness, and clinical practicality (Fan et al. 2020; Liu et al. 2021b). Thus, providing ongoing, systematic, and professional education is urgently needed for nurses to improve their competence in caring for the dying and meet the growing demand.

The CARES tool was proposed in 2013 by Bonnie Freeman (2013, 2015a) after a systematic search for articles and guidelines on the care of the dying. It is an acronym-organized and condensed education reference that provides prompts and recommendations to address the priority needs of the dying as Comfort, Airway, Restlessness and delirium, Emotional and spiritual support, and Self-care. According to a study by Stacy et al. (2019), education and use of the CARES tool significantly improved the knowledge, comfort, and confidence of nurses providing end-of-life care in the hospital setting. Our research team has translated the CARES tool into Chinese in 2019 (Freeman 2015b). In this study, we aimed to develop an educational program based on the CARES tool and test its impact on the attitudes and behaviors of oncology nurses toward the care of the dying to provide a scientific basis for the promotion and popularization of this educational program.

Materials and methods

Study design

For this study, a prospective and quasi-experimental design was used with standard questionnaires used pre- and post-education to evaluate the effectiveness of this learning intervention on the attitudes and behaviors of oncology nurses toward the care of the dying. The study protocol was approved by the Ethics Committee of the Peking University Cancer Hospital with the number 2021YJZ95.

Setting and sample

Nurses from 14 hospitals in Beijing, China, in January 2022 were recruited using a convenient sampling method. All participants were registered nurses, aged 18 years or older, independently engaged in oncology nursing work with experience in caring for terminally ill patients, and voluntarily participated in the study. Nurses were excluded if they were in-service training nurses from other hospitals or on leave during the study. Meanwhile, if nurses

had not participated in the entire education program or completed the pre- and post-education evaluation for various reasons, they would have been considered to drop out of this study.

The sample size was calculated using the G*Power 3.1.7 software. Taking into account data from previous studies (Abuhammad and Almasri 2022; Ghaemizade et al. 2022; Hao et al. 2021), a matched pairs t-test was used, with a significant alpha level of 0.05 (2 tails) and a power $(1 - \beta)$ level of 0.90, for detecting a moderate effect size of 0.25 to compute the required sample size, which was $n = 171$. Plus 20% of the sample loss, and the estimated sample size should be 206 cases. Actually, a total of 222 nurses who met the inclusion criteria were enrolled and completed the entire educational learning. Finally, 218 (98.2%) nurses completed the pre- and post-attitudes assessment and 213 (95.9%) nurses completed pre- and post-behaviors assessment.

Measurements

The measurements in this study consisted of the socio-demographic information of the nurses and their attitudes and behaviors toward the care of the dying. The socio-demographic information part included age, sex, education profile, professional title, and previous training in end-of-life care.

The Frommelt Attitude Towards Care of the Dying Scale (FATCOD) developed by Frommelt (1991) in 1991 was chosen for this study to assess nurses' attitudes. This instrument consists of 30 Likert-type items scored on a 5-point scale. Items 1, 2, 4, 10, 12, 16, 18, 20, 21, 22, 23, 24, 25, 27, and 30 are positively worded statements and scored from 1 for strongly disagree to 5 for strongly agree. All others are negative, and the opposite scoring system is used. Possible scores range from 30 to 150, and higher scores indicate more positive attitudes toward caring for terminally ill patients and their families. In 2016, Yang et al. (2016) translated FATCOD into Chinese and found that the Chinese version of FATCOD was reliable and valid. In this study, FATCOD had high reliability, with Cronbach's alpha values of 0.866 and 0.902 in pre- and post-education evaluations.

Nurses' Practice Behavior Toward Care of the Dying Questionnaire (NPBTCOD) developed by Hou et al. (2023b) was used to assess nurses' behaviors regarding caring for dying patients. The NPBTCOD was designed based on the CARES tool (Freeman 2013) and consisted of 31 items and 5 domains (pain management and comfort, airway management, restlessness and delirium management, emotional and spiritual support, and self-care of nurses). Nurses provide answers according to their actual implementation for various behaviors, and each behavioral item was rated using a 4-point Likert scale ranging from 0 (Never) to 3 (Frequently). The total score can range from 0 to 93 with higher score indicating better practice behavior toward caring for dying patients. The Item-Content validity Index (I-CVI) were 0.80–1.00, and the Cronbach's α coefficient of the overall questionnaire was 0.945 and the test–retest reliability was 0.785, indicating its good validity and reliability.

Procedure and data collection

At the beginning of the research, all participants were provided with a thorough explanation of the study and signed informed consent forms. We established a link to the online survey using a crowd-sourcing platform named Wenjuanxing in mainland China. Then a WeChat group was set up to convey the message. The self-administered online survey questionnaires were

Table 1. Modules and content of the educational program for the care of the dying

Module		Session	Course main content
Module 1	Introduction	Session 1	Development of the care of the dying
		Session 2	Definition and manifestations of the actively dying period Methods of predicting survival
Module 2	Comfort care (C)	Session 3	Pain management
		Session 4	Comfort care
Module 3	Airway management (A)	Session 5	Management of dyspnea Management of death rattle
Module 4	Restlessness and delirium management (R)	Session 6	Overview of restlessness and delirium Management of restlessness and delirium
Module 5	Emotional and spiritual support (E)	Session 7	End-of-life communication skills
		Session 8	Emotional and spiritual support for patients Emotional and spiritual support for family members
Module 6	Self-care (S)	Session 9	Nurses' self-care Support from organization or team
Module 7	Case studies	Session 10	Theoretical foundation of the CARES tool Use of the CARES tool

delivered to participants to complete at 3 points: before the learning intervention, at the end of the learning intervention, and 6 months after the learning intervention. The first survey questionnaire involved sociodemographic information from nurses, FATCOD and NPBTCOD. After the learning was completed, the participants were asked to complete the FATCOD again to assess the change in nurses' attitudes. Considering that behavioral change could take longer, the NPBTCOD was completed again 6 months after learning. Finally, baseline data were compared with post-education data to assess the impact of the educational program on nurses' attitudes and behaviors toward caring for the dying.

Educational intervention

The content of the educational intervention was designed based on the CARES tool. This tool can provide nurses with the information they need to address the 5 most common symptoms management needs when caring for the dying identified from a literature review and analysis, including comfort (C), airway (A), restlessness and delirium (R), emotional and spiritual support (E), and self-care (S). The educational course consisted of 7 modules: introduction, comfort care, airway management, restlessness and delirium management, emotional and spiritual support, self-care, and case studies. The main content of the educational program is presented in Table 1. This final course draft was formed after 2 rounds of 23 experts' consultations using the Delphi method to seek their advice. Each module was divided into 1 or 2 sessions and 10 sessions in total were distributed into 7 modules. All sessions were recorded on video using a PowerPoint presentation by a well-trained and experienced hospice care team in response to the precautions of COVID-19. And each session was carried out twice a week over 30–60 min, so that the participants could choose their preferred time for the curriculum. The overall educational program lasted for 5 weeks (2 sessions per week) under the supervision of a researcher. Participants who did not attend 3 sessions would be considered an automatic withdrawal from the education program.

Statistical analyses

The data were collected in a file compatible with Excel Statistics and then transferred to an IBM SPSS Statistics, Version 22.0 for Windows (SPSS Inc., Chicago, USA) to perform statistical analyzes. Descriptive statistics (frequency, percentage, means, standard deviations, median, range) were used as appropriate to describe the characteristics and study variables of the nurses. Paired samples *t*-tests were performed to determine the difference between the pre- and post-education scores of the attitudes and behaviors of the participants toward caring for the dying. The level of statistical significance was considered to be 0.05.

Results

Sociodemographic information for nurses

A total of 222 nurses completed all educational learning. They ranged in age from 21.0 to 53.0 years with a mean age of 32.83 (SD = 7.08) years and ranged in clinical nursing work experience from 0.5 to 34.0 years with a mean experience of 11.23 (SD = 7.68) years. Among the participants, the number of female nurses was 217 (97.7%) and the number of male nurses was 5 (2.3%). A total of 170 nurses (76.6%) had a bachelor degree, 48 nurses (21.6%) had an associate degree, and 4 nurses (1.8%) had a master degree. The number of nurses with primary, secondary and senior professional titles was 154 (69.4%), 60 (27.0%), and 8 (3.6%), respectively.

Impact of the educational program on nurses' attitudes toward care of the dying

The mean (SD) total attitudes scores of the pre-education and post-education were 108.83 (12.07) ranging from 86.0 to 150.0 and 115.09 (14.91) ranging from 80.0 to 150.0 on the FATCOD, respectively, and the difference was statistically significant ($t = -8.546$, $p < 0.001$). Furthermore, there were statistically significant differences between the pre- and post-intervention scores in the 24 items among the 30 items of the FATCOD ($p < 0.05$) (see Table 2).

Table 2. Comparison of nurses' attitudes toward care of the dying before and after the education program ($N = 218$)

	FATCOD items	Mean ± SD		t	p
		Pre-education	Post-education		
1	Giving care to the dying person is a worthwhile experience.	4.42 ± 0.73	4.45 ± 0.92	−0.443	0.658
2	Death is not the worst thing that can happen to a person.	3.91 ± 0.93	4.13 ± 0.98	−2.798	0.006
3	I would be uncomfortable talking about impending death with the dying person.	2.71 ± 1.03	3.16 ± 1.12	−5.383	<0.001
4	Caring for the patient's family should continue throughout the period of grief and bereavement.	3.54 ± 1.22	3.87 ± 1.22	−3.989	<0.001
5	I would not want to care for a dying person.	3.59 ± 1.05	3.79 ± 1.07	−2.442	0.015
6	The non-family care-givers should not be the one to talk about death with the dying person.	3.39 ± 1.01	3.73 ± 1.13	−4.527	<0.001
7	The length of time required to give care to a dying person would frustrate me.	3.11 ± 1.04	3.38 ± 1.16	−3.349	0.001
8	I would be upset when the dying person I was caring for, gave up hope of getting better.	2.31 ± 0.88	2.43 ± 1.11	−1.553	0.122
9	It is difficult to form a close relationship with the dying person.	3.28 ± 0.86	3.51 ± 1.02	−2.972	0.003
10	There are times when death is welcomed by the dying person.	3.60 ± 0.82	3.88 ± 0.84	−4.167	<0.001
11	When a patient asks, "Am I dying?", I think it is best to change the subject to something cheerful.	2.67 ± 0.98	3.01 ± 1.12	−4.676	<0.001
12	The family should be involved in the physical care of the dying person if they want to.	4.33 ± 0.73	4.55 ± 0.59	−3.581	<0.001
13	I would hope the person I'm caring for dies when I am not present.	3.22 ± 1.05	3.41 ± 1.08	−2.462	0.015
14	I am afraid to become friends with a dying person.	3.16 ± 1.07	3.51 ± 1.10	−5.165	<0.001
15	I would feel like running away when the person actually died.	3.52 ± 1.00	3.65 ± 1.10	−2.010	0.046
16	Families need emotional support to accept the behavior changes of the dying person.	4.12 ± 0.69	4.29 ± 0.82	−2.842	0.005
17	As a patient nears death, the non-family care-giver should withdraw from his/her involvement with the patient.	3.27 ± 1.02	3.30 ± 1.19	−0.318	0.751
18	Families should be concerned about helping their dying member make the best of his/her remaining life.	4.39 ± 0.59	4.51 ± 0.62	−2.672	0.008
19	The dying person should not be allowed to make decisions about his/her physical care.	4.02 ± 0.82	4.10 ± 0.99	−1.100	0.272
20	Families should maintain as normal an environment as possible for their dying member.	4.27 ± 0.57	4.38 ± 0.68	−2.174	0.031
21	It is beneficial for the dying person to verbalize his/her feelings.	4.32 ± 0.55	4.45 ± 0.64	−2.726	0.007
22	Care should extend to the family of the dying person.	4.43 ± 0.55	4.51 ± 0.61	−1.809	0.072
23	Care-givers should permit dying persons to have flexible visiting schedules.	3.78 ± 0.95	4.14 ± 0.92	−5.906	<0.001
24	The dying person and his/her family should be the in-charge decision makers.	4.08 ± 0.69	4.27 ± 0.77	−3.107	0.002
25	Addiction to pain relieving medication should not be a concern when dealing with a dying person.	4.05 ± 0.99	4.21 ± 1.03	−1.890	0.060
26	I would be uncomfortable if I entered the room of a terminally ill person and found him/her crying.	2.45 ± 0.95	2.78 ± 1.15	−4.776	<0.001
27	Dying persons should be given honest answers about their condition.	3.83 ± 0.78	4.03 ± 0.85	−3.057	0.003
28	Educating families about death and dying is not a non-family care-givers responsibility.	3.82 ± 0.86	4.05 ± 0.99	−3.186	0.002
29	Educating families about death and dying is not a non-family care-givers responsibility.	3.44 ± 0.99	3.67 ± 1.06	−3.059	0.002
30	It is possible for non-family care-givers to help patients prepare for death.	3.82 ± 0.80	3.97 ± 0.82	−2.261	0.025

Impact of the educational program on nurses' behaviors toward care of the dying

The total behavior scores on the NPBTCOD of 213 oncology nurses before and after education were 69.14 ± 17.56 and 73.40 ± 18.96 respectively, and the difference was statistically significant ($t = -3.231$, $p = 0.001$). Among them, the "airway management" domain ($t = -4.848$, $p < 0.001$), "emotional/spiritual support" domain ($t = -5.213$, $p < 0.001$), and "self-care" domain ($t = -5.076$, $p < 0.001$) showed statistically significant differences in behavior improvement (see Table 3).

Discussion

This is the first application research of the CARES tool in China. We developed educational courses based on the CARES tool and ensured that the courses are scientific and consistent with the needs of clinical practice. Experts' consultations were adopted using the Delphi method to perfect the content of the course.

This educational program effectively improved oncology nurses' attitudes toward care of the dying

After the 5-week educational program, the FATCOD scores increased significantly from 108.83 ± 12.07 to 115.09 ± 14.91 ($t = -8.546$, $p < 0.001$), implying that the attitude of the nurses gained a statistically significant improvement compared to the baseline. This finding agrees with those of previous studies despite different contents, methods or durations of the educational intervention (Abuhammad and Almasri 2022; Gupta et al. 2022; Hao et al. 2021). And these positive results also suggest that education is an effective factor in the development of positive attitudes toward caring for dying patients. From Table 2, we found that only 6 items' scores did not demonstrate a statistically significant difference between pre- and post-intervention among 30 items of the FATCOD ($p \geq 0.05$) although we saw underlying improvement trends. More positive data from our current study appeared to be gained than those from a study by Abuhammad and Almasri (2022) with a pediatric nurses' sample and another study by Byrne et al. (2020) with a sample of nursing students, highlighting the strength and effectiveness of the educational program as adopted in this study.

Among the 6 items with negative results, there were 4 items scoring above 4 at the baseline, meaning that nurses had relatively positive attitudes or would not be afraid to practice these behaviors before the educational program, so there could be less chance or room to improve them through educational intervention. However, for the item "I would be upset when the dying person I was caring for, gave up hope of getting better," the mean pre-intervention and post-intervention scores were 2.31 ± 0.88 and 2.43 ± 1.11 ($t = -1.553$, $p = 0.122$) respectively; this was not statistically significant. The fact that course content related to hope was not included in the educational program could be a factor associated with this result. There are 2 types of hope, including goal-based hope and emotion-based hope, and the dominant form of hope in a terminal situation often becomes emotion-based, allowing them to believe that their goals, desires, or wishes are possible . That means nurses should stay rational at all times even getting better is no longer possible and foster their emotion-based hope through the willingness of the patients to share a part of themselves, lister attentively, and so on. Accordingly, this evidence suggests that content regarding the preservation of patients' hope should be incorporated into future

educational intervention curriculum to improve nurses' attitude about this item.

This educational program also effectively improved oncology nurses' behaviors toward caring for the dying

Behavior changes never happen at once. In view of this, we again evaluated nurses' behaviors 6 months after the educational program. As expected, the result showed that the mean behavior scale score increased significantly 6 months after the education intervention compared to the baseline score ($t = -3.231$, $p = 0.001$). It is noteworthy that in the domain of "pain management and comfort care," as shown in Table 3, except for the item "physicians are advised to minimize invasive procedures and unnecessary laboratory tests when caring for patients in the dying phase," other behavioral items did not demonstrate a statistically significant improvement. This was possibly due to the high scores of these items at baseline. In particular, the scores of all behavioral items related to pain management were above 2.50 at baseline, which means that there is little room for improvement. This finding was similar to a previous study by Shen et al. (2019), and that pain management was the most commonly covered topic in their training and practice experience could be the reason.

Dyspnea, death rattle, and restlessness/delirium are also common symptoms in dying phrase, and taking effective measures is of utmost importance to reduce patient suffering. From Table 3, some behaviors in adopting non-pharmacological care measures to deal with these symptoms improved significantly over the following 6 months, suggesting that this educational program contributed to mobilizing nurses' initiative and playing their value and role. As the cancer patient enters the stage of actively dying, curative treatment is no longer an option and life-prolonging measures are deemed futile. At this time, emotional/spiritual support for patients and their families becomes the focus. Emotional/spiritual support requires nurses to have various skills such as communication, listening, companionship, and empathy. The most striking result that emerges from the data is that all behavioral items in the "emotional/spiritual support" domain showed statistically significant differences (all $p < 0.05$). This confirms the value and significance of the educational program in promoting nurses' implementation of emotional/spiritual support. Furthermore, as noted by Freeman B, "Caring for the dying and their families can be very stressful – physically, emotionally, and spiritually. Issues of moral distress, burnout, and compassion fatigue are common." Nurses' self-care is very important and is easily neglected. Many previous end-of-care educational interventions did not cover this content (Abuhammad and Almasri 2022; Ghaemizade et al. 2022; Hao et al. 2021). Fortunately, this educational program focused on this topic, and the results from the current study demonstrated its positive impact on improving their self-care behaviors.

Limitations

This study faced some limitations. First, we adopted a quasi-experimental research design rather than a randomization design, which might affect the generalizability of the study findings. However, it's worth mentioning that participants were recruited in our presented study from 14 hospitals and not just from a single institution in order to reduce sample bias and ensure sample representativeness, which strengthened the study findings. Second, various educational strategies such as face-to-face interaction or

Table 3. Comparison of nurses' practice behaviors toward care the dying before and 6 months after the education program (*N* = 213)

NPBTCOD items	Mean ± SD		*t*	*p*
	Pre-education	Post-education		
Pain management and comfort care	27.56 ± 7.65	27.00 ± 9.71	0.809	0.419
1. Encourage patients to express their painful feelings in the clinic and invite them to believe pain can be effectively managed.	2.60 ± 0.84	2.48 ± 0.97	1.518	0.131
2. In the pain assessment, the patient's complaint is used as the basis and recorded truthfully.	2.74 ± 0.75	2.61 ± 0.94	1.903	0.058
3. Appropriate application of assessment tools or pain assessment techniques to accurately determine the intensity of a patient's pain in patients with communication or severe cognitive impairment.	2.54 ± 0.87	2.45 ± 0.97	1.242	0.216
4. Proactively explain to the patient and family the importance of maintaining continuous pain-free with pain medication on time.。	2.66 ± 0.83	2.59 ± 0.94	1.009	0.314
5. Be able to identify influencing factors when poor pain control is identified, communicate with the physician, and actively manage to promote effective pain relief.	2.62 ± 0.80	2.51 ± 0.95	1.454	0.147
6. The analgesic effect was evaluated and recorded promptly according to the peak time of the different routes of opioid administration.	2.63 ± 0.81	2.53 ± 0.95	1.424	0.156
7. Prioritize patient comfort when implementing treatment and care measures for patients.	2.61 ± 0.81	2.57 ± 0.94	.558	0.577
8. Physicians are advised to minimize invasive procedures and unnecessary laboratory tests when caring for patients in the dying phase.	1.50 ± 1.09	1.88 ± 1.08	−4.254	<0.001
9. Assess the dying patient's wishes and assist with turning and positioning to improve comfort.	2.45 ± 0.87	2.37 ± 0.99	1.061	0.290
10. Change wet or contaminated dressings, gowns, and linens for dying patients promptly.	2.67 ± 0.78	2.56 ± 0.95	1.501	0.135
11. Proactively provide oral care for dying patients to keep their mouths clean.	2.54 ± 0.83	2.45 ± 0.96	1.357	0.176
Airway management	11.66 ± 4.89	13.74 ± 5.02	−4.848	<0.001
12. Instruct family members to use a low-speed fan or lightly shake the fan to reduce the patient's respiratory distress.	0.98 ± 1.09	1.84 ± 1.08	−9.284	<0.001
13. Offer to assist the patient in a comfortable position that relieves dyspnea, such as a semi-sitting or upright sitting position.	2.56 ± 0.86	2.51 ± 0.89	0.653	0.514
14. Proactively instruct family members to relieve patients' dyspnea exacerbated by anxiety through companionship, touch, and talking with the patient.	2.33 ± 0.97	2.46 ± 0.90	−1.507	0.133
15. Proactively explain to the family the changes in breathing patterns during the dying process and reassure them that the patient is not feeling pain now.	1.94 ± 1.08	2.33 ± 0.96	−4.397	<0.001

(*Continued*)

Table 3. (*Continued.*)

NPBTCOD items	Mean ± SD		t	p
	Pre-education	Post-education		
16. Knowing that a patient is dying by recognizing death rattles.	1.82 ± 1.14	2.23 ± 0.98	−4.467	<0.001
17. Provide proactive oral care when patients with death rattles are on medications that inhibit glandular secretion, causing dry mouth.	2.02 ± 1.10	2.37 ± 0.94	−4.002	<0.001
Restlessness/delirium management	9.33 ± 5.59	9.98 ± 5.86	−1.470	0.143
18. Proactively identify common causes of restlessness/delirium, identify reversible causes, and provide timely feedback to the physician for management advice, such as pain, urinary retention, and fecal canalization.	1.92 ± 1.18	2.03 ± 1.21	−1.112	0.267
19. Take proactive non-pharmacological care measures to help the restlessness/delirium patient relax, such as keeping the environment quiet, providing soft lighting, playing familiar music, and using aromatherapy.	1.62 ± 1.19	1.86 ± 1.19	−2.561	0.011
20. Proactively telling the family that their presence and expressions of love for their loved one can calm and relax the restlessness/delirium patient.	1.94 ± 1.21	2.05 ± 1.22	−1.111	0.268
21. Work with the family to understand the psycho-spiritual factors that may be causing the patient's restlessness and meet the patient's wishes whenever possible.	1.90 ± 1.22	2.00 ± 1.23	−1.029	0.305
22. Proactively inform the family that restlessness/delirium and wakefulness may alternate during the dying phase and encourage them to have meaningful communication while the patient is awake.	1.94 ± 1.21	2.04 ± 1.21	−1.031	0.304
Emotional/spiritual support	11.47 ± 3.34	12.63 ± 2.89	−5.213	<0.001
23. Appropriately apply communication skills to identify with the patient's distress and emotional reactions, always maintaining a sense of dignity and worth.	2.52 ± 0.70	2.65 ± 0.59	−2.410	0.017
24. Proactively work with family members to provide the patient with objects, activities, smells, sounds, and environments that enjoy.	2.25 ± 0.78	2.48 ± 0.70	−4.078	<0.001
25. Encourage family members to bring people, objects, and gifts that are meaningful to the patient or hold ceremonies to guide loved ones to reflect on shared life experiences, fulfill wishes and say goodbye.	2.08 ± 0.96	2.43 ± 0.78	−5.050	<0.001
26. Proactively attend to the psycho-spiritual distress of family members and provide support, including assessing their needs, providing support to give them rest, identifying with their feelings of grief, and answering their questions promptly.	2.39 ± 0.79	2.56 ± 0.64	−2.953	0.004
27. Acts as an advocate for patients and families, proactively speaking out for their needs and ensuring smooth communication between families and multidisciplinary team members.	2.22 ± 0.87	2.51 ± 0.66	−4.702	<0.001

(*Continued*)

Table 3. (*Continued.*)

| | Mean ± SD | | | |
NPBTCOD items	Pre-education	Post-education	*t*	*p*
Self-care	9.11 ± 2.80	10.06 ± 2.39	−5.076	<0.001
28. Confront and acknowledge the physical, emotional, and spiritual stresses that end-of-life care places on you.	2.38 ± 0.75	2.57 ± 0.65	−3.275	0.001
29. Proactively apply stress reduction methods to self-reduce stress when feeling anxious and stressed in end-of-life care	2.23 ± 0.85	2.44 ± 0.75	−3.408	0.001
30. Proactively reflect on and summarize the challenges they face in end-of-life care and the importance of their care has on patients and families.	2.23 ± 0.83	2.48 ± 0.70	−4.282	<0.001
31. Proactive learning and mastery of knowledge and skills in end-of-life care to alleviate stress and burnout in end-of-life care.	2.28 ± 0.83	2.57 ± 0.61	−5.547	<0.001

group work were restricted to carry out due to coronavirus pandemic events, and only the online learning conducted in our study might have some influence on the effectiveness of this educational program. Additionally, this study only examined the relatively short-term effects of the educational intervention, and ideally longer-term follow-up evaluations should be conducted to determine its sustained effects on nurses' attitudes and behaviors toward caring for dying patients.

Conclusions

In summary, this study presents a structured end-of-life educational intervention based on the CARES framework for nurses who participate in the care of dying patients, providing scientific and promising evidence for future education and training systems in end-of-life care. Our study results confirm that this 5-week online-based educational intervention can significantly improve the attitudes and behaviors of oncology nurses toward the care of the dying in a self-assessment evaluation. Therefore, it is recommended to generalize the use of the CARES framework as a learning method and incorporate similar educational programs into continuing education for nurses. And it is also recommended that further researches are conducted to determine whether the improvement in nurses' attitudes and behaviors toward care of dying patient following educational intervention can be sustained and translated into better nursing practices.

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