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Knowledge and attitudes of Iranian nursing students toward palliative and end-of-life care: a cross-sectional study

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Abstract

Background & Objective: Nursing education plays a key role in providing nursing students with the knowledge and positive attitudes needed to deliver palliative care to patients with chronic illnesses. This study assessed the palliative care knowledge and attitudes of Iranian nursing students and identified associated predictive factors.

Materials & Methods: This cross-sectional study included 202 undergraduate (third- or fourth-year) and postgraduate nursing students at Ahvaz Jundishapur University of Medical Sciences, Iran, from October 2024 to January 2025. Participants were recruited using a census sampling method. Data were collected via a demographic information questionnaire, the PC Quiz for Nurses (PCQN), and the Iranian questionnaire on Health Care Providers' Attitudes Toward Palliative Care. Statistical analyses were performed using SPSS version 25 and included independent t-tests, Pearson's correlation coefficient, and multiple linear regression to examine relationships among the variables.

Results: Mean knowledge and attitude scores were 7.10 ± 2.45 (range: 0–20) and 138.69 ± 9.63 (range: 37–185), respectively. Multiple linear regression analysis indicated that academic degree ($\beta = 0.335$, $p < 0.001$), knowledge ($\beta = 0.229$, $p = 0.001$), perceived need for palliative care education ($\beta = 0.154$, $p = 0.019$), and experience with terminally ill patients ($\beta = 0.153$, $p = 0.044$) were significant predictors of nursing students' attitudes. Knowledge was significantly predicted by care experience ($\beta = 0.202$, $p = 0.003$) and prior course attendance ($\beta = 0.192$, $p = 0.005$). The models accounted for 17% of the variance in attitudes ($R^2 = 0.170$, $F = 11.318$, $p < 0.001$) and 7.4% of the variance in knowledge ($R^2 = 0.074$, $F = 9.050$, $p < 0.001$).

Conclusion: The findings showed that nursing students had low levels of palliative care knowledge but generally positive attitudes toward end-of-life care. These findings highlight the need to strengthen palliative care education by systematically integrating core competencies, developing evidence-based instructional materials, and providing targeted faculty development. Such curriculum enhancements can improve students' knowledge, attitudes, and preparedness to provide high-quality end-of-life care.

Keywords: attitudes; palliative care; end-of-life care; nursing students

Introduction

Access to palliative care is increasingly recognized as an important part of comprehensive health care, ensuring comfort and dignity for patients facing serious illness. According to the World Health Organization (WHO), all countries should make palliative care a public health priority to ensure equitable access for patients regardless of age, disease type, or income level [1]. However, in many low- and middle-income countries, including Iran, palliative care is not yet fully integrated into the health system and faces numerous challenges [2].

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Palliative care is a holistic approach that enhances the quality of life for patients with life-threatening diseases and their families through early identification and assessment of physical, psychological, spiritual, and social needs, aiming to alleviate suffering [3]. Given the multifaceted nature of palliative care, multidisciplinary teams collaborate to address patients' diverse needs and improve their quality of life throughout the illness trajectory [4]. As essential members of the healthcare team, nurses play a key role in this process, spending substantial time with patients and their families while assessing their palliative care needs [5]. Consequently, a nurse's competence directly impacts the quality of care and treatment outcomes [6].

For palliative care to be effective, nurses must have adequate knowledge, a positive attitude, and sufficient skills. Research indicates that although nurses are committed to providing quality care, inadequate preparation and limited education in palliative care may lead to insufficient knowledge, negative attitudes toward death and dying, and reduced confidence in caring for patients with life-threatening illnesses. These gaps ultimately affect the quality of care provided [3, 7]. While palliative care is well integrated into healthcare systems in many developed countries and supported by specialized training programs for nurses and physicians [8], its provision in Iran faces substantial challenges. These challenges are largely attributed to limited awareness and knowledge among healthcare providers and the lack of formal palliative care education in healthcare curricula [9, 10]. The WHO emphasizes the importance of palliative care training for all healthcare professionals, particularly nurses, as vital for strengthening health systems and ensuring comprehensive patient care [1].

Providing effective palliative care requires nursing students to develop adequate knowledge, communication skills, and positive attitudes toward caring for patients with life-limiting illnesses. However, undergraduate nursing curricula often provide limited preparation in palliative and end-of-life care [3]. As a result, nursing students frequently report feeling inadequately prepared to care for dying patients and show deficiencies in palliative care knowledge, skills, and attitudes [11–13].

These concerns are supported by a recent systematic review showing that nursing students' mean palliative care knowledge score was only 8.94 out of 20, indicating an overall inadequate level of knowledge in this population [14]. Such findings highlight the need to better understand nursing students' preparedness for palliative care and to identify areas requiring educational improvement. Therefore, assessing the current level of knowledge and attitudes among nursing students is an essential first step toward addressing these gaps.

Although nursing students' knowledge and attitudes regarding palliative care have been widely studied internationally, research on this topic in Iran remains limited.

In Iran, the escalating demand for palliative care services is driven by both an aging population and the rising prevalence of incurable diseases. Nursing students, as future healthcare providers, will play a pivotal role in delivering palliative care services. Therefore, this study aimed to assess palliative care knowledge and attitudes, and identify associated predictive factors, among nursing students at Ahvaz Jundishapur University of Medical Sciences in Ahvaz, Iran.

Materials & Methods

Design and setting(s)

This cross-sectional study was conducted at the School of Nursing, Ahvaz Jundishapur University of Medical Sciences, Iran, during the 2024–2025 academic year (October 8, 2024 – January 19, 2025).

Participants and sampling

The target population comprised all third- and fourth-year undergraduate nursing students (n = 217) and all postgraduate nursing students (n = 63) enrolled at the School during the study period, for a total of 280 eligible students. First- and second-year undergraduate students were not eligible because their limited clinical exposure would not allow them to meaningfully respond to items related to palliative and end-of-life care.

All eligible students (N = 280) were invited to participate in the study through institutional communication channels. Of these, 202 students agreed to participate, provided informed consent, and completed the questionnaire, while 78 students did not respond despite follow-up reminders.

The final analytical sample consisted of 202 participants (response rate = 72.1%).

Given the finite target population (N = 280), the minimum required sample size was calculated using the formula for estimating a proportion in a finite population, with a 95% confidence level, a 5% margin of error, and a conservative assumed proportion of 50%. This calculation yielded a minimum required sample size of 162. The obtained sample (n = 202) exceeds this

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threshold, indicating adequate statistical power for descriptive and correlational analyses.

Tools/Instruments

The demographic information questionnaire included the students' age (≤ 23 years and ≥ 24 years), sex, marital status, academic degree (undergraduate or postgraduate), clinical work experience (excluding internships) (yes or no), history of attending palliative care courses (yes or no), and the perceived need to participate in palliative care courses (yes or no).

The Health Care Providers' Attitude toward Palliative Care questionnaire, a self-report instrument previously developed and validated by Ashrafizadeh et al. in Iran (2021), was used [14]. This 37-item questionnaire assesses five dimensions: attitudes toward palliative care principles (13 items), family participation (6 items), end-of-life care (9 items), and patient autonomy (9 items). Responses are measured using a 5-point Likert scale, where a score of 5 indicates "I strongly agree" and a score of 1 indicates "I strongly disagree."

Items 11, 13, 20, 21, 22, 23, 24, 28, and 29 are scored in reverse, with the "strongly disagree" option assigned a score of 5. The total score reflecting the respondent's attitude is the sum of the four subscales, which range from 37 to 185. The scores on the scale are categorized into three levels: low (37–85), moderate (86–134), and high (135–185) attitudes (14). While the original scale reported an overall Cronbach's alpha of 0.80 [14], its reliability in the present study, measured using Cronbach's alpha, was 0.75.

The Palliative Care Quiz for Nursing (PCQN) was used to assess students' palliative care knowledge. Ross et al. (1996) developed the PCQN [15]. This questionnaire has 20 items and three dimensions: philosophy and principles of palliative care (4 items), psychosocial and spiritual care (3 items), and management of pain and other symptoms (13 items).

Responses were scored as 1 for "correct" and 0 for "incorrect" or "I do not know." The PCQN total score ranges from 0 (lowest level of knowledge) to 20 (highest level of knowledge).

Scores falling ≤ 7, 7.1-14, and 14.1 and above are categorized as low, moderate, and sufficient levels of knowledge, respectively. Heidari et al. [16] conducted a psychometric evaluation of the Persian version of the PCQN in Iran. They reported an internal consistency coefficient of 0.72, measured using the Kuder-Richardson Formula 20 (KR-20) [16]. The instrument showed satisfactory internal consistency in this study, with a KR-20 of 0.73.

Data collection methods

Data were collected using an online questionnaire distributed via a Google Forms link. The questionnaire, accompanied by an informed consent form describing the study objectives, procedures, and participants' rights, was disseminated through official university channels and student class groups on social media platforms such as WhatsApp, Telegram, and Eita. Faculty members helped share the survey link directly within student groups. Participation was voluntary and anonymous, and no incentives were provided. To improve data quality, the questionnaire was designed to prevent missing responses and included attention/control items. The survey link was distributed on multiple occasions with reminder messages to improve the response rate.

Data analysis

Data were analyzed using SPSS v.25 software. Because the Kolmogorov–Smirnov test indicated a normal distribution of the data, parametric tests were used. An independent sample t-test was used to examine the statistical difference in mean knowledge and attitude scores across demographic subgroups. The relationship between the outcome variables (knowledge and attitude) was assessed using a correlation matrix based on Pearson correlation coefficients. Finally, stepwise multiple linear regression analyses were performed to identify the most important predictors of knowledge and attitude scores (P-value for entry < 0.05). This method was used to select variables based on statistical criteria and to reduce the risk of overfitting.

Results

A total of 202 nursing students participated in the study. The response rate was 72.14%. The mean age of the students was 24.23 ± 3.96 years. The majority of the participants (54.5%) were female, 88.1% were single, 82.6% were undergraduates, and 17.4% were postgraduates. Additionally, 51.5% of the students reported having clinical work experience, while nearly half (49.5%) attended palliative care courses. More than 75% of the students also recognized the importance of participating in palliative care courses. The demographic characteristics of the students, along with their mean levels of knowledge and attitudes toward palliative care, are presented in **Table 1**.

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Table 1. Comparison of palliative care knowledge and attitude scores across demographic characteristics of nursing students

Variables		Number (%)	APPC (M±SD)	AFPPC (M±SD)	AELC (M±SD)	APA (M±SD)	Total Attitude (M±SD)	PPPC (M±SD)	PSM (M±SD)	PSC (M±SD)	Total Knowledge (M±SD)
Age	≤ 23	126 (62.5)	51.97 ± 4.25	24.93 ± 3.08	26.57 ± 2.99	34.89 ± 4.32	138.38 ± 8.96	1.71 ± 0.80	5.01 ± 1.93	0.28 ± 0.54	7.01 ± 2.43
	> 23	76 (37.5)	51.80 ± 4.41	25.11 ± 3.09	26.92 ± 2.84	35.36 ± 5.18	139.19 ± 10.70	1.65 ± 0.72	5.32 ± 2.06	0.27 ± 0.55	7.26 ± 2.48
	Sig		t = 0.277	t = -0.405	t = -0.801	t = -0.677	t = -0.552	t = 0.500	t = -1.085	t = 0.117	t = -0.693
			p = 0.782	p = 0.686	p = 0.424	p = 0.499	p = 0.582	p = 0.618	p = 0.279	p = 0.907	p = 0.489
Sex	Female	110 (54.5)	52.25 ± 4.37	25.32 ± 2.97	26.57 ± 2.97	35.89 ± 4.56	140.04 ± 9.42	1.79 ± 0.73	5.09 ± 1.86	0.30 ± 0.55	7.18 ± 2.31
	Male	92 (45.5)	51.50 ± 4.20	24.61 ± 3.18	26.86 ± 2.89	34.08 ± 4.60	137.07 ± 9.69	1.57 ± 0.78	5.18 ± 2.12	0.26 ± 0.55	7.02 ± 2.61
	Sig		t = 1.242	t = 1.630	t = -0.715	t = 2.786	t = 2.202	t = 1.974	t = -0.334	t = 0.502	t = 0.461
			p = 0.216	p = 0.105	p = 0.475	p = 0.006	p = 0.029	p = 0.050	p = 0.739	p = 0.616	p = 0.646
Marital Status	Single	178 (88.1)	51.68 ± 4.28	24.96 ± 2.91	26.74 ± 2.92	34.93 ± 4.62	138.33 ± 9.48	1.65 ± 0.77	5.06 ± 1.99	0.30 ± 0.57	7.02 ± 2.48
	Married	24 (11.9)	53.58 ± 4.20	25.29 ± 4.21	26.45 ± 3.06	36.04 ± 4.92	141.37 ± 10.50	1.95 ± 0.75	5.66 ± 1.88	0.12 ± 0.33	7.75 ± 2.13
	Sig		t = -2.042	t = -0.484	t = 0.443	t = -1.090	t = -1.456	t = -1.794	t = -1.403	t = 2.198	t = -1.366
			p = 0.042	p = 0.629	p = 0.658	p = 0.277	p = 0.147	p = 0.074	p = 0.162	p = 0.033	p = 0.174
Academic degree	Undergraduate	177 (87.6)	51.61 ± 4.31	24.84 ± 3.08	26.58 ± 2.96	34.62 ± 4.32	137.67 ± 9.26	1.68 ± 0.79	4.96 ± 1.97	0.29 ± 0.56	6.95 ± 2.48
	Postgraduate	25 (12.4)	54.00 ± 3.71	26.12 ± 2.89	27.56 ± 2.61	38.20 ± 5.75	145.88 ± 9.31	1.72 ± 0.67	6.32 ± 1.62	0.16 ± 0.37	8.20 ± 1.97
	Sig		t = -2.629	t = -1.944	t = -1.556	t = -3.701	t = -4.140	t = -0.185	t = -3.265	t = 1.617	t = -2.402
			p = 0.009	p = 0.053	p = 0.121	p < 0.001	p < 0.001	p = 0.853	p = 0.001	p = 0.113	p = 0.017
Clinical work experience	Yes	104 (51.5)	51.81 ± 4.33	24.82 ± 3.22	26.61 ± 2.78	35.46 ± 4.69	138.72 ± 9.69	1.74 ± 0.78	5.50 ± 2.08	0.26 ± 0.54	7.51 ± 2.56
	No	98 (48.5)	52.01 ± 4.29	25.19 ± 2.93	26.80 ± 3.09	34.65 ± 4.00	138.66 ± 9.62	1.64 ± 0.76	4.73 ± 1.80	0.29 ± 0.55	6.67 ± 2.26
	Sig		t = -0.317	t = -0.844	t = -0.461	t = 1.234	t = 0.043	t = 0.893	t = 2.818	t = -0.344	t = 2.478
			p = 0.751	p = 0.400	p = 0.646	p = 0.219	p = 0.966	p = 0.373	p = 0.005	p = 0.732	p = 0.014
Perceived need to participate in palliative care courses	Yes	153 (75.7)	52.35 ± 4.61	25.32 ± 2.96	26.91 ± 2.77	35.18 ± 4.59	139.77 ± 9.12	1.72 ± 0.74	5.13 ± 1.94	0.27 ± 0.54	7.13 ± 2.31
	No	49 (24.3)	50.53 ± 4.50	24.00 ± 3.27	26.06 ± 3.33	34.71 ± 4.88	135.30 ± 10.48	1.59 ± 0.86	5.12 ± 2.13	0.30 ± 0.58	7.02 ± 2.87
	Sig		t = 2.615	t = 2.659	t = 1.782	t = 0.612	t = 2.878	t = 1.050	t = 0.045	t = -0.349	t = 0.289
			p = 0.010	p = 0.008	p = 0.076	p = 0.541	p = 0.004	p = 0.295	p = 0.964	p = 0.727	p = 0.773
History of attending in palliative care courses	Yes	100 (49.5)	51.46 ± 4.61	24.78 ± 3.05	26.74 ± 3.01	35.49 ± 4.50	138.47 ± 10.01	1.80 ± 0.63	5.49 ± 1.96	0.33 ± 0.58	7.62 ± 2.29
	No	102 (50.5)	52.35 ± 3.94	25.22 ± 3.11	26.67 ± 2.87	34.65 ± 4.79	138.91 ± 9.29	1.58 ± 0.88	4.78 ± 1.95	0.23 ± 0.51	6.60 ± 2.51
	Sig		t = -1.475	t = -1.026	t = 0.153	t = 1.273	t = -0.325	t = 1.959	t = 2.559	t = 1.222	t = 2.987
			p = 0.142	p = 0.306	p = 0.878	p = 0.205	p = 0.746	p = 0.052	p = 0.011	p = 0.223	p = 0.003
Experience in providing care for terminally ill patients	Yes	84 (41.6)	52.41 ± 4.18	25.15 ± 3.27	26.63 ± 2.89	36.07 ± 4.45	140.27 ± 8.94	1.76 ± 0.80	5.71 ± 1.97	0.25 ± 0.51	7.72 ± 2.34
	No	118 (58.4)	51.55 ± 4.37	24.89 ± 2.95	26.76 ± 2.97	34.35 ± 4.68	137.56 ± 9.98	1.64 ± 0.75	4.72 ± 1.89	0.30 ± 0.57	6.66 ± 2.44
	Sig		t = 1.412	t = 0.581	t = -0.314	t = 2.617	t = 1.981	t = 1.064	t = 3.608	t = -0.700	t = 3.078
			p = 0.160	p = 0.562	p = 0.754	p = 0.010	p = 0.049	p = 0.288	p < 0.001	p = 0.485	p = 0.002

Note: Independent t-test was used to compare mean knowledge and attitude scores across demographic subgroups. Significance level was set at α = 0.05. Data are presented as Mean ± Standard Deviation (M±SD). The total knowledge score ranged from 0 to 20, with subscales including Philosophy and Principles of Palliative Care (PPPC: 0–4), Pain and Symptom Management (PSM: 0–13), and Psychosocial and Spiritual Care (PSC: 0–3). The total attitude score ranged from 37 to 185, with subscales including Attitude towards Principles of Palliative Care (APPC: 13–65), Attitude towards Family Participation in Palliative Care (AFPPC: 6–30), Attitude towards End-of-Life Care (AELC: 9–45), and Attitude towards Patient Autonomy (APA: 9–45).

Abbreviations: SD, standard deviation; M, mean; PPPC, philosophy and principles of palliative care; PSM, pain and symptom management; PSC, psychosocial and spiritual care; APPC, attitude towards principles of palliative care; AFPPC, attitude towards family participation in palliative care; AELC, attitude towards end-of-life care; APA, attitude towards patient's autonomy; PC, palliative care; t, independent t-test statistic; p, probability-value.

The mean knowledge score of the nursing students was 7.10 ± 2.45. Based on the predefined cut-off scores, 54% of the students had poor knowledge (score ≤ 7), while 46% had moderate knowledge (score 7.1–14) (**Table 2**). Item analysis showed that the lowest scores were obtained for items 5 and 17 (4%), followed by items 13, 7, and 3. In contrast, the highest score was recorded for item 4 (93%), followed by items 9, 18, and 20. **Table 3** displays the participants' responses to the PCQN items.

Nursing students' mean knowledge scores did not differ significantly by age (t = -0.693, p = 0.489), sex (t = 0.461, p = 0.646), marital status (t = -1.366, p = 0.174), or perceived need to participate in palliative care courses (t = 0.289, p = 0.773). However, mean knowledge scores differed significantly by academic degree (t = -2.402, p = 0.017), clinical work experience (t = 2.478, p = 0.014), history of attending palliative care courses (t = 2.987, p = 0.003), and experience providing care for terminally ill patients (t = 3.078, p = 0.002) (**Table 1**). The mean attitude score of the nursing students was 138.69 ± 9.63. Based on the predefined cut-off scores, 65.8% of students had high attitude levels toward palliative care, while 34.2% had moderate levels. Among the subscales, the highest scores were recorded for attitudes toward the principles of palliative care and patient autonomy, whereas the lowest scores were recorded for attitudes toward family participation and end-of-life care, respectively (**Table 2**). Average item-level attitude scores ranged from 1.67 (item 23) to 4.59 (item 2). **Table 4** presents the mean attitude scores of students regarding palliative care. Mean attitude scores did not differ significantly by age (t = -0.552, p = 0.582), marital status (t = -1.456, p = 0.147), clinical work experience (t = 0.043, p = 0.966), or attendance in palliative care courses (t = -0.325, p = 0.746). However, mean attitude scores differed significantly by sex (t = 2.202, p = 0.029), academic degree (t = -4.140, p < 0.001), perceived need to participate in palliative care courses (t = 2.878, p = 0.004), and experience providing care for terminally ill patients (t = 1.981, p = 0.049) (**Table 1**). A correlation matrix was generated as a prerequisite for regression analysis. A significant positive correlation was observed between the knowledge score and attitude (r = 0.26, p < 0.001) (**Table 5**).

Two multiple linear regression analyses were conducted using the stepwise method to identify the predictors of

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knowledge and attitudes among nursing students. The results showed that academic degree (β = 0.335, p < 0.001), knowledge (β = 0.229, p = 0.001), perceived need to participate in palliative care courses (β = 0.154, p = 0.019), and experience providing care for terminally ill patients (β = 0.153, p = 0.044) were significantly associated with nursing students' attitudes, accounting for 17% of the variance in attitudes toward palliative care (R^2 = 0.170, F = 11.318, p < 0.001). In addition, experience providing care for terminally ill patients (β = 0.202, p = 0.003) and history of attending palliative care courses (β = 0.192, p = 0.005) were significantly associated with knowledge. This model explained 7.4% of the variance in nursing students' knowledge about palliative care (R^2 = 0.074, F = 9.050, p < 0.001) (**Table 6**).

Table 2. Descriptive statistics of palliative care knowledge and attitude scores among nursing students

Outcome variables	Mean ± SD	Possible range
Attitude subscales		
Attitude towards principles of palliative care	51.91 ± 4.30	13–65
Attitude towards family participation in palliative care	25.00 ± 3.08	6–30
Attitude towards end-of-life care	26.70 ± 2.93	9–45
Attitude towards patient's autonomy	35.06 ± 4.65	9–45
Total attitude	**138.69 ± 9.63**	**37–185**
Knowledge subscales		
Philosophy and principles of palliative care	1.69 ± 0.77	0–4
Pain and symptom management	5.13 ± 1.98	0–13
Psychosocial and spiritual care	0.28 ± 0.55	0–3
Total knowledge	**7.10 ± 2.45**	**0–20**

Note: n = 202. Data are presented as Mean ± Standard Deviation (SD). The possible range for each subscale and total score is presented to facilitate interpretation of the findings.
Abbreviations: SD, standard deviation.

Table 3. Distribution of nursing students' knowledge about palliative care (n = 202)

No.	Knowledge Questions	Correct Answer	Correct n (%)	Incorrect/Do Not Know n (%)
1	Palliative care is only appropriate when there is evidence of a decline or deterioration in the patient's condition. (F)	F	100 (49.5)	102 (50.5)
2	Morphine is the standard for comparing the analgesic effects of other opioids. (T)	T	62 (30.7)	140 (69.3)
3	The extent of the disease determines the method of pain treatment. (F)	F	22 (10.9)	180 (89.1)
4	Supportive therapies are important in pain management. (T)	T	189 (93.6)	13 (6.4)
5	It is very important for family members to stay at the bedside until the moment of death. (F)	F	8 (4.0)	194 (96.0)
6	In the last days of life, drowsiness accompanied by electrolyte imbalance may reduce the need for sedatives. (T)	T	75 (37.1)	127 (62.9)
7	Drug addiction is a major problem that arises when using morphine for long-term pain management. (T)	T	19 (9.4)	183 (90.6)
8	Individuals undergoing treatment with opioid medications should follow a soft diet (treatment with laxatives). (T)	T	110 (54.5)	92 (45.5)
9	The provision of palliative care requires emotional detachment. (F)	F	180 (89.1)	22 (10.9)
10	In the final stages of the disease, respiratory depressants are not a suitable choice for the treatment of severe shortness of breath. (T)	T	32 (15.8)	170 (84.2)
11	Men generally cope with grief sooner than women. (F)	F	26 (12.9)	176 (87.1)
12	The philosophy of palliative care is compatible with the philosophy of aggressive treatment. (T)	T	54 (26.7)	148 (73.3)
13	The use of placebos is appropriate in the treatment of some types of pain. (F)	F	14 (6.9)	188 (93.1)
14	Codeine at higher doses than morphine causes nausea and vomiting. (T)	T	47 (23.3)	155 (76.7)
15	Physical pain and suffering are the same. (F)	F	123 (60.9)	79 (39.1)
16	Demerol (Pethidine) is not an effective analgesic for controlling chronic pain. (T)	T	47 (23.3)	155 (76.7)
17	Frequent exposure to distressing situations inevitably leads to occupational burnout for those working in palliative care. (F)	F	8 (4.0)	194 (96.0)
18	The clinical manifestations of chronic pain are different from acute pain. (T)	T	161 (79.7)	41 (20.3)
19	Accepting the death of a distant relative is much easier than accepting the loss of a loved one or close friend. (F)	F	23 (11.4)	179 (88.6)
20	A person's pain tolerance is diminished when they are experiencing fatigue or anxiety. (T)	T	136 (67.3)	66 (32.7)

Note: n = 202. The correct answer for each question is indicated in parentheses: (T) = True, (F) = False. Percentages may not sum to 100% due to rounding.
Abbreviations: n, number of participants; T, true; F, false; %, percentage.

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Table 4. Nursing students' attitudes toward palliative care (n = 202)

Dimensions	Item	Items	Mean ± SD	Agree/Strongly Agree n (%)	Unsure n (%)	Disagree/Strongly Disagree n (%)
Attitude towards principles of palliative care	1	All patients with incurable disease are candidates for receiving palliative care services, not just cancer patients.	4.50 ± 0.61	191 (94.5)	10 (5.0)	1 (0.5)
	2	Nurses and physicians should be familiar with palliative care services.	4.59 ± 0.55	198 (98.0)	3 (1.5)	1 (0.5)
	3	One of the advantages of palliative care is improving the quality of life in patients and their families.	4.58 ± 0.54	197 (97.5)	5 (2.5)	0 (0.0)
	4	Palliative care is the patient's right.	4.59 ± 0.53	198 (98.0)	4 (2.0)	0 (0.0)
	5	Palliative care can be provided at home, in outpatient settings and in the hospital.	4.37 ± 0.68	181 (89.6)	20 (9.9)	1 (0.5)
	6	Pain management is of great importance in the patients in need of palliative care.	4.56 ± 0.53	198 (98.0)	4 (2.0)	0 (0.0)
	7	During end-of-life pain management, addiction to analgesics is not a concern.	3.77 ± 1.05	128 (63.2)	45 (22.3)	29 (14.5)
	8	Managing symptoms such as constipation, nausea and vomiting, loss of appetite, etc. is of great importance.	4.43 ± 0.56	195 (96.5)	7 (3.5)	0 (0.0)
	9	It is important for terminally-ill patients to express their feelings.	4.29 ± 0.76	174 (86.1)	23 (11.4)	5 (2.5)
	10	Having experiences of family counseling and breaking bad news is effective in providing palliative care.	4.13 ± 0.77	167 (82.7)	30 (14.9)	5 (2.4)
	*11	Palliative care is different from conventional and traditional care.	1.95 ± 0.75	154 (76.2)	46 (22.8)	2 (1.0)
	12	End-of-life care is a part of palliative care.	4.07 ± 0.74	161 (79.7)	37 (18.3)	4 (2.0)
Attitude towards family participation in palliative care	*13	Some members of the care team are more important than other team members for providing palliative care.	2.06 ± 0.86	150 (74.2)	39 (19.3)	13 (6.5)
	14	Many skills are needed to discuss death with a dying patient or his/her family.	4.45 ± 0.57	194 (96.0)	8 (4.0)	0 (0.0)
	15	Palliative care should also be provided to the family of a dying patient.	4.38 ± 0.66	186 (92.0)	14 (6.9)	2 (1.1)
	16	Families need emotional support to accept the behavioral changes of the dying individual.	4.40 ± 0.60	192 (95.0)	9 (4.5)	1 (0.5)
	17	The family should be involved in choosing treatment.	4.19 ± 0.80	176 (87.1)	17 (8.4)	9 (4.5)
	18	Providing care for the patient's family should continue in the time of grief and mourning.	3.67 ± 1.01	123 (60.9)	50 (24.8)	29 (14.3)
	19	The family should keep the environment as normal as possible for the dying member.	3.92 ± 0.86	150 (74.2)	36 (17.8)	16 (8.0)
Attitude towards end-of-life care	*20	As patient's death approaches, health care providers should stop being involved with the patient.	2.22 ± 1.01	135 (66.8)	44 (21.8)	23 (11.4)
	*21	In most cases, when the patient is dying, it is the family who should be informed instead of the patient.	2.39 ± 1.03	114 (56.5)	54 (26.7)	34 (16.8)
	*22	I am afraid of making friends with chronic patients who are dying.	3.04 ± 1.10	67 (33.2)	60 (29.7)	75 (37.1)
	*23	When providing palliative care, family's questions and concerns should be perceived as a threat.	1.67 ± 0.60	190 (94.1)	11 (5.4)	1 (0.5)
	*24	Caregivers cannot help patients prepare for death.	3.41 ± 1.14	51 (25.2)	38 (18.8)	113 (56.0)
	25	Major depression is normal for end-of-life patients.	3.55 ± 0.81	117 (57.9)	62 (30.7)	23 (11.4)
Attitude towards patient autonomy	26	Having religious beliefs similar to the patient's improves the care provision process.	3.92 ± 0.77	153 (75.8)	39 (19.3)	10 (4.9)
	27	My religious beliefs significantly affect my attitude towards death and dying.	3.89 ± 0.92	146 (72.2)	39 (19.3)	17 (8.5)
	*28	It is normal for family members to experience the symptoms of grief for 6 to 12 months.	2.61 ± 1.09	104 (51.5)	53 (26.2)	45 (22.3)
	*29	The dying person should not be allowed to make decisions about his/her care.	3.69 ± 0.99	27 (13.4)	44 (21.8)	131 (64.8)
	30	Dying individuals should be given honest answers about their illness.	3.72 ± 0.87	132 (65.3)	50 (24.8)	20 (9.9)
	31	The patient should be informed of his/her medical diagnosis.	3.89 ± 0.79	152 (75.3)	37 (18.3)	13 (6.4)
	32	The patient should be informed of the prognosis of his/her disease.	4.09 ± 0.70	179 (88.7)	15 (7.4)	8 (3.9)
	33	In case the patient wants to be informed, it is good to tell him/her the approximate time of death.	3.59 ± 1.01	125 (61.8)	43 (21.3)	34 (16.9)
	34	Terminally-ill patients have the right to choose a Do-Not-Resuscitate (DNR) order.	3.63 ± 1.13	119 (58.9)	50 (24.8)	33 (16.3)
	35	Ethical issues such as independence and autonomy are important in palliative care.	4.10 ± 0.68	170 (84.1)	29 (14.4)	3 (1.5)
	36	The patient should be allowed to participate in choosing treatment.	4.12 ± 0.70	176 (87.1)	19 (9.4)	7 (3.5)
	37	Patients' desire to use complementary medicine is respectable.	4.24 ± 0.67	183 (90.5)	16 (7.9)	3 (1.6)

Note: *Items with negative wording were reverse-coded before calculating mean scores. Percentages may not sum to 100% due to rounding. SD, standard deviation; n = 202.
Abbreviations: n, number of participants; SD, standard deviation; %, percentage; DNR, do-not-resuscitate.

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Table 5. Correlation matrix between knowledge and attitude variables among nursing students (n = 202)

Variables	APPC	AFPPC	AELC	APA	Total attitude	PPPC	PSM	PSC	Total knowledge
APPC	1								
AFPPC	0.500**	1							
AELC	-0.059	-0.120	1						
APA	0.325**	0.307**	0.110	1					
Total attitude	0.746**	0.655**	0.293**	0.760**	1				
PPPC	0.154*	0.136	0.002	0.157*	0.189**	1			
PSM	0.253**	0.183**	-0.145*	0.292**	0.268**	0.298**	1		
PSC	<0.001	-0.133	0.020	-0.070	-0.070	0.122	0.070	1	
Total knowledge	0.253**	0.161*	-0.112	0.270**	0.261**	0.584**	0.919**	0.319**	1

Note: Pearson correlation coefficients were used to assess relationships between variables. *p < 0.05; **p < 0.001. n = 202. Correlation coefficients close to 0.90 or higher (e.g., PSM with Total Knowledge = 0.919) indicate strong multicollinearity, which should be considered in regression analyses.
Abbreviations: n, number of participants; APPC, attitude towards principles of palliative care; AFPPC, attitude towards family participation in palliative care; AELC, attitude towards end-of-life care; APA, attitude towards patient's autonomy; PPPC, philosophy and principles of palliative care; PSM, pain and symptom management; PSC, psychosocial and spiritual care.

Table 6. Stepwise multiple linear regression models predicting knowledge and attitude scores among nursing students (n = 202)

Model / Dependent Variable	Independent Variables	B	SE	β	t	p	95% CI	F	R	R^2	Adj. R^2
Model 1: Attitude	Constant	122.079	5.072	-	24.069	< 0.001	(112.077, 132.082)	11.318	0.432	0.187	0.170
	Academic degree (Postgraduate vs. Undergraduate)	7.984	1.803	0.335	4.428	< 0.001	(4.428, 11.540)				
	Knowledge (Total score)	0.899	0.259	0.229	3.468	0.001	(0.388, 1.410)				
	Perceived need to participate in PC courses (Yes vs. No)	3.458	1.457	0.154	2.374	0.019	(0.586, 6.331)				
	Experience in providing care for terminally ill patients (Yes vs. No)	3.183	1.572	0.153	2.025	0.044	(0.083, 6.283)				
Model 2: Knowledge	Constant	9.049	0.781	-	13.246	< 0.001	(8.804, 11.884)	9.050	0.289	0.083	0.074
	Experience in providing care for terminally ill patients (Yes vs. No)	1.074	0.361	0.202	2.972	0.003	(0.361, 1.786)				
	History of attending PC courses (Yes vs. No)	0.942	0.333	0.192	2.826	0.005	(0.285, 1.599)				

Note: Stepwise multiple linear regression was used to identify predictors of knowledge and attitude scores. Academic degree was coded as 0 = Undergraduate, 1 = Postgraduate. Perceived need to participate in palliative care courses, clinical work experience, and history of attending palliative care courses were coded as 0 = No, 1 = Yes.
B = unstandardized regression coefficient; SE = standard error; β = standardized regression coefficient; CI = confidence interval. The attitude model accounted for 18.7% of the variance ($R^2 = 0.187$, Adj. $R^2 = 0.170$), while the knowledge model accounted for 8.3% of the variance ($R^2 = 0.083$, Adj. $R^2 = 0.074$).
Abbreviations: n, number of participants; PC, palliative care; B, unstandardized coefficient; SE, standard error; β, standardized coefficient; CI, confidence interval; F, F-statistic; R, multiple correlation coefficient; R^2, coefficient of determination; Adj. R^2, adjusted R^2; p, probability value.

Discussion

Today's nursing students represent the future of the nursing profession, and their knowledge and attitudes toward palliative care will directly shape the quality of care delivered to patients who need these services. Therefore, assessing their current knowledge and attitudes is essential to strengthening their understanding and fostering more positive perspectives on palliative care [4, 17]. The present study found that over half of Iranian nursing students had limited knowledge of palliative care, consistent with findings reported in China [17], Spain [18], and systematic reviews across various contexts [12, 19]. Regional evidence from the Eastern Mediterranean also confirms this trend [2, 3]. However,

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some studies have reported higher levels of awareness — Younis et al. [7] found that over 66% of students had comprehensive knowledge, while Muliira et al. [20] identified moderate knowledge levels across India, Jordan, and the Philippines. These discrepancies may be attributed to cross-national differences in curriculum structure, clinical exposure, and the maturity of palliative care systems. In Iran, nursing education programs may underrepresent palliative care, and public discourse surrounding death remains constrained by cultural taboos [10]. Furthermore, Iran's fragmented service delivery and limited institutional support hinder the effective integration of palliative care into both education and practice [21]. Addressing these contextual factors requires reforms in nursing curricula, national policymaking, and investments in dedicated care centers to bridge the knowledge gap and enhance palliative care competency.

This study found that nursing students showed the strongest knowledge in pain and symptom management, while their understanding of the psychological, spiritual, and philosophical dimensions of palliative care was comparatively weak — an issue also reported in studies from Jordan, Greece, Palestine, and Iran [7, 22–24]. The strong correlation between total knowledge and the pain and symptom management subscale reflects the higher weight of this domain within the PCQN. Although symptom management is foundational and commonly emphasized in clinical curricula, particularly in Iran, the humanistic aspects of care appear to be underrepresented [8]. Evidence from a qualitative study revealed gaps in training related to palliative care philosophy and a lack of competency in delivering psychosocial and spiritual support, despite students' positive attitudes toward this type of care [9]. These deficiencies may compromise holistic end-of-life care and underscore the need for curricular reform and targeted educational resources to better prepare students for comprehensive palliative care delivery. Building on these findings, undergraduate nursing curricula should explicitly incorporate structured palliative care content—particularly in psychosocial, spiritual, and philosophical domains—to ensure that essential competencies are systematically developed rather than acquired incidentally through limited clinical exposure.

Consistent with previous research conducted in China, Europe, and Iran [5–6, 13], this study found that nursing students generally held moderate to positive attitudes toward palliative care despite their limited knowledge. Variations in findings across different studies indicate that attitudes are associated with multiple factors, including education, clinical experience, and cultural beliefs [3–4, 17]. In Iran, cultural, religious, and familial norms strongly advocate for compassionate care, which may contribute to positive attitudes among nursing students toward end-of-life support [25–26]. These deeply ingrained values encourage students to embrace their roles in alleviating suffering and providing holistic palliative care [25]. Additionally, a belief in divine destiny fosters an acceptance of death and perceives care as a compassionate transition rather than an interference with divine will, which may be associated with more positive attitudes [27]. This cultural and religious perspective enhances the receptivity of both families and patients, creating a more supportive environment for students [25]. Collectively, these findings underscore the importance of culturally sensitive educational approaches in strengthening students' acceptance and effective implementation of palliative care.

Our analysis revealed that nursing students hold negative attitudes toward certain aspects of palliative care, particularly regarding "family participation in palliative care" and "end-of-life care." These low scores indicate that their attitudes are narrow and lack comprehensiveness. Cultural factors in Iran, such as limited family involvement in medical decisions and societal taboos surrounding death, may be associated with these attitudes [26]. Additionally, insufficient clinical experience in palliative care likely influences their perceptions, as a lack of direct exposure to end-of-life situations can diminish their appreciation for family involvement and humanistic care [11, 28]. Structural barriers, including resource shortages and inadequate training, may further be associated with the development of positive attitudes [3]. To cultivate more positive attitudes, it is essential to implement comprehensive educational programs that emphasize the importance of family participation and holistic care.

Postgraduate students in this study had higher levels of knowledge and more positive attitudes toward palliative care than undergraduate students. Furthermore, this variable was associated with attitudes among nursing students. This finding aligns with a systematic review conducted by Taheri Hatkehlouei et al., which reported a positive correlation between academic year and knowledge in palliative and end-of-life care [12]. Although palliative care is not included in the undergraduate curricula in Iran, its recent incorporation into the postgraduate curriculum has been associated with improved students' knowledge [8, 10]. Higher

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levels of education are associated with a broader understanding, positively influencing attitudes and improving patient care [5–6, 23].

The study found that students who had received education in palliative and end-of-life care showed significantly higher knowledge levels, with regression analysis indicating a 0.192 increase in scores. This finding aligns with numerous prior studies [2,17,22]; however, some research indicates no correlation between education and knowledge [29]. The observed variation may be attributed to factors such as the quality, content, and delivery of training, as well as individual motivation, prior experience, and the learning environment [30].

Clinical work experience was another demographic variable associated with nursing students' level of knowledge of palliative and end-of-life care. This finding has also been confirmed in previous studies [12, 17]. Work experience may enhance knowledge by allowing students to apply and reinforce learning in real-world settings [31]. However, some studies [24, 32] did not find this association, likely due to variations in participant demographics and research methodologies.

Women in this study had a more positive attitude toward palliative and end-of-life care, consistent with the findings of Yang et al. [5]. However, some studies report no significant gender differences [6, 13, 33]. This variation may arise from women's heightened empathy and caregiving roles in various cultures, which may be associated with deeper emotional connections in caregiving contexts [34]. Nevertheless, further research is needed to clarify this relationship. Our findings showed a strong, significant association between respondents' perceived need for formal education and training in palliative and end-of-life care and their overall attitude scores. Given that knowledge has a direct impact on attitude [11], this finding is plausible. In addition, it emphasizes the importance of comprehensive education to increase knowledge and improve attitudes towards palliative care. Nursing students who had provided care for terminally ill patients during clinical practice also reported significantly greater knowledge and a more positive attitude toward palliative and end-of-life care. This association between caring for terminally ill patients and both knowledge and attitude is consistent with previous research showing that exposure to end-of-life care improves attitudes [33, 35]. To enhance learning, nursing curricula should incorporate practical end-of-life care experiences alongside theoretical instruction [36]. A positive, significant correlation was observed between nursing students' knowledge and attitude scores. In the regression model, knowledge was associated with attitude (standardized $\beta = 0.229$), indicating that a one standard deviation increase in knowledge was associated with a 0.229 standard deviation increase in attitude. This finding is consistent with previous studies [22, 33]. However, in contrast to the results reported by Ferri et al. [13], the influence of knowledge on attitudes may vary depending on factors such as the type and quality of information received, pre-existing beliefs, cultural context, and personal experiences, which in some cases can lead to negative shifts in attitudes [5, 11, 37]. These considerations highlight the need for educational programs to account for such contextual and individual factors in order to effectively enhance both knowledge and attitudes.

Promoting nursing students' competence in palliative care requires the intentional integration of structured, evidence-based educational strategies within undergraduate programs. Core palliative care content—including symptom management, communication with patients and families, ethical decision-making, psychosocial and spiritual support, and interdisciplinary collaboration—should be embedded across theoretical and clinical courses. Active teaching methods such as simulation-based training, case-based learning, reflective practice, and role-play can strengthen students' clinical reasoning and confidence in end-of-life care. Clinical placements in hospice units, oncology wards, intensive care units, and community-based palliative care services provide essential experiential learning and help students translate theoretical knowledge into practice. Strengthening partnerships between nursing schools and palliative care centers can ensure consistent, high-quality clinical exposure. Faculty development is also critical; educators require ongoing training in palliative care principles, communication skills, and culturally sensitive approaches to end-of-life care to effectively support student learning. This study is one of the few conducted in Iran on palliative and end-of-life care, focusing on nursing students' knowledge and attitudes while using validated Iranian instruments that enhance internal validity and comparability. However, it has limitations, including its cross-sectional design, which restricts causal inference, and its reliance on self-reported questionnaires, which may be influenced by psychological and motivational factors. Additionally, the study accounted for only a small portion of the variance in knowledge (7.4%) and attitudes (17%), indicating that other factors—such as personal, social, cultural, and psychological variables—likely play significant roles.

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Future research should explore additional influences, such as religiosity and personal experiences with death.

Conclusion

The findings of this study indicate that although nursing students showed positive attitudes toward palliative and end-of-life care, their knowledge in this area was insufficient. A significant association was observed between knowledge and attitude, with higher scores among postgraduate students and those with prior palliative care training. Students who perceived a greater need for education also reported more positive attitudes, highlighting the importance of structured learning opportunities. These results underscore the need to strengthen palliative care education within undergraduate nursing programs. Enhancing students' knowledge through well-designed educational interventions may be associated with more positive attitudes and better preparation to care for patients with life-limiting conditions. Overall, the study highlights the importance of integrating palliative care as a foundational component of nursing education so that future nurses are prepared to deliver compassionate, high-quality care.

Ethical considerations

This research has been approved by the ethics committee of Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran (Ethical Code: IR.AJUMS.REC.1403.217). Administrative authorization for data collection was granted by the appropriate authorities and conducted in accordance with the Declaration of Helsinki. Participants were informed about the study's objectives, their right to withdraw at any time, and the confidentiality of their data.

They were explicitly assured that their participation was strictly voluntary. Before the commencement of the study, all participants provided informed consent.

Artificial intelligence utilization for article writing

We acknowledge the use of WORDVICE.AI (https://wordvice.ai/proofreading/6c21e242-4286-4ed0-93c7-ea479dd98f86) to proofread some sentences of our work

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Conflict of interest statement

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Author contributions

MA, NDH, and SB contributed to the study's conception and design. Material preparation, data collection, and analysis were performed by MA, NDH, SB, and AND. The first draft of the manuscript was written by MA, SB, and NDH. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript. MA as a principal investigator, supervised the project.

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Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request. For access to more data, please reach out to the corresponding author.

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