



Research Article

Factors Associated with Behaviors Toward End-of-life Care Among Chinese Oncology Nurses: A Cross-Sectional Study

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SUMMARY

Purpose: The goal of this study was to describe the current status of oncology nurses' behaviors toward end of life (EOL) care in China and to explore the factors associated with oncology nurses' behaviors toward EOL care.**Methods:** A cross-sectional design was applied and a convenience sample of 1038 oncology nurses from 22 grade A hospitals were recruited into this study. A general social demographic data questionnaire was administered, and the Chinese version of Nurses' Behaviors of Caring for Dying Patients Scale was used to assess nurse behavior toward EOL care. The total score ranges from 40 to 200 points. Data were analyzed with SPSS 26.0 software.**Results:** Chinese oncology nurses' average score of holistic EOL care behaviors was 2.97 ± 0.59 . Oncology nurses provide physical care most (3.81 ± 0.76), followed by family care (3.02 ± 0.86), and spiritual care (2.37 ± 0.67). Multiple regression analysis showed that a higher frequency of sharing EOL care experience with colleagues, in-service palliative care education, higher level of head nurse support for EOL patient care, more cases of EOL care, higher working position, and nurse's perceived high level of support were positively associated with behavior toward EOL care. These six factors explained 16.2% of the total variance.**Conclusions:** The results may help provide a basis for converting behavior for EOL care among oncology nurses and design interventions to better improve quality of life for EOL patients with cancer in China.© 2021 Korean Society of Nursing Science. Published by Elsevier BV. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Cancer is a serious threat to human health and a major public health problem in China and globally, which impairs social and economic development [1]. According to 2018 cancer statistics [2], there are estimated 18.19 million new cancer cases annually and 9.6 million cancer deaths worldwide. About 10,000 people are diagnosed with cancer every day in China, equivalent to 7 diagnoses every minute. The rapid rises in cancer rates and deaths must be accompanied by a dramatic increase in palliative care, hospice care, and end-of-life (EOL) care. The World Health Organization indicated

that nowadays 19.92 million people worldwide require palliative care at the end of their lives, of whom 34.0% were cancer patients [3]. These data reveal that a large number of cancer patients die or receive EOL care in hospitals. As a result, oncology nurses play a vital role in caring for these patients during this critical time [4].

EOL cancer patients often face physical, psychosocial, and spiritual pain in the process of disease progression. They may experience pain, dyspnea, anorexia/cachexia, nausea, vomiting, constipation, malignant bowel obstruction, fatigue, sleep disorders, and mental disorders/delirium [5]. When families and patients have to face the decision to shift the focus of care from active life-prolonging treatment toward comfort-oriented care, there will be also significant psychological consequences [6]. Spiritually, they may find hope and find the meaning of life [7]. When the disease enters the final stage and the focus of treatment shifts from curative to palliative treatment, nurses need to provide care and support with more empathy for patients and their families [8]. A 2013

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statement by the American Association of Pain Management Care [9] pointed out that comprehensive and empathetic end-of-life care is the responsibility of nurses. The core purpose of hospice care is to help patients attain a good death, which requires oncology nurses to systematically assess the patient, communicate with empathy, identify and manage symptoms, recognize and deal with dying and death, and understand the holistic elements of dying [10]. Therefore, it is very important for oncology nurses to be confident in providing care to dying cancer patients, discussing goals of care with the patient and family, and possess enough knowledge and skills to provide EOL care.

Although cancer is a leading cause of death, little is known about cancer-related EOL care in China until recent years, when it gradually gained attention [11,12]. Because of cultural factors, there is no universal regulation on EOL care. In China, Zheng and colleagues [13] reported that the nursing behaviors of oncology nurses in China include physical and mental care, family care, maintaining patient dignity, facilitating communication between patients and their families, providing education on life and death, and coping with negative emotions during the care process. A growing body of evidence has confirmed the benefits of EOL care on both cost and quality of care [14,15]. Several studies have revealed that a high level of EOL care has significant effects on physical and psychological symptoms, quality of life, and patient satisfaction with care and provider communication [16,17].

The behavior of oncology nurses toward EOL care is closely related to the patient's quality of EOL. However, there are no consistent conclusions on the factors associated to behaviors toward EOL care among oncology nurses, and there is a lack of theoretical framework. A study from Taiwan used Green's model as a theoretical framework to explore the influencing factors of nurses' care behavior for dying patients [18]. Based on precede model, promoting the change of human behavior includes predisposing factors, reinforcing factors and enabling factors [19]. A study from Australia found that emotional support for nurses, knowledge are influential factors affecting nurses' EOL care behaviors. The findings highlight the importance of future training and practice development opportunities [20]. Others also reported that knowledge and courses in caring for EOL patients are related to the behavior of oncology nurses toward EOL care [18,21]. A study from Korea found that factors that significantly influenced nurses' performance of EOL were EOL care stress, obstacles and EOL care attitudes [22]. In addition, some study pointed that the experiences of caring for EOL patients helped nurses to reflect on the meaning of death and life, and positively influenced their behaviors toward caring for the dying [13]. What's special is that death is a taboo in traditional Chinese culture, This increases the difficulty of effective communication between nurses, patients and families [13]. Nurses will face discomfort and experience various setbacks in the process of caring for EOL patients, this will affect nurse physical and mental health and reduce the quality of the EOL care they provide [13,23].

At present, there are few domestic studies on the nursing behavior of oncology nurses for EOL patients, and most research tools are self-designed, indicating a lack of systematic and comprehensive evaluation criteria and methods. However, despite marked development in other countries, EOL care is still in its infancy in China; only a few quantitative studies have examined Chinese nurses' behaviors toward caring for terminal cancer patients [24]. The purpose of this study was to describe the current status of oncology nurses' behaviors toward EOL care in China and to explore the factors associated with oncology nurses' behaviors toward EOL care. The findings of this study may provide a basis for promoting behavior for EOL care among oncology nurses that will lead to the design of interventions to improve the quality of life of cancer patients at the EOL stage in China.

Methods

Study design

This study used a cross-sectional design and convenience sampling.

Setting and sample

This cross-sectional survey was conducted with a convenience sample of nurses from 19 tertiary hospital oncology departments and 3 specialist oncology hospitals in China's Guangdong province between October 2017 and March 2018. Nurses who satisfied the following criteria were included: (1) registered nurses, (2) have at least 1 year of clinical nursing experience, and (3) have experience caring for EOL patients. Manager level nurses who do not deliver bedside care were excluded. A total of 1266 oncology nurses were recruited. Of these oncology nurses, 148 were excluded because they did not deliver bedside care for now. Eventually, 1118 participants were included, and 80 oncology nurses refused to participate in the study (participation rate: 92.8%).

Ethical considerations

The guidelines of the Declaration of Helsinki were followed. The study was approved by Institutional Review Board (IRB) of the Anthropology Department at Sun Yat-sen University (Approval no. 20170618). All participants were informed about the study and the voluntary nature of participation. All collected data were kept confidential and anonymous.

Variables and instruments

Two instruments were used to assess the demographics, work-related information, and EOL care information of participants and investigate behaviors toward EOL care among nurses.

Demographic, work-related information, and EOL care information questionnaire

Participants' demographic (age, gender, marital status, educational background, religious beliefs) and work-related information (years of nursing experience, professional title, personal monthly income, working position, type of work unit) were collected. Based on precede model, promoting the change of human behavior includes predisposing factors (such as knowledge, attitude, skills, etc.), reinforcing factors (such as encouragement from colleagues) and enabling factors (policy support, social support) [19]. Therefore, this study chose 13 items for collecting EOL care information. The questionnaire also asked about EOL care information (loss of an important family member or a friend, number of EOL patient care cases, frequency of sharing EOL care experience with colleagues, level of hospital support for EOL patient care, level of head nurse support for EOL patient care, nurse's perceived support in care of EOL patients, nurse's perceived difficulty in care of EOL patients, training status in palliative care as a nursing student, training status in EOL care as a nursing student, training status in communication as a nursing student, in-service training status in palliative care, in-service training status in EOL care courses, and in-service training status in communication).

Nursing behavior scale of nurses facing dying patients

The Nurses' Behaviors of Caring for Dying Patients Scale was adopted to evaluate behaviors toward EOL care among Chinese nurses. The scale was designed by Gu [18] and contained 38 items and 3 dimensions (physical care behavior; spiritual care behavior;

and family care behavior.). It uses a five-point Likert scale that ranges from 1 (never) to 5 (always). The official Cronbach's α was 0.9742. Due to linguistic and cultural differences between mainland China and Taiwan, the researchers re-evaluated the content validity consistency of the scale. In addition to retranslation of the professional terms, two items were added to the source scale: "To provide privacy and a quiet environment" and "to respect the customs and requirements of the patient and his/her family." After re-evaluating, the scale was submitted to the expert committee to evaluate the content validity, and the item-content validity index (I-CVI) was 0.99. After the expert evaluation, a pre-test was carried out and yielded a Cronbach's α of 0.888. The total score ranges from 40 to 200 points and mean score for this instrument was obtained by dividing the total score by the number of items, with a higher score indicating a higher frequency of caring behavior.

Data collection

The researchers conducted the study after obtaining permission from the hospitals. Uniform instructions were used to explain the project aims and significance. Nurses were asked to fill in the questionnaire independently using unified instruction language. If there were any questions, researchers provided guidance and explanations. Each participant needed 10–15 min to finish questionnaires. The investigators collected the questionnaires immediately, and responses with obvious errors and missing information were discarded or corrected.

Data analysis

Data were analyzed using the IBM Statistical Package for Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics are used to present participants' demographic and work-related factors and the prevalence of behaviors toward EOL care. Independent sample *t*-tests and one-way analyses of variance (ANOVAs) with LSD test were used to assess homogeneity of variance, and Pearson's or Spearman's correlation analyses were used to compare differences and examine relationships between participants' demographic and work-related variables and behaviors toward EOL care. Finally, four multiple linear regression models were used to identify salient variables associated with behaviors toward EOL care among demographic and work-related factors. An alpha-level of $p < .05$ was considered significant in all analyses.

Results

General characteristics

A descriptive analysis of the general demographic and work-related characteristics of participants is shown in Table 1. A total of 1038 nurses were included; 1018 participants (98.1%) were female and 627 (60.4%) were married. The mean age was 31.01 ± 6.87 years. The vast majority (97.6%) were non-religious. There were 453 participants (43.6%) whose initial education level was an advanced diploma, and 732 participants' highest education level was undergraduate (70.5%). For work-related characteristics, the mean working years were 9.60 ± 7.50 years. Moreover, 40.8% of participants were senior nurses, and 78.7% were general nurses. More than half (64.1%) of nurses worked in the oncology department of a general hospital.

EOL care characteristics

Information on EOL care is shown in Table 2. Among the 1038 nurses, about 434 (41.8%) had bereavement experience, and more

than half (61.4%) of them cared for less than 30 EOL patients. 482 (46.4%) "sometimes" shared their experience of caring for EOL patients with their colleagues. Most nurses believed that the hospital and head nurse had a "supportive" or "very supportive" attitude towards EOL care. The majority of nurses indicated that they felt "great" or "very great" difficulty in the care of EOL patients. During their employment, 556 (53.6%) participants did not complete palliative care courses, 526 (50.7%) did not take EOL care courses, but 650 (62.6%) received communication training courses. Similarly, in terms of nursing students, 603 (58.1%) participants did not receive palliative care education, 559 (53.9%) did not receive EOL care courses, and 60.1% received communication skills training courses.

Prevalence of behaviors toward EOL care

The prevalence of behaviors toward EOL care is shown in Table 3. The mean score for behaviors toward EOL care among Chinese

Table 1 Demographic Characteristics Of The Participants (N = 1038).

Variable	Category	n	%
Gender	Men	20	1.9
	Women	1018	98.1
Marital status	Married	627	60.4
	Unmarried	411	39.6
Age (years)	≤ 25	234	22.5
	26 ~ 30	355	34.2
	31 ~ 35	211	20.3
	36 ~ 40	126	12.1
	41 ~ 55	112	10.8
Religious beliefs	No	1013	97.6
	Yes	25	2.4
Initial educational level	Diploma	367	35.4
	Advanced diploma	453	43.6
	Bachelor's degree or above	218	21.0
Highest level of nursing education	Diploma	15	1.4
	Advanced diploma	280	27.0
	Bachelor's degree	732	70.5
	Master's degree or above	11	1.1
Years of nursing experience	≤ 5	388	37.4
	6 ~ 10	319	30.7
	11 ~ 15	122	11.8
	16 ~ 20	87	8.4
	21 ~ 25	72	6.9
	26 ~ 30	50	4.8
Working position	General nurse	817	78.7
	Nurse group leader	133	12.8
	Specialist nurse	40	3.9
	Area head nurse	40	3.9
	Department head nurse	8	0.8
Type of Work Unit	Specialist Oncology hospital	373	35.9
	Oncology department of general hospital	665	64.1
Personal monthly income (RMB)	<2500	28	2.7
	2500 ~	246	23.7
	5000 ~	343	33.0
	7500 ~	297	28.6
	10000 ~	124	11.9
Professional title	Nurse	350	33.7
	Senior nurse	423	40.8
	Supervisor nurse or above	265	25.5

Table 2 Information Of Care Of End-of-life Patients By Oncology Nurses (N = 1038).

Variable	Category	n	%
Loss of an important family member or a friend	Yes	434	41.8
	No	604	58.2
Number of EOL patient care cases	1 ~ 10	384	37.0
	11 ~ 30	253	24.4
	31 ~ 50	108	10.4
	51 ~ 100	162	15.6
	101 or above	131	12.6
Frequency of sharing EOL care experience with colleagues	Never	63	6.1
	Seldom	291	28.0
	Sometimes	482	46.4
	Often	182	17.5
	Always	20	1.9
Level of hospital support for EOL patient care	Against/neutral	195	18.8
	Supportive	697	67.1
	Very supportive	146	14.1
Level of head nurse support for EOL patient care	Against/neutral	97	9.3
	Supportive	693	66.8
	Very supportive	248	23.9
Nurse's perceived support in care of EOL patients	Very supportive	299	28.8
	Non-supportive	739	71.2
Nurse's perceived difficulty in care of EOL patients	Very difficult	401	38.7
	Difficult	566	54.5
	No difficulty	71	6.8
Training status in palliative care as a nursing student	Yes	482	46.4
	No	556	53.6
Training status in EOL care as a nursing student	Yes	512	49.3
	No	526	50.7
Training status in communication as a nursing student	Yes	650	62.6
	No	388	37.4
In-service training status in palliative care	Yes	435	41.9
	No	603	58.1
In-service training status in EOL care courses	Yes	479	46.1
	No	559	53.9
In-service training status in communication	Yes	624	60.1
	No	414	39.9

Note. EOL = End Of Life.

oncology nurses was 118.68 ± 23.64 . 50.5% of participants had average levels of behaviors toward EOL care. The mean item scores for the dimensions of physical care; family care; and spiritual care were 3.81 ± 0.76 , 3.02 ± 0.86 , and 2.37 ± 0.67 , respectively.

Univariate analyses of factors associated with behaviors toward EOL care

Independent sample *t*-tests and ANOVAs revealed that nurses who were 41–50 years old, had 11–30 years of nursing experience, married, supervisor nurse or above, and nurse group leader or

above had more EOL patient cases, a higher frequency of sharing EOL care experience with colleagues, greater level of head nurse support for EOL patient care, higher level of nurse perceived support, palliative care education, communication training, and EOL care courses had higher total behavior and for all three dimensions toward EOL care ($p < .050$). In addition, nurses with a bachelor's degree or above, personal monthly income over 5000 RMB, worked in oncology department of a general hospital, higher level of hospital support for EOL patient care, and training status in palliative care as a nursing student had higher total behavior ($p < .050$). Similarly, nurses who worked in oncology departments of general hospitals had higher physical care behavior, but who had higher level of nurse' perceived difficulty in care of EOL patients had lower physical care behavior ($p < .050$). Furthermore, nurses who had a bachelor's degree or above, had experience of losing an important family member or a friend, and had higher level of hospital support for EOL patient care had higher spiritual care behaviors ($p < .050$). Finally, nurses who had a higher personal monthly income; worked in the oncology department of a general hospital; had an experience of losing an important family member or a friend; had a higher level of hospital support for EOL patient care; and had palliative care education, communication training, and EOL care courses as a nursing student had higher family care behavior ($p < .050$, see [Supplementary Table](#)).

Regression analysis examining covariates of behaviors towards EOL care

Significant variables in univariate analyses were inputted to the multivariate regression analysis. Before the analysis, we examined the linear relationship, multivariate normality, and homoscedasticity of variables. As a result of the test of multicollinearity using the tolerance limit and the variation inflation factor (VIF) value, it was found that all variables did not have a multicollinearity problem (tolerance limit: .54–.93; VIF: 1.08–1.85). The results of regression analyses examining covariates of behaviors towards EOL care are presented in [Table 4](#). In the total model, the frequency of sharing EOL care experience with colleagues, in-service received palliative care education, level of head nurse support for EOL patient care, number of EOL care cases, working position, and nurse's perceived support in care of EOL patients were significant correlates explaining 16.2% of the total model variance ($F = 11.58$, $p < .001$). In terms of physical care behavior, the frequency of sharing EOL care experience with colleagues, number of EOL care cases from 51 to 100, professional title of supervisor nurse or above, in-service EOL care courses, and type of work unit explained 8.9% of the total model variance ($F = 15.52$, $p < .001$). In terms of spiritual care behavior, the frequency of sharing EOL care experience with colleagues, in-service palliative care education, level of head nurse support for EOL patient care, number of EOL care cases from 11 to 30 and ≥ 51 , specialist nurse, and nurse's perceived support were significant correlates explaining 11.9% of the total model variance ($F = 9.24$, $p < .001$). According to regression analyses, seven variables exerted an influence on family care behavior: frequency of sharing EOL care experience with colleagues, in-service palliative care education, level of head nurse support for EOL patient care,

Table 3 The Prevalence of Behaviors Toward EOL Care Among Oncology Nurses (N = 1038).

Dimension	Range	Minimum	Maximum	Mean	Entry mean	sorting
Total score	40–200	51	187	118.68 ± 23.64	2.97 ± 0.59	
Body care behavior	13–65	18	65	49.50 ± 9.82	3.81 ± 0.76	1
Family care behavior	8–40	8	40	24.16 ± 6.92	3.02 ± 0.86	2
Spiritual care behavior	19–95	19	89	45.02 ± 9.82	2.37 ± 0.67	3

Table 4 Regression Analysis Examining Covariates of Behaviors Towards End-of-life Care.

Model	Total ^a					Body care behavior ^b					Spiritual care behavior ^c					Family care behavior ^d				
	B	SE	Beta	t	p	B	SE	Beta	t	p	B	SE	Beta	t	p	B	SE	Beta	t	p
(Constant)	90.34	5.34		16.93	<.001**	38.12	1.68		22.67	<.001**	32.34	2.56		12.63	<.001**	13.39	1.72		7.77	<.001**
X ₁ Frequency of sharing EOL care experience with colleagues	4.54	.84	.17	5.40	<.001**	1.74	.35	.15	5.04	<.001**	1.94	.46	.13	4.23	<.001**	1.30	.25	.16	5.22	<.001**
X ₂ In-service training status in palliative care	6.67	1.42	.14	4.69	<.001**	-	-	-	-	-	3.17	.78	0.12	4.07	<.001**	1.70	.48	.12	3.56	<.001**
X ₃ Level of head nurse support for EOL patient care	4.09	1.24	.10	3.29	.001*	-	-	-	-	-	1.72	.68	.08	2.52	.012*	1.25	.37	.10	3.38	.001*
X ₄ Number of EOL patient care cases																				
X ₄₁ 11–30	4.32	1.90	.07	2.28	.023*	-	-	-	-	-	2.28	1.03	.07	2.21	.027*	-	-	-	-	-
X ₄₂ 31–50	5.51	2.67	.06	2.06	.039*	-	-	-	-	-	-	-	-	-	-	1.62	.80	.06	2.04	.042
X ₄₃ 51–100	9.06	2.31	.12	3.93	<.001**	2.23	.93	.07	2.40	.017	4.54	1.26	.12	3.62	<.001**	-	-	-	-	-
X ₄₄ 101 or above	7.03	2.62	.09	2.68	.008*	-	-	-	-	-	3.69	1.44	.09	2.57	.01*	-	-	-	-	-
X ₅ Working position																				
X ₅₁ Nurse group leader	6.11	2.30	.09	2.66	.008*	-	-	-	-	-	-	-	-	-	-	1.61	.69	.08	2.35	.019
X ₅₂ Specialist nurse	4.63	1.88	.08	2.46	.014*	-	-	-	-	-	2.80	1.03	.09	2.73	.007*	-	-	-	-	-
X ₆ Nurse's perceived support	3.85	1.57	.07	2.46	.014*	-	-	-	-	-	2.32	.86	.08	2.71	.007*	-	-	-	-	-
X ₇ Professional title																				
X ₇₁ Supervisor nurse or above	-	-	-	-	-	3.06	.76	.14	4.04	<.001**	-	-	-	-	-	-	-	-	-	-
X ₈ In-service training status in eol care courses	-	-	-	-	-	1.76	.59	.09	2.98	.003*	-	-	-	-	-	-	-	-	-	-
X ₉ Type of Work Unit	-	-	-	-	-	1.96	.61	.10	3.21	.014	-	-	-	-	-	1.57	.43	.11	3.64	<.001**
X ₁₀ In-service training status in communication	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.11	.48	.08	2.34	.019

^a F = 11.58, *p* < .001, *R*² = 17.8%, *R*_{adj}² = 16.2%.^b F = 15.52, *p* < .001, *R*² = 9.5%, *R*_{adj}² = 8.9%.^c F = 9.24, *p* < .001, *R*² = 13.3%, *R*_{adj}² = 11.9%.^d F = 8.49, *p* < .001, *R*² = 14.9%, *R*_{adj}² = 13.2%.

number of EOL care cases from 31 to 50, nurse group leader, type of work unit, and in-service communication training explained 13.2% of the variance ($F = 8.49, p < .001$).

Discussion

At present, more than 20.4 million people worldwide need palliative care annually. Approximately 19 million are adults, and 34% are patients diagnosed with cancer [3]. The demand continues to grow, and nurses play an integral role in promoting palliative care for cancer patients and their families [25]. It is therefore necessary to understand the behavior of nurses toward EOL care. In this study, we assessed the EOL care behavior of 1038 Chinese oncology nurses with the Nurses' Behaviors of Caring for Dying Patients Scale. The results showed that the average score of EOL care behaviors among Chinese oncology nurses was 2.967 ± 0.59 . This corresponds to a similar level of hospice care behavior compared with previous studies using the same questionnaire for clinical nurses in Taiwan [18]. Furthermore, oncology nurses usually give priority to patients' physiological requirements, which conforms to Maslow's theory of basic human needs. These findings are similar to previous reports [18,26,27]. In this study, the average score for spiritual care behavior was only 2.37, indicating that nurses rarely performed this kind of behavior. However, in addition to the control of pain and other symptoms, it is equally important to meet the psychological, social, and spiritual needs and provide substantive support in EOL care [28]. Possible reasons for the lack of his care are as follows. First, nurses are too busy dealing with doctors' orders and providing treatment to have good communication with patients [29]. Secondly, spiritual care has only recently entered the realm of nursing in China compared with other countries. Over the past 5000 years, Chinese culture has developed a unique view on dying and death due to the profound influences of Taoism, Confucianism, and Buddhism [30,31]. However, Chinese nurses have insufficient understanding and ability to provide the necessary spiritual care [32,33]. Thirdly, due to the influences of Chinese traditional culture and death taboos, oncology nurses lack the confidence and proficiency to provide psychological care and communicate with patients' families [18]. Our results indicate that the behaviors of oncology nurses are insufficient for EOL care and underscore the need for health institutions to address this issue.

With regard to demographic and work-related factors, we found that a higher working position was positively related to behavior toward EOL care. Specialist nurses and nursing group leaders had higher scores in total caring behavior, possibly because they are appropriately trained, have better professional knowledge, and know how to deliver high-quality EOL care [34]. A research also showed that post and title were significant factors to behaviors toward EOL care [35].

With regard to EOL care factors, we found that a higher frequency of sharing EOL care experience with colleagues, in-service palliative care education, higher level of head nurse support for EOL patient care, number of cases of EOL care, and nurse's higher perceived support were positively associated with behavior toward EOL care. Oncological nurses who had treated 50–100 EOL patients had the most active EOL care behavior, which was consistent with the research results of Marjan and colleagues [36]. Some studies found the frequency of EOL care supportive behaviors was the factor affecting EOL care competency [37,38]. This is mainly because if a nurse has more EOL patient experience, the more positive their nursing attitude will be, and they are more willing to talk about EOL care problems and death [3,39]. Weigel and colleagues [40] proposed that this phenomenon occurs because nurses' various care skills, especially communication skills, develop as the number of patients increases. We also observed that the more frequently

oncology nurses shared their EOL patient care experiences with colleagues, the more frequently they engaged in nursing behaviors. Beckstrand et al. [41] assessed 1005 oncology nurses and concluded that listening to the experience, knowledge, and advice of senior oncology nurses contributed to the promotion of high-quality, compassionate EOL care. Our results showed that the level of head nurse support for EOL patient care was positively associated with behavior toward EOL care, which was consistent with previous reports [36,42,43]. This finding indicates that the head nurse's attitudes influence EOL care among clinical nurses. In addition, our results showed that nurse's perceived high level of support was positively associated with behavior toward EOL care. In previous studies, support for nurses has been proved to be a positive factor affecting their caring behavior toward EOL care [44]. Furthermore, nurses who received palliative care education at work had higher scores on behaviors toward EOL care. Participation in a nationwide education program were factors that showed a significant association with adequate EOL care [38]. Therefore, it is especially important for nursing educators to provide EOL care courses suitable for conditions within China.

We performed multiple regression analyses on the three dimensions of behavior toward EOL care. In addition to the variables previously analyzed into the total score model, we found that three variables related to physical care behavior (professional title, in-service EOL care courses, and type of work unit). It was found that oncology nurses who were supervising nurses and above exhibited more physical care behavior, which was similar to previous studies [19,45]. The reason may be that nurses with intermediate titles have more professional knowledge and life experience and are therefore more able to feel patients' pain and understand their needs. The work unit also affected the physical care behavior dimension score. This indicates that nurses working in oncology departments in general hospitals provide more physical care for EOL patients and suggests that nursing managers in oncology hospitals should pay more attention to training nurses in other aspects of EOL care. Indeed, we found that EOL care courses played an important role in affecting behavior toward EOL care. Offering these courses can help directly either by improving nurses' attitudes or enhancing direct patient care skills [39,46]. Systematic EOL care training generally includes death education, psychological and spiritual care, and communication skills [47]. The late Life Care Education course [47,48] was shown to have positive impacts on nurses' education about death on patients and family members, promotion of care skills, and care behavior. With regard to the family dimension, we found that receiving communication training during employment was positively associated with family care behavior. The reasons are as follows: compared with the other dimensions, family care requires good communication between family members and nurses, who can assist with grief counseling [49]. One study reported that completing a communication course improved nurses' knowledge and confidence in communication, as well as their ability to educate others [50]. Palliative care nurses should therefore incorporate communication skills into their practice.

To our knowledge, this is the first study to describe the behavior towards EOL patients in oncology nurses in China. A few groups have investigated nurses' caring behavior towards EOL patients here and abroad. However, most of the research tools are questionnaires designed by the investigators themselves, so there is a lack of systematic and comprehensive evaluation criteria and methods. Most were qualitative studies. Our results should be considered in the context of several limitations. First, the convenience sample limits the generalizability of the findings to nurses in 22 hospitals in Guangdong Province, China. Then, the predictive model in this study only explained 16.2% of the total variance. The reasons might be as follows: In previous studies, knowledge and

attitude of nurses have been proved to be related to caring behavior, but this variable was not included in this study. In addition, because behavior toward EOL care is affected by many complex factors, including cultural factors, So, more research is needed to explore the influencing factors.

Conclusion

Our results demonstrate that Chinese nurses' behaviors toward EOL care for cancer patients mainly focus on physical care, ignoring patients' psychological and spiritual needs, and family care. Behaviors toward EOL care are affected by sociodemographic variables, EOL training, and other factors. Among them, availability of training for palliative care, EOL care, and communication are important. The level of head nurse support for EOL patient care and nurse's perceived support in care of EOL patients also affect behaviors. These findings may reflect that EOL care education is not well integrated into nursing education. Based on this findings, we recommend developing a training program for oncology nurses to improve knowledge and skill of EOL care. Well-trained nurses may provide better care for patients at their end of lives. These innovative programs should be developed in the context of traditional Chinese culture to improve the quality of care for patients with terminal cancer.

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Ethical approval

This study was approved by the Institutional Review Board of the S University (Approval no. 20170618).

Conflict of interest

The authors declared no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.anr.2021.10.003>.

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