



## Attitudes and knowledge of undergraduate nursing students about palliative care: An analysis of influencing factors



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### ABSTRACT

**Background:** With the growing aging population, continual increase of the number of the old, and increase of cancer survival rate, palliative care is being considered a global public health issue. As a core force for the sustainable development of the nursing field, undergraduate nursing students' knowledge about and attitudes toward palliative care will directly affect the quality of care for dying patients in the future.

**Objective:** To investigate undergraduate nursing students' knowledge about and attitudes toward palliative care and analyze their influencing factors.

**Methods:** This descriptive and cross-sectional survey was conducted in 2016. A total of 1200 Chinese undergraduate nursing students were randomly selected as the survey subjects using stratified sampling method. The revised palliative care quiz for nursing (PCQN) and a self-designed questionnaire were used to measure students' knowledge and attitudes.

**Results:** The mean score of the revised PCQN was  $16.10 \pm 5.04$ . Only a few respondents (19.8%) expressed desire to work in palliative care in the future. The findings show that knowledge and school, grade, gender, birthplace, and religious beliefs have statistically significant impacts ( $P < 0.01$ ). In addition, logistic regression analysis showed that talking about death and caring for dying family members can have a significant influence on students' attitudes ( $P < 0.05$ ).

**Conclusion:** At present, Chinese undergraduate nursing students' knowledge about palliative care is minimal with the majority holding negative attitudes. Thus, the development of an effective end-of-life care program for nursing students is critical.

### 1. Introduction

The National Bureau of Statistics of China released a population data on 28 February 2019, showed that the number of people aged 60 and above was 249.49 million, which accounted for 17.9%. Furthermore, the population aged 65 and above was 166.58 million, which accounted for 11.9% percent of the total population by the end of 2018 in China (National Bureau of Statistics of China, 2019). With the rapidly aging population and improved cancer survival rate, the number of patients that require quality palliative care is also increasing (Park et al., 2019). Nurses play an essential role in providing palliative care to terminally ill patients and their family members because they spend the longest time with patients and their proximity to patients' bedsides (Smith et al., 2018; Khraisat et al., 2017; Sopalliative care-check, 2016; Sarabia-Cobo et al., 2016). However, many studies show that nurses and nursing students lack enough knowledge about

palliative care and feel ill-prepared to care for dying patients (Farmani et al., 2019; Sujatha and Jayagowri, 2017; Khraisat et al., 2017; Gilliland, 2015; Gillan et al., 2014; Al Qadire, 2014). Today's students are future nurses, and their knowledge about and attitude toward palliative care will directly affect the quality of care for dying patients in the future. Therefore, improving students' knowledge about palliative care and changing attitudes through palliative education is important.

Glover et al. (2017) reported a study at a university in the southern United States in 2017 and found that nearly 85% of senior nursing students reported that they received inadequate training in palliative and end-of-life care in their baccalaureate programs, and with similar research about nurses in Iran (Jabbari et al., 2019; Dehnavieh et al., 2015). Furthermore, previous researches have demonstrated that education on palliative care and death were excluded in the undergraduate nursing curricula in Argentina, Cameroon, and Korea (Mutto et al., 2007; Bassah et al., 2016; Choi et al., 2012). In Iran, 80% of nurses and

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nursing students declared that the demand for palliative care is increasing, and they are in need of further knowledge and education (Park et al., 2019; Azami-Aghdash et al., 2015).

To date, reports on knowledge about and attitudes toward palliative care among Chinese nursing students remain lacking. Therefore, the author carried out this study to investigate the level of knowledge and attitude toward palliative care and analyze their influencing factors among Chinese undergraduate nursing students.

## 2. Methods

### 2.1. Design

In 2016, descriptive research methods and cross-sectional surveys were conducted in China. By using a stratified random sampling method, 1200 undergraduate nursing students from four medical universities in the Guangxi Zhuang Autonomous Region were randomly selected as study samples. The revised palliative care quiz for nursing (PCQN) and a self-designed questionnaire were used to measure students' knowledge and attitudes.

### 2.2. Participants

There are 4 medical universities in Guangxi, namely, Guangxi Medical University, Guangxi University of Chinese Medicine, Guilin Medical University and Youjiang Medical University (All public, full-time, four-year courses). The sample consisted of 1200 nursing students from all the four schools. The participants were included if they meet the following inclusion criteria: (1) a student from one of the four medical universities in Guangxi, (2) participate voluntarily, and (3) correctly understand the context of the questionnaire and no reading disorder. In accordance with the total number of students in each of the four schools, the students were stratified by grade, and a sample number was determined by the proportion of each layer. Then, student's ID numbers were written on pieces of paper and placed inside a container. After evenly mixing, the papers were individually extracted and disposed until the sample size was complete.

### 2.3. Instruments

First, respondents' demographic information, such as the name of school, grade, gender, birthplace, nationality, religious belief, frequency of talking about death, experience of caring for dying family members, and family members with terminal illnesses, were collected.

To examine students' knowledge about palliative care, a revised version of the palliative care quiz for nursing (PCQN) was used. Ross et al. (1996) designed the original questionnaire, which is widely used around the world (Choi et al., 2012). The questionnaire comprises 20 questions with three possible responses (true, false, or I do not know). It also covers three categories: (1) philosophy and principles of palliative care (4 items), (2) pain and symptom management (13 items), (3) psychosocial and spiritual care (3 items). Answers were coded as follows: 1 = correct, 0 = incorrect, or "I do not know." (Iranmanesh et al., 2014). The internal consistency reliability of the original English version of the palliative care questionnaire is 0.78, which is considered high (Al Qadire, 2014). Zou translated the original English questionnaire into Chinese in Zou, 2007, which is widely used in China. She invited three experts to translate the original scale in sequence, and then invited two experts for back translation. Next, pre-investigation was conducted to test the reliability and validity. The results showed that the Chinese version had a test-retest reliability of 0.782 and an internal consistency reliability of 0.758. The correlation coefficient between the three subscales and the total score was between 0.541 and 0.835 ( $P < 0.01$ ), which indicated that the Chinese version of PCQN had good construct validity.

However, both the original English questionnaire and Chinese

questionnaire are mainly used to evaluate nurses' knowledge about palliative care. For students with no experience in clinical practices, such a questionnaire is obscure and difficult to complete. To refer to the actual education situation in China and help Chinese students understand the questionnaire better, we supplemented and revised the Chinese questionnaire. Considering less questions in the first and third category of the original questionnaire and more questions in the second category, we changed original questionnaire Q15: "Suffering and physical pain are synonymous" into "Hospice Care is related to holistic Nursing and Humanistic Care", and added 6 items on these two categories. Ultimately, this version consists of 26 questions and covers the following categories: (1) philosophy and principles of palliative care (9 items: 1, 9, 12, 15, 17, 21, 22, 23, 24), (2) pain and symptom management (12 items: 2–4, 6–8, 10, 13, 14, 16, 18, 20), (3) psychosocial and spiritual care (5 items: 5, 11, 19, 25, 26). The knowledge scores can range from 0 to 26. In relation to the use of the self-designed questionnaire, 5 nursing specialists in this field were invited to evaluate the content validity of new items, and then we made appropriate modifications according to the experts' opinions. 1 = uncorrelated, 2 = weak correlation, 3 = strong correlation, 4 = very correlated, the number of experts who choose 3 or 4 divided by the total number of experts. At last, our results showed that both item-level content validity index (I-CVI) and scale-level content validity index (S-CVI) are 1.00. We selected 30 students to answer the questionnaire and test for reliability. The results showed a Cronbach's alpha value of 0.764, which was considered favorable.

Students reflected their attitudes toward palliative care by answering the following questions: "Would you like to be engaged in palliative care in the future?" The options are set to yes, no, and not sure. If the choice is no or not sure, then the student is required to explain the reasons (more than one answer is possible), such as low pay and overwork, afraid to face death and anxiety about death, sad and depressing working environment, worry about disputes, meaningless nursing services, or others.

### 2.4. Ethical considerations

This study maintains the anonymity of all the participants, who can opt whether or not to participate. Formal written consent was obtained from all participants. We further guaranteed that the identity of the participants will not be disclosed and that their answers will be confidential. Ethical approval for the project was gained from the ethics committees of the universities [grant numbers ECGXMU16293].

### 2.5. Data collection

The survey and data collection were conducted from March to July 2016. The respondents completed the questionnaire independently, and questionnaires were returned on the spot after completion.

### 2.6. Statistical analysis

The obtained data were entered and analyzed using statistical analysis software SPSS version 23.0. Descriptive statistics, such as percentages and frequencies, were used to analyze demographic data, variables, and responses. An independent samples *t*-test was used to compare the means between two groups, and analysis of variance (ANOVA) was used to compare the means for more than two categories. First, potential factors that influence knowledge and attitudes were identified by univariate analyses, such as independent samples *t*-test, ANOVA, and chi-square test, to analyze differences between groups. Knowledge scores as dependent variable in multivariate linear regression analysis, and attitude as dependent variable in logistic regressions analysis. Next, we performed a multiple linear regression analysis and logistic regressions analysis using all potential factors that were identified earlier by the univariate analyses.  $P < 0.05$  was considered

**Table 1**  
Demographic characteristics of students (n = 1156).

Variate	Frequency	Percentage
School		
School A	182	15.7
School B	218	18.9
School C	343	29.7
School D	413	35.7
Grade		
Freshman	457	39.5
Sophomore	411	35.6
Junior	288	24.9
Gender		
Male	110	9.5
Female	1046	90.5
Birthplace		
Countryside	1009	87.3
City	147	12.7
Nationality		
The Han nationality	616	53.3
Minority	540	46.7
Religious belief		
Yes	120	10.4
No	1036	89.6
Talk about death		
Always	194	16.8
Sometimes	850	73.5
Never	112	9.7
Care for dying family members		
Yes	691	59.8
No	465	40.2
Family member with a terminal illness		
Yes	624	54.0
No	532	46.0

statistically significant with a 95% confidence interval.

### 3. Results

#### 3.1. Participants

We distributed 1200 questionnaires, and a total of 1156 Chinese undergraduate nursing students responded. A response rate of 96.3% was achieved. The participants' age ranged from 18 to 25 years old (mean = 20.81, SD = 1.37). All participant schools have yet to set an end-of-life care curriculum, and all the students had no clinical practices in hospitals at the moment of the survey. Table 1 presents other detailed demographics.

#### 3.2. Knowledge about palliative care and influencing factors

In this study, the mean score was 16.10 (SD = 5.04), and the minimum and maximum scores were 0 and 24, respectively. Questions 4, 15, and 25 had the highest accuracy (79.8%, 82.9%, and 82.0.2%), and three questions (Q5, Q7, and Q13) were poorly answered (7.3%, 28.1%, and 26.0%). Table 2 provides the responses to each question.

In Table 3, the univariate analysis findings show that statistically significant differences occur in the palliative care knowledge scores among schools, grades, genders, birthplaces, religious belief, and whether or not they experienced caring for dying family members ( $P < 0.05$ ). However, multivariate linear regression analysis showed that school, grade, gender, birthplace, and religious belief were influencing factors on knowledge ( $P < 0.01$ ), and eliminated the variate: "The experience of caring for dying family members" (Table 4).

#### 3.3. Attitudes toward palliative care and influencing factors

Overall, the majority of Chinese undergraduate nursing students hold negative or skeptical attitudes toward palliative care. In this

survey, only 19.8% of students would like to be engaged in palliative care career in the future, 275 (23.8%) students were unwilling to work in palliative care, and 652 (56.4%) were unsure. As shown in Fig. 1, the main reasons for unwillingness or uncertainty to engage in palliative care are sad and depressing working environment (723, 78.0%), afraid to face death and anxiety about death (521, 56.2%), and worry about disputes (442, 47.7%).

Logistic regression model demonstrated that the experience of talking about death and caring for dying family members affect students' attitudes toward palliative care ( $P < 0.05$ ). The analysis excluded two variables, namely, schools and family member with a terminal illness (see Tables 3 and 5).

### 4. Discussion

Our survey results reflect that knowledge about palliative care among Chinese nursing students was insufficient, and a negative attitude was held toward palliative care. To the best of our knowledge, all participant schools have yet to formulate a specialized, compulsory, and unified end-of-life care curriculum at the moment of the survey. That is, the content of palliative care was only embedded in one unit of other nursing specialized courses. As a result, this problem has attracted the attention of an increasing number of Chinese nursing educators (Zhang et al., 2018; Li et al., 2015; Wu et al., 2015). They have reached a consensus that the deficient knowledge associated with undergraduate nursing education may be due to the exclusion of the topic from the curriculum (Khraisat et al., 2017;). Previous studies have pointed out that the need for end-of-life care and palliative care education is increasing (Park et al., 2019; Azami-Aghdash et al., 2015). Nurses and nursing students argued that it should be a mandatory subject for all students in the healthcare profession and be independent of their current studies (Azami-Aghdash et al., 2015; Ballesteros et al., 2014). Likewise, nearly all (96.1%) Chinese nursing students in our study deemed that additional learning on palliative care is necessary. In 2016, the American College of Nursing Association (AACN) also suggested that palliative care should be included in undergraduate nursing curriculum (AACN, 2016). In this context, given the call to improve education on providing palliative care, medical universities should open individual end-of-life care courses for nursing students as soon as possible to change the current situation in China.

This study contributes to the literature as follows. We modified and supplemented Ross' palliative care, where the reliability of the new self-designed questionnaire reached a credible value of 0.764. The knowledge scores presented in Table 2 indicate that students' knowledge about pain and symptom management is inadequate, which is in line with the results of Sujatha and Jayagowri (2017). Ballesteros et al. (2014) and Jeffers and Ferry (2014) introduced the end-of-life and palliative care course into undergraduate nursing education. Their results show that students' knowledge about pain management improved. This context further illustrates the importance of developing palliative care education. In this study, we found that the question with the lowest correct answer rate (7.3%) was Q5 (false). The answer rate in other countries for the same question was over 60% (Iranmanesh et al., 2014; Wilson et al., 2016). Our accuracy was quite less than accuracy reported by other nursing students in different parts of the world. Thus, we infer that the cause of such a big difference should be further analyzed. In general, the Chinese people traditionally believe that the company of family members is crucial for dying people. For example, the immediate family should always keep an old man company in his deathbed. In addition, children, grandchildren, relatives, and friends should visit him and attend his funeral. They are taking the opportunity to show their respect and condolences to the family of the deceased. For this reason, departments in the Chinese government specifically set up a period of funeral leave. Perhaps, the views of China and the West on this issue largely differ. This view contributes to the Chinese emphasis on the importance of company before death. As a result, this question

**Table 2**  
Responses of the revised palliative care (n = 1156).

Item (Correct answer, T = true; F = false)	Correct n (%)	Incorrect n (%)	I Don't know n (%)
Q1: Palliative care is only appropriate in situations where there is evidence of a downward irreversible deterioration. (F)	724 (62.6)	290 (25.1)	142 (12.3)
Q2: Morphine is the standard used to compare the analgesic effect of other opioids. (T)	647 (56.0)	80 (6.9)	429 (37.1)
Q3: The extent of the disease determines the method of pain treatment. (F)	573 (49.6)	316 (27.3)	267 (23.1)
Q4: Adjuvant therapies are important in managing pain. (T)	923 (79.8)	68 (5.9)	165 (14.3)
Q5: It is crucial for family members to remain at the bedside until death occurs. (F)	907 (78.5)	84 (7.3)	165 (14.3)
Q6: During the last days of life, drowsiness associated with electrolyte imbalance may decrease the need for sedation. (T)	551 (47.7)	93 (8.0)	512 (44.3)
Q7: Drug addiction is a major problem when morphine is used on a long-term basis for the management of pain. (F)	589 (51.0)	325 (28.1)	242 (20.9)
Q8: Individuals who are taking opioids should also follow a bowel regime (laxative treatment) (T)	725 (62.7)	266 (23.0)	165 (14.3)
Q9: The provision of palliative care requires emotional detachment. (F)	351 (30.4)	565 (48.9)	240 (20.8)
Q10: During the terminal stages of an illness, drugs that can cause respiratory depression are appropriate for the treatment of severe dyspnea. (T)	619 (53.5)	228 (19.7)	309 (26.7)
Q11: Men generally reconcile their grief more quickly than women. (F)	340 (29.4)	409 (35.4)	406 (35.1)
Q12: The philosophy of palliative care is compatible with that of aggressive treatment. (T)	581 (50.3)	303 (26.2)	272 (23.5)
Q13: The use of placebos is appropriate in the treatment of some types of pain. (F)	511 (44.2)	300 (26.0)	345 (29.8)
Q14: In high doses, codeine causes more nausea and vomiting than morphine. (T)	796 (68.9)	108 (9.3)	252 (21.8)
Q15: Hospice Care is related to holistic Nursing and Humanistic Care. (T) <sup>a</sup>	958 (82.9)	55 (4.8)	143 (12.4)
Q16: Pethidine is not an effective analgesic for the control of chronic pain. (T)	653 (56.5)	173 (15.0)	330 (28.5)
Q17: The accumulation of losses makes burnout inevitable for those who work in palliative care. (F)	570 (49.3)	385 (33.3)	201 (17.4)
Q18: Manifestations of chronic pain are different from those of acute pain. (T)	919 (79.5)	38 (3.3)	199 (17.2)
Q19: The loss of a distant relationship is easier to resolve than the loss of one that is close or intimate. (F)	372 (32.2)	494 (42.7)	290 (25.1)
Q20: Pain threshold is lowered by fatigue or anxiety. (T)	767 (66.3)	100 (8.7)	289 (25.0)
Q21: Palliative care is a measure to provide conservative and supportive measures for dying patients and their families. (T) <sup>a</sup>	891 (77.1)	96 (8.3)	169 (14.6)
Q22: Palliative care services include both terminal patients and family members. (T) <sup>a</sup>	864 (74.7)	35 (3.0)	257 (22.2)
Q23: Nurses need to understand patients' views of life and death when providing palliative care. (T) <sup>a</sup>	837 (72.4)	140 (12.1)	179 (15.5)
Q24: The main purpose of palliative care is to manage symptoms, reduce burden of pain, and improve quality of life. (T) <sup>a</sup>	851 (73.6)	108 (9.3)	197 (17.0)
Q25: In deathbed stage, patients have the right to decide on his or her own schedule, such as meeting with friends, fulfill the wish, treatment, etc. (T) <sup>a</sup>	950 (82.2)	60 (5.2)	146 (12.6)
Q26: If patients request to give up treatment and go home before death, it should be supported. (T) <sup>a</sup>	787 (68.1)	150 (13.0)	219 (18.9)

<sup>a</sup> New items.

**Table 3**  
Univariate analysis of knowledge and attitudes of students in different groups.

Item	n	Knowledge ( $\bar{x} \pm s$ )			Attitudes [n (%)]			
		Scores	t/F	P	Yes	No or Unsure	$\chi^2$	P
School			12.650	< 0.001**			8.520	0.036*
School A	182	17.57 ± 4.38			47(25.8)	135(74.2)		
School B	218	14.53 ± 5.61			33(15.1)	185(84.9)		
School C	343	16.20 ± 4.82			74(21.6)	269(78.4)		
School D	413	16.20 ± 4.96			75(18.2)	338(81.8)		
Grade			30.442	< 0.001**			2.332	0.312
Freshman	457	15.19 ± 5.05			86(18.8)	371(81.2)		
Sophomore	411	15.78 ± 5.23			77(18.7)	334(81.3)		
Junior	288	18.01 ± 4.17			66(22.9)	222(77.1)		
Gender			-3.240	0.002**			1.121	0.290
Male	110	14.52 ± 5.43			26(23.6)	84(76.4)		
Female	1046	16.27 ± 4.97			203(19.4)	842(80.6)		
Birthplace			2.435	0.016*			1.696	0.193
Countryside	1009	16.26 ± 4.86			194(19.2)	815(80.8)		
City	147	15.00 ± 6.00			35(23.8)	112(76.2)		
Nationality			0.526	0.599			0.193	0.660
The Han nationality	616	16.17 ± 4.83			125(20.3)	491(79.7)		
Minority	540	16.02 ± 5.27			104(19.3)	436(80.7)		
Religious belief			3.533	0.001**			1.333	0.248
Yes	120	17.58 ± 4.81			19(15.8)	101(84.2)		
No	1036	15.93 ± 5.04			210(20.3)	826(79.7)		
Talk about death			1.995	0.137			15.540	< 0.001**
Always	194	16.61 ± 5.04			58(29.9)	136(70.1)		
Sometimes	850	16.07 ± 5.04			148(17.4)	702(82.6)		
Never	112	15.44 ± 4.95			23(20.5)	89(79.5)		
Caring for dying family members			2.476	0.013*			10.097	0.001**
Yes	691	16.40 ± 4.91			158(22.9)	533(77.1)		
No	465	15.65 ± 5.19			71(15.3)	394(84.7)		
Family member with a terminal illness			1.010	0.313			4.538	0.033*
Yes	624	16.24 ± 4.99			138(22.1)	486(77.9)		
No	532	15.94 ± 5.10			91(17.1)	441(82.9)		

\* P-value < 0.05.

\*\* P-value < 0.01.

**Table 4**  
The result of multiple linear regression analysis of knowledge influencing factors.

Independent variable	B	$\beta$	t	P
School	-3.188	-0.248	-6.633	< 0.001**
Grade	1.360	0.213	7.390	< 0.001**
Gender	1.872	0.109	3.873	< 0.001**
Birthplace	-1.042	-0.069	-2.461	0.014*
Religious belief	-1.395	-0.085	-2.946	0.003**

95%CI,  $R^2 = 0.323$ ,  $F = 19.159$ ,  $P < 0.001$ .

\*  $P < 0.05$ .

\*\*  $P < 0.01$ .

had a low accuracy rate.

Multiple linear regression analysis was used to confirm the following factors that can influence knowledge about palliative care: school, grade, gender, birthplace, and religious belief. Table 3 shows that the students from school A, at the junior level, who were female, who were born in the countryside, and with religious belief reported the highest knowledge scores. After further investigation, we found that school A integrated all courses related to palliative care into compulsory courses. We deem that this initiative is the reason why School A students obtained the highest level of knowledge. On the other hand, junior students obtained higher scores because they learned additional specialized courses compared with junior and sophomore students. Our finding supports previous research by Ross et al. (1996) and Dimoula et al. (2019). We found that female nursing students were more knowledgeable compared to male nursing students' and similar findings do exist in Greece (Dimoula et al., 2019). But it is difficult to explain the effects of gender on knowledge.

Place of birth and religious belief of Chinese nursing students are also worth discussing. The Chinese people generally believe that the spirit of a dead person cannot return home if he dies far from his hometown. An old saying in China states that “fallen leaves return to the roots,” which expresses the idea that dying at home is as natural as autumn leaves falling to the ground (Shih et al., 2015). Aside from China, surveys in other countries also showed that the majority of terminally ill patients prefer dying at home (Jabbari et al., 2019; Cleary, 2017; Khamenian and Jabbari-Beyrami, 2016). Interestingly, in 2015, Shih et al. (2015) conducted a data analysis and revealed that patients who believe in Chinese folk religion and live in rural areas prefer to die at home. Thus, under the influence of such family values and cultural customs, students who were born in the countryside and hold religious beliefs may have more knowledge on palliative care, as indicated by the higher palliative care scores compared with students born in cities and do not hold religious beliefs. From an educational point of view, religious beliefs should be honored and integrated to inspire nursing educators to pay attention to this aspect in the teaching process (Lu et al., 2018).

The findings of our logistic regression analysis show a significant

**Table 5**  
The result of logistic regression analysis of attitudes influencing factors.

Independent variable	Regression coefficient	Wald $\chi^2$	P	OR
Talk about death	-0.365	6.177	0.013*	1.441
Caring for dying family members	0.437	7.357	0.007**	1.548

95%CI.

\*  $P < 0.05$ .

\*\*  $P < 0.01$ .

correlation between attitudes and talking about death and caring for dying people. Research by Hagelin et al. (2016) concluded that students with an early experience of meeting a dying person hold a positive attitude toward palliative care. This result is similar to that of a study carried out in Australia, where participants with previous experience of death and dying had less anxiety and felt prepared to provide palliative and end-of-life care (Adesina et al., 2014). The positive attitude may be because they felt and shared the pain of a loved one's death and can thus understand the meaning of palliative care. However, only < 20% of students (19.8%) in the present study wanted to be engaged in a palliative care career in the future. The main reasons why these students were unwilling to work in palliative care were the sad working environment and anxiety about death. Talking about death and dying is taboo in Chinese communities, and families may not discuss these issues for fear of invoking bad luck. However, practices have proven that close contact with dying patients has a positive effect on reducing fear of and anxiety about death and improves students' attitudes toward palliative care (Carmack and Kemery, 2018; Wang et al., 2017; Gilliland, 2015; Davis-Berman, 2014). Many researches demonstrated that simulated experiences have positive effects on reducing death anxiety and enhance students' knowledge, attitudes, self-confidence, and communication skills during palliative care education (Kirkpatrick et al., 2019; Hagelin et al., 2016; Colley, 2016; Sarabia-Cobo et al., 2016; Saylor et al., 2016; Gillan et al., 2016). Accordingly, we suggest that teachers encourage students to talk about death with their families and provide opportunities and experiences for students to care for dying patients to enrich students' emotional experience.

### 5. Limitations

Several limitations should be considered. First, this study was conducted in Guangxi without additional data from other provinces. Hence, the results cannot be generalized to all Chinese nursing students. Second, this was a cross-sectional study without longitudinal observation of the subjects. Finally, due to time constraints, we only conducted a questionnaire survey, and did not carry out an intervention. Consequently, future research should improve on these aspects. And now we are preparing for a longitudinal study and conducting a questionnaire survey of graduate nursing students. In addition, we plan to



Fig. 1. The reasons for unwillingness or uncertainty to be engaged in palliative care (%).

carry out a curriculum intervention in a nursing school, taking into account the factors that we have found.

## 6. Conclusion

The present findings revealed that knowledge about palliative care among Chinese undergraduate nursing students, specifically in pain management, is deficient. The date analysis indicated that school, grade, gender, birthplace and religious belief were influencing factors on knowledge ( $P < 0.01$ ). In addition, experiences of talking about death and caring for dying family members positively influenced students' attitudes ( $P < 0.05$ ). We suggest that medical universities should set up an individual palliative care and end-of-life care curriculum for nursing students as early as possible. All influencing factors should be taken into account when developing palliative care and end-of-life care education, especially religious belief, anxiety about death, and the experience of caring for dying people.

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## Ethical considerations

This study maintains the anonymity of all the participants, who can opt whether or not to participate. Formal written consent was obtained from all participants. We further guaranteed that the identity of the participants will not be disclosed and that their answers will be confidential. Ethical approval for the project was gained from the ethics committees of the universities [grant numbers ECGXMU16293].

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## Declaration of competing interest

The authors declare no conflicts of interest.

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