

Effectiveness of a palliative care education program for caregivers of cancer patients receiving chemotherapy in Port Said City: A pre-post quasi-experimental study

Original Article

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Abstract

Background. Emphasizing the pivotal role of caregivers in the cancer care continuum, a program designed to educate caregivers of cancer patients undergoing chemotherapy underscores their significance. The palliative care education initiative strives to cultivate a compassionate and effective care environment, benefiting both patients and caregivers. By imparting education, fostering positive attitudes, offering support, encouraging appropriate behaviors, and providing essential resources, the program aims to enhance the overall caregiving experience and contribute to the well-being of those navigating the challenges of cancer treatment.

Objectives. To evaluate the effectiveness of a palliative care education program for caregivers of cancer patients receiving chemotherapy.

Methods. The research employed a purposive sample comprising 155 caregivers who were actively present with their cancer patients throughout the pre- and post-test phases within a quasi-experimental research design. The study took place at the outpatient oncology center of Al-Shifa Medical Complex in Port Said City, Egypt. To gather comprehensive data, 4 instruments were utilized: a demographic questionnaire, a nurse knowledge questionnaire, a scale measuring attitudes toward palliative care, and an assessment of reported practices in palliative care. This methodological approach allowed for a thorough exploration of caregiver perspectives, knowledge, attitudes, and practices within the context of a palliative care education program.

Results. Before the palliative care education program, only 1.3% of caregivers had a good overall level of knowledge about cancer and palliative care; this increased to 40.6% after the program. Similarly, before the palliative care education program, 32.9% of caregivers had a positive overall attitude, which increased to 72.3% after the program. Similarly, 27.1% of caregivers had an overall appropriate palliative care practice during the pre-test phase, which increased to 93.5% after the palliative care education program.

Significance of the results. The palliative care education program significantly improved caregivers' knowledge, attitudes, and practice scores. It is strongly recommended that caregivers of cancer patients receive continuing education in palliative care. In addition, it is crucial to conduct further research with a larger sample size in different situations in Egypt.

Introduction

Cancer is the second leading cause of death from noncommunicable diseases worldwide (Sung et al. 2021). In 2020, there was approximately 19.3 million new cases of cancer and approximately 10 million deaths from cancer (Ferlay et al. 2021). By 2040, the number of cancer cases is expected to reach 30.2 million (Rahib et al. 2021). Cancer causes significant stress for both patients and caregivers during treatment, disrupting the balance of daily life (Saimaldaher and Wazqar 2020). In addition, cancer patients experience physical, psychological, social, and economic difficulties during this time (Essue et al. 2020). In addition, cancer patients require long-term care due to a variety of symptoms, including pain, fatigue, sleep disturbance, depression, anxiety, and stress (Lewandowska et al. 2020). Because of the symptom burden, cancer patients have difficulty performing daily tasks such as eating, walking, and even speaking (Batra et al. 2021).

As a result, cancer patients become increasingly dependent on family caregivers (Kilic and Oz 2019). Family caregivers have to make numerous attempts to support patients' daily needs, reduce their symptom burden, and cope with the stress of having a loved one with a life-threatening disease (Zhai et al. 2023). Family caregivers must perform important tasks such as symptom management (Mather et al. 2022), medication monitoring (Sherman 2019), transportation (Swartz and Collins 2019), care coordination (Given 2019), and emotional support (Zavagli et al. 2019). In addition, family caregivers attempting to fulfill both family and caregiving obligations may encounter a number of issues related to their own physical and psychological health, daily activities, work life, social activities, and recreation (Xu et al. 2021). During the illness phase, caregivers may feel extremely burdened as they deal with various issues related to loss and death (Bijnsdorp et al. 2022).

Furthermore, caring for cancer patients undergoing chemotherapy is a demanding and emotionally challenging responsibility, particularly for the caregivers involved (Evans Webb et al. 2021; Sun et al. 2019). Chemotherapy is a critical component of cancer treatment (Hossain and Haldar Neer 2023), aimed at eradicating or controlling the growth of cancer cells (Behranvand et al. 2022). Although it can be effective in treating the disease, chemotherapy often has a number of side effects and complications that affect the physical and emotional well-being of the patient. In this context (Altun and Sonkaya 2018), palliative care becomes essential (Bağçivan et al. 2022).

Palliative care is a specialized form of medical care that focuses on improving the quality of life for people facing serious illnesses such as cancer (Teoli et al. 2023). It encompasses a comprehensive approach to patient care that addresses not only physical symptoms and side effects but also the psychosocial, emotional, and spiritual needs of patients (Gray et al. 2022; Swami and Case 2018). While the term "palliative care" is sometimes associated with end-of-life care, it is equally relevant at different stages of the disease, including during active cancer treatment such as chemotherapy (Glover and Kluger 2019; Tatum 2020).

An important aspect of palliative care is to support and educate the caregivers of cancer patients (Brenner et al. 2021; Seow and Bainbridge 2018). Caregivers, who are often family members or close friends (Swartz and Collins 2019), play an important role in the patient's journey (Johansen et al. 2018). They provide emotional support (Brighton et al. 2019), assistance with activities of daily living (Ferrell et al. 2019), and coordination of medical care (Alam et al. 2020). However, the demands of caregiving, particularly during chemotherapy, can be overwhelming (Stolz-Baskett et al. 2021). Caregivers may lack the necessary knowledge and skills to effectively manage the complex needs of cancer patients undergoing chemotherapy (Charles et al. 2017; Topham et al. 2022).

The palliative care education programs are designed to equip caregivers with the essential knowledge, tools, and support necessary for delivering optimal care to cancer patients undergoing chemotherapy (Bilgin and Ozdemir 2022; Rosa et al. 2021). Addressing various aspects, including symptom management, pain control, emotional support, and effective communication with healthcare providers (Kittelson et al. 2015; Li et al. 2021; Wantonoro et al. 2022), these programs play a crucial role in enhancing caregivers' capabilities. By structuring education around these critical components, the aim is to empower caregivers to deliver holistic care, ultimately reducing patient suffering and enhancing overall quality of life (Collingridge Moore et al. 2020; Noh et al. 2021).

The effectiveness of these educational programs has been the subject of increasing interest and research (Seow et al. 2023; Wong et al. 2022). Numerous studies have been conducted to assess the impact of palliative care education on caregivers and, by extension, the cancer patients they support (Chang et al. 2021; Li et al. 2021; Wantonoro et al. 2022). These studies have examined improvements in caregivers' knowledge, skills, and overall well-being (Li et al. 2021; Noh et al. 2021). They have also examined the potential benefits in terms of symptom management, patient quality of life, and healthcare utilization (Kittelson et al. 2015; Mathew et al. 2021; Swetz and Kamal 2018). In addition, by understanding the principles of palliative care, caregivers can help patients make informed decisions about their care (Mulcahy Symmons et al. 2022) and enhance their sense of autonomy and dignity throughout their cancer journey (Greer et al. 2020). Furthermore, by addressing caregiver burnout and stress, these programs can ensure a higher quality of care and an improved overall experience for both patients and caregivers (Antony et al. 2018; Horn and Johnston 2020; Sultana et al. 2021).

Community health nurses play a crucial role in supporting caregivers of cancer patients undergoing chemotherapy (Argyle 2016; Mollica and Kent 2021), ensuring that palliative care is effectively integrated into the care process (King et al. 2010; Sekse et al. 2018; Siva et al. 2021). These healthcare professionals are at the forefront of care delivery (Aydın 2020) and provide invaluable education (Hagan et al. 2018), emotional support (Dellafiore et al. 2022), and guidance to both patients and their caregivers (Leadbeater 2013). One of their key responsibilities is to educate caregivers about the principles and practices of palliative care (Schroeder and Lorenz 2018; Siva et al. 2021). This education equips caregivers with the knowledge and skills needed to effectively manage the symptoms and side effects that often accompany chemotherapy (Achora and Labrague, 2019; Harden et al. 2017). From pain management to addressing emotional distress, community health nurses empower caregivers to provide comprehensive care (Aydın 2020).

In addition to education, community health nurses provide emotional support to caregivers, who often bear the emotional burden of caring for a loved one with cancer (Argyle 2016; Mollica and Kent 2021). They provide a compassionate presence and coping strategies (Khumalo and Brown 2022), recognizing that caregivers may experience stress, anxiety, and depression as they navigate this challenging journey (Moss et al. 2019). Communication is another important aspect of their role (Aydın 2020). These nurses facilitate open and honest discussions between caregivers, patients, and the wider healthcare team (Khumalo and Brown 2022). Effective communication ensures that patients' preferences, needs, and goals are acknowledged and respected, promoting a more patient-centered approach to care (Engle et al. 2021; Hashim 2017; Naughton 2018).

Community health nurses also assist with symptom management (Blay et al. 2022) and help caregivers cope with the distressing side effects of chemotherapy (Argyle 2016). By providing guidance on pain relief, nausea control, and fatigue management, they ensure that patients are as comfortable as possible (Aydın 2020; Khumalo and Brown 2022). They also guide caregivers through end-of-life planning and provide support during the difficult process of bereavement, ensuring that caregivers are prepared and have access to essential resources during and after the patient's death (Khumalo and Brown 2022). Recognizing that caregivers often neglect their own well-being while focusing on the patient (Argyle 2016), community health nurses emphasize the importance of self-care (Zeydani et al. 2023). They encourage caregivers to prioritize their own health and emotional needs (MacRae et al. 2020) so that

they can continue to provide the support their loved ones need (Engle *et al.* 2021; Hashim 2017; Naughton 2018).

Significance of the study

Studying the effectiveness of a palliative care education program for caregivers of cancer patients receiving chemotherapy in Port Said City holds significant importance in the context of Egypt's healthcare landscape. With cancer being a prevalent and burdensome health issue in the country, particularly in light of rising incidence rates, understanding and enhancing the support system for caregivers becomes paramount. Egypt faces unique challenges in healthcare infrastructure and resource allocation, and an evidence-based assessment of the impact of a palliative care education program can contribute valuable insights for healthcare practitioners and policymakers. Given the cultural and societal dynamics in Egypt, where family plays a central role in caregiving, empowering caregivers with the knowledge and skills to provide effective palliative care aligns with the broader goal of improving the quality of life for cancer patients. The findings of this study could inform targeted interventions, educational strategies, and policy initiatives to enhance the overall palliative care experience in Port Said City and, by extension, provide a template for addressing similar challenges across the country.

Aim of the study

The aim of the study is to evaluate the effectiveness of a palliative care education program for caregivers of cancer patients receiving chemotherapy.

Research hypothesis

H1: The caregivers' knowledge and practice of palliative care for cancer patients who receive chemotherapy will be significantly improved after palliative care education.

H2: The caregivers' attitude toward palliative care for cancer patients who receive chemotherapy will change significantly after palliative care education.

Method

A quasi-experimental research design was used to achieve the aim of the study. The study was conducted at the Al-Shifa Medical Complex Oncology Centre, which is part of the Ministry of Health's universal health insurance program and is located on 23rd July Street in Port Said City. It provides a range of medical treatments, including outpatient care and chemotherapy, as well as general and specialist services. There are 4 floors in the oncology facility. There are 5 outpatient clinics on the first floor. On the second floor is the chemotherapy day care unit with 30 beds. The first clinic had 8 beds, the second 6, the third 6, the fourth 6, and the fifth 5. G-POWER software was used to calculate the effective sample size. The researchers used a power of 0.80, a modest effective size of 0.15, and an alpha value of 0.05. The estimated effective sample size was 176. The researchers distributed 200 questionnaires. The researchers received 155 completed questionnaires.

The researchers used a purposive sampling to obtain the required sample size, and based on considerations of availability

during data collection and a demonstrated willingness to actively engage in the study, participants were meticulously selected. To be eligible, individuals had to be at least 20 years old and serving as primary caregivers for cancer patients undergoing chemotherapy. A paramount focus was placed on their overall well-being, ensuring that participants were devoid of any discernible physical, social, psychological, or emotional issues that might introduce confounding variables. This stringent inclusion criterion was implemented to assemble a cohort of caregivers capable of providing reliable insights into the effectiveness of the palliative care education program, thereby enhancing the study's credibility and contributing to the robustness of its outcomes.

Tools of data collection

Four tools were used to collect data: a Self-Administered Demographic Questionnaire, a Caregiver Knowledge Questionnaire, a Palliative Care Attitudes Scale, and a Palliative Care Reported Practice Scale.

The first tool was a Self-Administered Demographic Questionnaire developed in Arabic by the researchers based on a review of several literature and scientific research databases on caregivers of cancer patients receiving chemotherapy and requiring palliative care. It included age, gender, level of education, marital status, occupation, relationship to the patient, years of palliative care experience with the patient, information received about palliative care, sources of information, previous training in palliative care, and length of training.

The second tool was the Self-Administered Caregiver Knowledge Questionnaire developed by Morsy *et al.* (2022) in Arabic to assess caregivers' knowledge of palliative care for cancer patients receiving chemotherapy. It included 22 questions on the following topics: definition of cancer, causes of cancer, risk factors of cancer, types of cancer, signs and symptoms of cancer, complications of cancer, methods of cancer diagnosis, methods of treatment, complications of chemotherapy, ways to prevent cancer, definition of palliative care, time to start palliative care, purpose of palliative care, palliative care, areas of palliative care, general principles of palliative care, beneficiaries of palliative care, symptoms improved after using palliative care, main considerations when using palliative care, factors influencing palliative care, palliative care team, and places where palliative care could be practiced. The final responses are coded 1 = correct, 0 = incorrect and don't know. Total scores of the caregivers' knowledge of palliative care for cancer patients receiving chemotherapy can range from 0 (lowest level of knowledge) to 22 (highest level of knowledge). The internal consistency of the Self-administered Caregiver's Palliative Care Knowledge was 0.78, which indicates a respectable level of reliability. Furthermore, the validity of the tool was tested by 5 experts in the fields of community health nursing and public health and all confirmed the combinability, relevance, comprehensibility, accuracy, and feasibility of the knowledge tool. These scores were converted into a percentage. The overall knowledge score was considered good if it was greater than 75%, average if it was between 50 and 75%, and poor if it was less than 50%.

The third tool was the Palliative Care Attitude Scale adopted by Ayed *et al.* (2015) in English and translated by researchers into Arabic. It was used to assess caregivers' attitudes toward palliative care for cancer patients undergoing chemotherapy. This tool consisted of 16 items as follows: Palliative care is only provided for cancer patients; the experience of caring for a person is worthwhile;

palliative care deals with physical and psychological aspects; pain is treated in palliative care; the patient expresses his feelings; palliative care is provided by a specialized team; the family participates in the care; the family provides a safe environment; the patient and his family decision-makers; support to accept behavioral changes of the patient; care for the patient's family continue; palliative care is also provided by volunteers; it is possible to have flexible visit schedules; the patient gives honest answers about his condition; the patient asks "Am I going to die" change to funny; and it frustrates long period of patient care.

Caregivers' attitudes toward palliative care were scored on a Likert scale from strongly disagree to agree: 1 = disagree, 2 = somewhat agree, and 3 = agree. Possible total scores range from 16 to 48, with higher scores reflecting more positive attitudes. Overall mean scores were calculated by summing the individual item scores and dividing the result by the number of items. A percentage score was then calculated from these scores. The total attitude score was considered positive if it was greater than 75%, indifferent if it was between 50 and 75%, and negative if it was less than 50%. The validity of the tool was assessed by 5 specialists in community health nursing and public health, who all validated the combinability, relevance, comprehensibility, accuracy, and practicality of the tool. In addition, the internal consistency of the attitude scale in this study was 0.73, indicating an acceptable level of reliability.

The fourth tool was the reported practice about palliative care developed by Morsy et al. (2022) in Arabic, which was used to assess the practices of caregivers regarding palliative care required for cancer patients receiving chemotherapy. It consisted of 5 main aspects: the physical aspect of care (5 items), the psychological aspect of care (1 item), the social and cultural aspect of care (1 item), the spiritual aspect of care (1 item), and the ethical aspect of care (1 item). Each practice received one point for completion and zero points for non-completion. Total practice scores were calculated; if the total reported practice score was greater than 60%, it was considered adequate; if it was less than 60%, it was considered inadequate. The validity of the tool was assessed by 5 experts in community health nursing and public health, who all endorsed its combinability, relevance, comprehensibility, accuracy, and practicality. In addition, the internal consistency of the reported practices in this study was 0.80, indicating an adequate level of reliability.

Procedure

An official letter was sent from the Faculty of Nursing at Port Said University to the directors of the Oncology Centre at Al-Shifa Medical Complex in Port Said City to obtain their permission to conduct the study. The study was fully explained to the participants at the outset, and they were made aware that their participation was completely voluntary and that they could stop at any time. Each participation questionnaire was confidential. Participants signed informed consent forms after being informed of the confidentiality of the data. Each participant was given a self-administered written questionnaire to complete both before and after the intervention (researchers interviewed, assisted, and completed tools for participants who could not read or write). Participants' details, palliative care training requirements, an assessment of their understanding of palliative care, and attitudes toward caring for cancer patients receiving chemotherapy were all included in the initial phase of the study.

The training course was designed as an intervention and delivered over 10 weeks, based on the information obtained from the

participants about their training needs. Two months after the end of the intervention, participants were given the same questionnaires as before for the post-test of the survey. The impact of the training on nurses' palliative care knowledge, attitudes, and practices in caring for cancer patients receiving chemotherapy was assessed by comparing baseline and post-intervention data. The study protocol was approved by the Ethics Committee of the Faculty of Nursing, Port Said University (NUR 5/11/2023 (31)). A pilot study was conducted on 10% of the total caregiver population (20 caregivers) who were present with their cancer patients. These caregivers were not included in the study sample. The purpose of the pilot study was to assess the feasibility, clarity, and application of the tools, as well as the time required to complete the structured questionnaire. It took about 45 minutes to complete the tools.

The palliative care educational program

The educational intervention for the post-test phase included 6 education and training sessions lasting 25–30 minutes each, which included lectures, group discussions, questions and answers, the use of instructional posters and pamphlets, the screening of films, and PowerPoint presentations. An oncologist, along with 5 public health professionals, worked together to develop the teaching program. The details of the education sessions were as follows:

1. First session: Meaning of cancer, Causes of cancer, Types of cancer, Most vulnerable groups for cancer, Signs and symptoms of cancer, and Complications of cancer.
2. Second session: Methods of cancer diagnosis, Methods of cancer treatment and its complications, and Methods of cancer prevention.
3. Third session: Meaning of palliative care, Palliative care recipients, Goal of palliative care, Appropriate time to start palliative care, Aspects of palliative care, Factors assessing palliative care, and Benefits of palliative care.
4. Fourth session: Advantages and disadvantages of palliative care, Ethical principles of palliative care, and The barriers of palliative care and palliative care team.
5. Fifth session: Management of the physical, psychological, and social symptoms using palliative care.
6. Sixth session: Spiritual symptoms and ethical aspects of care management using palliative care. Furthermore, this session involved a general revision of the total palliative care education sessions.

The educational program was held for 10 groups of 15–16 caregivers (155 caregivers in the post-test phase), and training courses were held twice a week (each week one group was trained and educated with 3 sessions) in the aforementioned setting. The subjects received a book of the educational sessions. The subjects in the post-test phase group were kept up-to-date and improved with a weekly text message on palliative care, and a WhatsApp group was created for information sharing. The current study fieldwork lasted 6 months, from the beginning of March 2022 to the end of August 2022.

Ethical considerations

In the examination of the effectiveness of a palliative care education program for caregivers of cancer patients undergoing chemotherapy in Port Said City, ethical considerations played a pivotal role

throughout the research process. The informed consent of all participants was meticulously documented, with a clear and comprehensive explanation provided regarding the study's purpose, procedures, and the voluntary nature of participation. Anonymity and confidentiality were rigorously maintained, employing participant codes during data collection and ensuring secure storage of information. The principles of beneficence and non-maleficence guided the study, emphasizing the avoidance of harm and the maximization of benefits for participants. Ethical approval was diligently obtained from a recognized committee prior to commencing the study, and cultural sensitivity was observed throughout the research process. Continuous monitoring and reporting of any ethical concerns were conducted, reinforcing the commitment to upholding ethical standards in the past conduct of this essential investigation.

Statistical design

Statistical analysis was carried out using the Statistical Package for Social Sciences version 26. Data were collected, updated, coded, structured, tabulated, and analyzed using frequencies, numbers, percentages, means, standard deviations (SDs), and correlation coefficients. Tables were used to present the data. The mean (X) and SD were used to present quantitative data. The qualitative data were presented in the form of frequency distribution tables, numbers, and percentages. The Chi-square test (X^2) and correlation were used to determine the relationship between the variables of the study (p -value). The Marginal Homogeneity Test determines whether the values of 2 paired ordinal variables are equally likely to be the same. In repeated measures settings, the Marginal Homogeneity Test is often used. This test is a binary response extension of the McNemar test. It compares a 1-sample median with a reference value and analyzes the difference in median between 2 paired samples. The Wilcoxon signed rank test, a non-parametric hypothesis test, was used, and the results were considered significant at a p -value of 0.05, while p -values greater than 0.05 were not considered significant.

Results

Table 1 represents that 38.7% of the caregivers were aged 20 years old, 55.5% of them were females, 35.5% of the caregivers had a university education, 59.4% of them were married, and 87.1% were working. Also, 38.1% of caregivers were sons/daughters of the patients, and 70.3% of the caregivers reported having more than 5 years of providing palliative care for their patients. Furthermore, findings indicated that 60% of the caregivers claimed to receive information about palliative care from nurses, 76.8% of the caregivers reported not receiving any palliative care training previously, and 75% of the caregivers confirmed receiving training regarding palliative care from 1 to 2 weeks.

Table 2 demonstrates that there was a significant improvement in the total knowledge scores of the caregivers regarding palliative care during the post-test phase, which reached 27.16 ± 12.08 compared to 14.56 ± 7.87 in the pre-test phase. Furthermore, there were high statistically significant differences between the total knowledge scores of the caregivers of cancer patients receiving chemotherapy during the pre- and post-test phases where $p < 0.005$.

Table 3 depicts that there was a statistically significant improvement in the caregivers' total attitude scores after the palliative care

Table 1. Distribution of the studied caregivers according to demographic characteristics ($N = 155$)

Items	No.	%
Age (years)		
20 –	60	38.7
30 –	49	31.6
40 –	20	12.9
≥50	26	16.8
Gender		
Male	69	44.5
Female	86	55.5
Educational level		
Not read and write	15	9.7
Basic education	50	32.3
Secondary or technical education	35	22.5
University education	55	35.5
Marital status		
Single	59	38.1
Married	92	59.4
Divorced	2	1.3
Widowed	2	1.3
Occupation		
Not work	20	12.9
Work	135	87.1
Relationship to the patient		
Husband/wife	57	36.8
Son/daughter	59	38.1
Brother/sister	34	21.9
Others (Mother)	5	3.2
Years of experience (caring) to the patients		
<5 years	109	70.3
5–10 years	41	26.5
>10 years	5	3.2
Received information about palliative care		
No	92	59.4
Yes	63	40.6
Source of information ($n = 63$)		
Doctor	10	15.9
Nurses	38	60.3
Friends	2	3.2
Media	13	20.6
Received education sessions in palliative care before		
No	119	76.8
Yes	36	23.2

(Continued)

Table 1. (Continued.)

Items	No.	%
Period of education sessions		
1–2 weeks	27	75.0
1 month	8	22.2
More than a month	1	2.8

Table 2. Distribution of the studied caregivers' total level of knowledge regarding cancer before and after the educational program implementation (*N* = 155)

Items	Pre		Post		MH	<i>p</i>
	No.	%	No.	%		
Knowledge of caregivers about cancer						
Poor (<50%)	54	34.8	51	32.9	214.0*	<0.001*
Average (50–75%)	101	65.2	41	26.5		
Good (>75%)	0	0.0	63	40.6		
Knowledge of caregivers about palliative care						
Poor (<50%)	95	61.3	52	33.5	182.50*	<0.001*
Average (50–75%)	56	36.1	39	25.2		
Good (>75%)	4	2.6	64	41.3		
Total knowledge						
Poor (<50%)	97	62.6	52	33.5	192.0*	<0.001*
Average (50–75%)	56	36.1	40	25.8		
Good (>75%)	2	1.3	63	40.6		
Overall (0–42)						
Total score					Z	<i>p</i>
Min.–Max.	0.0–33.0		9.0–42.0		9.899*	<0.001*
Mean ± SD	14.56 ± 7.87		27.16 ± 12.08			
Median	11.0		25.0			

MH = Marginal Homogeneity Test.
p: *p*-value for comparing between the 2 studied periods.
 *Statistically significant at *p* ≤ 0.05.

education program implementation. Also, there were statistically significant differences between the pre- and post-attitudes of the caregivers where *p* < 0.005.

Table 4 shows that there was a remarkable improvement in the total practice scores of the caregivers after the palliative care educational program implementation. Furthermore, there were highly statistically significant variances between the pre- and post-practices of the caregivers where *p* < 0.005.

Table 5 illustrates that there was a highly statistical association between the age of the caregivers and total palliative care knowledge scores during the pre- (*p* = 0.029*) and post-test phases (*p* = 0.002*). Moreover, statistical associations were found between the level of educational level of the caregivers and their total knowledge scores toward palliative care after the palliative care education program was implemented (*p* = 0.007*). Also, there were statistically significant associations between the years of experience of the caregivers toward palliative care and their total level of knowledge toward palliative care during both the pre- (*p* = 0.001*) and post-test (*p* = 0.005*) phases.

Table 3. Comparison between the studied caregiver's attitudes toward palliative care throughout program phases (*n* = 155)

Items	Pre		Post		Test of Sig.	<i>p</i>
	No.	%	No.	%		
Negative (<50%)	39	25.2	7	4.5	MH = 176.50*	<0.001*
Indifferent (50–75%)	65	41.9	36	23.2		
Positive (>75%)	51	32.9	112	72.3		
Total score (0–32)						
Min.–Max.	1.0–32.0		11.0–32.0		Z = 8.807*	<0.001*
Mean ± SD	19.91 ± 7.17		27.20 ± 5.59			
Median	16.0		31.0			

MH = Marginal Homogeneity Test; SD = standard deviation; Z = Wilcoxon signed ranks test.
p: *p*-value for comparing between the 2 studied periods.
 *Statistically significant at *p* ≤ 0.05.

Table 6 reveals that there was a highly statistically significant positive association between the caregivers' age, marital status, and relationship of the patients with their total attitude scores through the post-test phase where *p* = (0.004*, 0.039*, and 0.011*), respectively.

Table 7 shows that there was no statistically significant relationship between the sociodemographic data of the caregivers and their total practice scores through the pre- and post-test phases where *p* < 0.005.

Discussion

Family caregivers provide a significant amount of care to people with serious illness and are themselves care recipients. Family caregivers are involved in direct care, decision-making, goal setting, and advance care planning. Family involvement in palliative care can lead to many positive outcomes, such as family satisfaction with the patient's care, coping with the challenges posed by a particular health condition, and the desire and willingness to care for the patient at home (Weerasinghe 2023). As professionals, they have an important role to play in involving caregivers in the care plan and supporting them in their role. Therefore, this study was conducted to evaluate the effectiveness of a palliative care education program for caregivers of cancer patients undergoing chemotherapy in Port Said City.

The study's findings indicate a marked improvement in the knowledge scores of caregivers on palliative care during the post-test phase. In addition, there were highly significant statistical differences in the total knowledge scores of caregivers for cancer patients receiving chemotherapy in the pre- and post-test phases. The researcher suggested that the limited understanding of palliative care for cancer patients during the pre-test phase may be linked to a high proportion of young caregivers, of whom the majority of participants were under the age of 20. In addition, most respondents reported not receiving any palliative care information or training, and even those who did received training only for a brief duration. This may be attributed to the absence of a standardized education program and the unavailability of training courses for caregivers of cancer patients. It could also be due to caregivers' inability to learn, with half of the study's participants having

Table 4. Comparison between the studied caregiver's reported practices toward palliative care throughout program phases ($n = 155$)

Items	Pre	Post	Z	p
First: The physical aspect of care (0–40)				
Total score				
Min.–Max.	0.0–40.0	9.0–40.0	10.230*	<0.001*
Mean ± SD	14.30 ± 10.64	33.06 ± 7.75		
Median	12.0	34.0		
Second: The psychological aspect of care (0–7)				
Total score				
Min.–Max.	0.0–7.0	1.0–7.0	9.248*	<0.001*
Mean ± SD	2.52 ± 2.64	6.12 ± 1.47		
Median	1.0	7.0		
Third: The social and cultural aspects of care (0–5)				
Total score				
Min.–Max.	0.0–7.0	1.0–7.0	8.837*	<0.001*
Mean ± SD	2.52 ± 2.64	6.12 ± 1.47		
Median	1.0	7.0		
Fourth: The spiritual aspect of care (0–5)				
Total score				
Min.–Max.	0.0–5.0	0.0–5.0	8.688*	<0.001*
Mean ± SD	1.99 ± 1.89	4.53 ± 1.16		
Median	2.0	5.0		
Fifth: The ethical aspect of care (0–4)				
Total score				
Min.–Max.	0.0–4.0	0.0–4.0	7.776*	<0.001*
Mean ± SD	1.88 ± 1.78	3.59 ± 1.03		
Median	2.0	4.0		
Overall practices scores			17.475*	<0.001*
Inadequate (<60%)	113	72.9	10	6.5
Adequate (>60%)	42	27.1	145	93.5
Total score				
Min.–Max.	0.0–61.0	12.0–61.0	10.323*	<0.001*
Mean ± SD	22.86 ± 16.04	51.78 ± 10.62		
Median	19.0	55.0		

SD = standard deviation; Z = Wilcoxon signed ranks test.

p: p-value for comparing between the 2 studied periods.

*Statistically significant at $p \leq 0.05$.

low levels of education. However, following the implementation of the educational program and with the examined group obtaining access to educational resources and participating in educational sessions, their knowledge was expanded and improved, providing confirmation of the success and necessity of the educational program.

This study aligns with Morsy et al.'s (2022) findings that, prior to implementing the educational recommendations, approximately

one-third of the caregivers possessed inadequate knowledge. In contrast, following the implementation of the educational guidelines, two-thirds of caregivers displayed improved knowledge. Furthermore, Carrillo et al. (2021) demonstrated that the intervention resulted in statistically significant differences in the knowledge level of caregivers concerning palliative care among the studied caregivers.

Shah et al. (2020) concluded that over 50% of caregivers had an improved understanding of the palliative care approach after completing the educational program. In addition, Nevis (2014) found that end-of-life patients experienced better symptom control after receiving educational interventions, and informal caregivers had enhanced knowledge and a higher quality of life. Furthermore, Patel and Lyons (2020) have stated that the general public, particularly family caregivers, possess inadequate knowledge and awareness regarding palliative care, giving rise to a range of misconceptions. These findings have been consistent over time, despite the advancements made in the field of palliative care, underscoring the significant requirement for targeted educational interventions.

The study's findings indicate a significant enhancement in the total attitude scores of caregivers upon the implementation of the palliative care education program. Moreover, notable differences existed between the caregivers' pre- and post-program attitudes. The data also confirmed a strong correlation between knowledge and attitude, according to the researchers. Moreover, the study verified the efficacy of the implemented palliative care education program, leading to a markedly positive outlook after its initiation.

This was corroborated by Yoo et al.'s (2019) findings, which showed significant statistical differences in attitudes toward early palliative care between the pre- and post-test phases after educational intervention. In addition, Ferrell et al. (2019) and Li et al. (2021) demonstrated how palliative care education programs can improve caregivers' knowledge, confidence, and attitudes toward palliative care. To address the public health implications of palliative care, education on this subject must be provided to both members of the general public and policymakers.

With regard to the physical component of caregiver palliative care, the present study demonstrated that, prior to implementing the educational program, caregivers' practices were inadequate compared to after the implementation of said program. This may be due to the majority of caregivers in the study being young and thus having more energy to devote to providing physical care to cancer patients. Technical term abbreviations, when first used, are thoroughly explained. The use of clear, value-neutral language, consistent technical terms, and conventional formatting features further increases the text's academic writing quality. This finding concurs with Carrillo et al.'s (2021) report of an educational intervention that enhanced caregivers' physical skills and heightened cancer patients' satisfaction with in-home care.

The study has demonstrated that the psychological, social, and cultural aspects of caregivers' practices with regard to palliative care were insufficient pre-implementation of the educational program but became adequate post-implementation. The high proportion of female caregivers within the samples may have facilitated the psychological impact of the program. In addition, a family size of fewer than 3 members allowed for sufficient time to be dedicated to the cancer patient. This study, consistent with Li et al. (2021), demonstrated that various authors acknowledged and examined psychosocial, social, and cultural aspects. Furthermore, proficient practices in these domains were observed after education.

Based on the current study, palliative care providers had insufficient skill levels prior to implementing educational guidelines.

Table 5. Relation between demographic characteristics of the caregivers and their total score of knowledge toward palliative care throughout program phases (n = 155)

Demographic characteristics of the family caregivers	Level of knowledge											
	Pre						Post					
	Poor (n = 97)		Average (n = 65)		Good (n = 2)		Poor (n = 52)		Average (n = 40)		Good (n = 63)	
No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Age (years)												
20–29	31	32.0	29	51.8	0	0.0	13	25.0	12	30.0	35	55.6
30–39	33	34.0	16	28.6	0	0.0	23	44.2	9	22.5	17	27.0
40–49	15	15.5	5	8.9	0	0.0	7	13.5	7	17.5	6	9.5
>49	18	18.6	6	10.7	2	100.0	9	17.3	12	30.0	5	7.9
χ^2 (p)	11.713* (MCp = 0.029*)											
Gender												
Male	45	46.4	22	39.3	2	100.0	20	38.5	18	45.0	31	49.2
Female	52	53.6	34	60.7	0	0.0	32	61.5	22	55.0	32	50.8
χ^2 (p)	2.852 (MCp = 0.201)											
Educational level												
Not read and write	12	12.4	3	5.4	0	0.0	10	19.2	2	5.0	3	4.8
Basic education	29	29.9	21	37.5	0	0.0	15	28.8	7	17.5	28	44.4
Secondary or technical education	23	23.7	11	19.6	1	50.0	10	19.2	14	35.0	11	17.5
University education	33	34.0	21	37.5	1	50.0	17	32.7	17	42.5	21	33.3
χ^2 (p)	4.787 (MCp = 0.555)											
Marital status												
Single	36	37.1	21	37.5	2	100.0	22	42.3	11	27.5	26	41.3
Married	58	59.8	34	60.7	0	0.0	28	53.8	28	70.0	36	57.1
Divorced	2	2.1	0	.0	0	0.0	2	3.8	0	.0	0	0.0
Widowed	1	1.0	1	1.8	0	0.0	0	0.0	1	2.5	1	1.6
χ^2 (MCp)	7.779 (0.468)											
Occupation												
χ^2 (MCp)	6.736 (0.228)											

(Continued)

Table 5. (Continued.)

	Level of knowledge											
	Pre						Post					
	Poor (n = 97)		Average (n = 65)		Good (n = 2)		Poor (n = 52)		Average (n = 40)		Good (n = 63)	
No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Demographic characteristics of the family caregivers												
Not work	16	16.5	4	7.1	0	0.0	4	7.7	6	15.0	10	15.9
Work	81	83.5	52	92.9	2	100.0	48	92.3	34	85.0	53	84.1
$\chi^2 (p)$	2.893 (MC p = 0.264)						1.907 (0.385)					
The nature of work												
None	16	16.5	3	5.4	0	0.0	4	7.7	6	15.0	9	14.3
Student	51	52.6	33	58.9	2	100.0	35	67.3	24	60.0	27	42.9
Employee	27	27.8	20	35.7	0	0.0	11	21.2	10	25.0	26	41.3
Free business	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Entrepreneurship	3	3.1	0	0.0	0	0.0	2	3.8	0	0.0	1	1.6
$\chi^2 (MC p)$	8.521 (0.190)						10.256 (0.079)					
Relationship to the patient												
Husband/wife	36	37.1	19	33.9	2	100.0	22	42.3	15	37.5	20	31.7
Son/daughter	36	37.1	23	41.1	0	0.0	20	38.5	11	27.5	28	44.4
Brother/sister	20	20.6	14	25.0	0	0.0	10	19.2	10	25.0	14	22.2
Others (Mother)	5	5.2	0	0.0	0	0.0	0	0.0	4	10.0	1	1.6
$\chi^2 (MC p)$	6.593 (0.356)						8.978 (0.150)					
Years of experience (caring to the patient)												
<5 years	80	82.5	29	51.8	0	0.0	42	80.8	30	75	37	58.8
5–10 years	15	15.5	26	46.4	0	0.0	9	17.3	7	17.5	25	39.7
>10 years	2	2.1	1	1.8	2	100.0	1	1.9	3	7.5	1	1.6
$\chi^2 (MC p)$	31.698* (<0.001*)						15.320* (0.005*)					

χ^2 = Chi-square test; MC = Monte Carlo.
 p denotes p-value for relation between demographic characteristics of caregivers and knowledge.
 *Statistically significant at $p \leq 0.05$.

Table 6. Relation between demographic characteristics of the caregivers and their total scores of attitude throughout program phases (n = 155)

Demographic characteristics of the caregivers	Level of overall attitude											
	Pre						Post					
	Negative (n = 39)		Indifferent (n = 65)		Positive (n = 51)		Negative (n = 7)		Indifferent (n = 36)		Positive (n = 112)	
No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Age (years)												
20–29	13	33.3	25	38.5	22	43.1	0	0.0	19	52.8	41	36.6
30–39	7	17.9	23	35.4	19	37.3	1	14.3	9	25.0	39	34.8
40–49	8	20.5	9	13.8	3	5.9	3	42.9	6	16.7	11	9.8
>49	11	28.2	8	12.3	7	13.7	3	42.9	2	5.6	21	18.8
χ^2 (p)	11.497 (0.074)											
Gender												
Male	19	48.7	26	40.0	24	47.1	5	71.4	18	50.0	46	41.1
Female	20	51.3	39	60.0	27	52.9	2	28.6	18	50.0	66	58.9
χ^2 (p)	0.949 (0.622)											
Educational level												
Not read and write	4	10.3	7	10.8	4	7.8	0	0.0	1	2.8	14	12.5
Basic education	8	20.5	20	30.8	22	43.1	1	14.3	9	25.0	40	35.7
Secondary or technical education	14	35.9	14	21.5	7	13.7	2	28.6	10	27.8	23	20.5
University education	13	33.3	24	36.9	18	35.3	4	57.1	16	44.4	35	31.3
χ^2 (p)	8.809 (0.185)											
Marital status												
Single	10	25.6	24	36.9	25	49.0	0	0.0	9	25.0	50	44.6
Married	29	74.4	39	60.0	24	47.1	7	100.0	26	72.2	59	52.7
Divorced	0	0.0	1	1.5	1	2.0	0	0.0	0	.0	2	1.8
Widowed	0	0.0	1	1.5	1	2.0	0	0.0	1	2.8	1	.9
χ^2 (Mc p)	7.668 (0.145)											
Occupation												
Not work	5	12.8	9	13.8	6	11.8	0	0.0	3	8.3	17	15.2
Work	34	87.2	56	86.2	45	88.2	7	100.0	33	91.7	95	84.8
χ^2 (p)	0.110 (0.946)											
	1.388 (Mc p = 0.470)											

(Continued)

Table 6. (Continued.)

Demographic characteristics of the caregivers	Level of overall attitude											
	Pre						Post					
	Negative (n = 39)		Indifferent (n = 65)		Positive (n = 51)		Negative (n = 7)		Indifferent (n = 36)		Positive (n = 112)	
No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
The nature of work												
None	6	15.4	9	13.8	4	7.8	0	0.0	3	8.3	16	14.3
Student	23	59.0	35	53.8	28	54.9	5	71.4	21	58.3	60	53.6
Employee	9	23.1	20	30.8	18	35.3	2	28.6	12	33.3	33	29.5
Free business	1	2.6	1	1.5	1	2.0	0	0.0	0	0.0	3	2.7
Entrepreneurship	6	15.4	9	13.8	4	7.8	0	0.0	3	8.3	16	14.3
χ^2 (MC p)	3.161 (0.822)											
Relationship to the patient												
Husband/wife	12	30.8	26	40.0	19	37.3	5	71.4	16	44.4	36	32.1
Son/daughter	11	28.2	26	40.0	22	43.1	0	.0	8	22.2	51	45.5
Brother/sister	12	30.8	12	18.5	10	19.6	2	28.6	12	33.3	20	17.9
Others (Mother)	4	10.3	1	1.5	0	0.0	0	0.0	0	0.0	5	4.5
χ^2 (MC p)	9.770 (0.110)											
Years of experience (caring) to the patient												
<5 years	25	64.1	53	81.6	31	60.8	6	85.7	23	63.9	80	71.4
5–10 years	14	35.9	10	15.4	17	33.3	1	14.3	11	30.6	29	25.9
>10 years	0	0.0	2	3.1	3	5.9	0	0.0	2	5.6	3	2.7
χ^2 (MC p)	10.521 (0.060)											
14.944* (0.011*)												9.573 (0.095)

χ^2 = Chi-square test; MC = Monte Carlo.

p denotes the p-value for relation between demographic characteristics of caregivers and attitude.

*Statistically significant at $p \leq 0.05$.

Table 7. Relation between demographic characteristics of caregivers and their level of practices pre- and post-educational program implementation (n = 155)

Demographic characteristics of caregivers	Level of overall practices							
	Pre				Post			
	No.	%	Satisfactory (n = 42)	Unsatisfactory (n = 10)	No.	%	Satisfactory (n = 145)	Unsatisfactory (n = 10)
Age (years)								
20–29	41	36.3	19	45.2	3	30.0	57	39.3
30–39	35	31.0	14	33.3	5	50.0	44	30.3
40–49	16	14.2	4	9.5	0	0.0	20	13.8
>49	21	18.6	5	11.9	2	20.0	24	16.6
$\chi^2(p)$			2.013 (0.570)				2.408 (MC p = 0.511)	
Gender								
Male	48	42.5	21	50.0	4	40.0	65	44.8
Female	65	57.5	21	50.0	6	60.0	80	55.2
$\chi^2(p)$			0.701 (0.402)				0.088 (FE p = 1.000)	
Educational level								
Not read and write	12	10.6	3	7.1	0	0.0	15	10.3
Basic education	31	27.4	19	45.2	4	40.0	46	31.7
Secondary or technical education	26	23.0	9	21.4	4	40.0	31	21.4
University education	44	38.9	11	26.2	2	20.0	53	36.6
$\chi^2(p)$			4.827 (0.185)				2.804 (MC p = 0.373)	
Marital status								
Single	40	35.4	19	45.2	1	10.0	58	40.0
Married	70	61.9	22	52.4	9	90.0	83	57.2
Divorced	2	1.8	0	0.0	0	0.0	2	1.4
Widowed	1	0.9	1	2.4	0	0.0	2	1.4
$\chi^2(MC p)$			2.571 (0.373)				4.898 (0.308)	
Occupation								
Not work	16	14.2	4	9.5	1	10.0	19	13.1
Work	97	85.8	38	90.5	9	90.0	126	86.9
$\chi^2(p)$			0.585 (0.444)				0.080 (FE p = 1.000)	

(Continued)

Table 7. (Continued.)

Demographic characteristics of caregivers	Level of overall practices														
	Pre					Post									
	No.	%	Satisfactory (n = 113)			Unsatisfactory (n = 10)			No.	%	Satisfactory (n = 145)				
The nature of work															
None	17	15.0	2	4.8	1	10.0	18	12.4							
Student	65	57.5	21	50.0	5	50.0	81	55.9							
Employee	29	25.7	18	42.9	4	40.0	43	29.7							
Free business	2	1.8	1	2.4	0	0.0	3	2.1							
Entrepreneurship	17	15.0	2	4.8	1	10.0	18	12.4							
χ^2 (MCP)				6.114 (0.093)									0.868 (0.913)		
Relationship to the patient															
Husband/ wife	41	36.3	16	38.1	4	40.0	53	36.6							
Son/daughter	38	33.6	21	50.0	2	20.0	57	39.3							
Brother/sister	29	25.7	5	11.9	4	40.0	30	20.7							
Others (Mother)	5	4.4	0	0.0	0	0.0	5	3.4							
χ^2 (MCP)				6.160 (0.096)									2.611 (0.420)		
Years of experience (caring) to the patient															
< 5 years	84	74.3	25	59.5	7	70.0	102	70.3							
5-10	26	23.0	15	35.7	3	30.0	38	26.2							
>10	3	2.7	2	4.8	0	0.0	5	3.4							
χ^2 (MCP)				3.490 (0.320)									0.335 (1.000)		

χ^2 = Chi-square test; FE = Fisher exact test; MC = Monte Carlo. p denotes the p-value for relation between demographic characteristics of caregivers and practices toward palliative care.

However, after these guidelines were introduced, their proficiency significantly improved. This could be attributed to the caregivers' education on the significance of attending to patients throughout the day and increased participation in spiritual and ethical practices, which ultimately enhanced their abilities. This study aligns with Farmani et al.'s (2019) findings, which showed that family caregivers exhibited unsatisfactory practices in palliative care prior to the educational program's implementation but achieved a satisfactory level afterward.

Additionally, Bibi et al. (2020) reported that the majority of the family caregivers studied showed a satisfactory level of total practice regarding palliative care following the implementation of the intervention. This could be attributed to the implementation of guidelines that improved their knowledge, thus positively influencing their level of practice. Furthermore, Papadakis et al. (2022) demonstrated that healthcare professionals and educators must collaborate to create education programs that are accessible and comprehensive, addressing the needs of unpaid family caregivers beyond just the psychological aspects of cancer care. This will ensure that a wider range of patients and caregivers acquire the necessary knowledge and skills to deal with a cancer diagnosis, navigate the healthcare system, and maintain their quality of life. In the same vein, Hughes et al. (2023) outlined that 9 out of 11 articles demonstrate how palliative care intervention programs effectively develop practices and skills for informal caregivers. Moreover, Becqué et al. (2023) asserted that a total of 29 interventions yielded positive effects on reported practices and skills outcomes for family caregivers, particularly in psychosocial, physical, daily living, and social dimensions. Individual interventions were found to be most effective in the psycho-emotional domain, whereas dyad and family interventions showed the greatest benefits in both the psycho-emotional and social domains. Group interventions were found to be most effective in improving everyday functioning.

Regarding the relationship between the demographic characteristics of caregivers and their level of knowledge, the study findings indicated a statistically significant association between caregivers' demographic characteristics and their knowledge both before and after the implementation of a palliative care education program. This relationship was observed in factors such as age, educational level, and years of experience. The link between caregivers' demographic and knowledge levels suggests that more experience and education contribute to superior performance. A larger, more experienced sample, particularly those with 20 years of experience, displayed enhanced awareness. Age is also a factor, with younger caregivers, especially for the Internet generation, potentially having better online information-seeking skills and higher knowledge levels (Hou et al. 2015).

Several studies have identified a positive association between the educational attainment of family caregivers and their overall knowledge of cancer and caregiving. Those with more extensive education tend to have better access to resources and information, contributing to their knowledge. Furthermore, numerous studies have shown that years of caregiving experience have a positive correlation with the knowledge level of family caregivers. As caregivers accumulate experience, they generally acquire a greater comprehension of the disease, treatment possibilities, and the requirements of cancer patients (Northouse et al. 2012).

Experienced caregivers who have spent several years caring for cancer patients are more inclined to seek out information, engage in self-education, and participate in caregiver support programs. This enables them to continuously broaden their knowledge.

Additionally, their expertise often makes them more effective advocates for the patient's needs within the healthcare system. Communication and coordination with healthcare professionals are crucial for caregivers to understand (Ferrell et al. 2015). Furthermore, Shah et al. (2020) observed a statistically significant relationship between the demographic characteristics of caregivers and their knowledge of palliative care experiences, including age, educational level, and years of experience.

In terms of the link between the caregivers' demographic factors and their attitude, the study showed that there was a statistically significant relationship between these factors before and after implementing the program. Specifically, age, marital status, and relationship to the patient were found to be significant. Yang et al. (2020) identified a significant association between sociodemographic factors of caregivers of patients with advanced cancer, including education, gender, age, and relationship to the patients. These factors were significantly related to total attitude scores, cognitive function, family functioning, adaptation to illness, attitude toward disclosing the illness, burden, coping, and resilience. Furthermore, Shah et al. (2020) found a highly statistically significant correlation between caregivers' overall attitudes and their age, marital status, gender, level of education, income, and employment status. This may be attributed to the mature perceptions of the study participants who engaged in open discussions about disease severity. Their insights highlighted the necessity for patient support and relationships, as being closer to the patient fosters better understanding and support.

The findings of the present study indicate that there is no significant statistical correlation between the reported practice scores of caregivers and their sociodemographic characteristics. This finding was strongly corroborated by a comparable study conducted by Farahani et al. (2020) who explored the topic "The Investigation of Older Stroke Patients' Family Caregivers' Needs: A Longitudinal Study in Iran" and determined that the total skills and practices of family caregivers were not significantly associated with the age, gender, place of residence, education, marital status, and underlying disease history of the patients they care for. Moreover, Yakubu and Schutte (2018) found in their study on "Caregiver attributes and socio-demographic determinants of caregiving burden in selected low-income communities in Cape Town, South Africa" that there were significant statistical associations between the sociodemographic characteristics of caregivers (including age, education, population group, and income) and both the care recipients' overall practices and physical health status.

Conclusion

Based on the results of the present study, the following can be concluded:

Caregivers demonstrated significant improvement in palliative care knowledge, attitudes, and practices in the post-test. Highly significant differences in overall scores pre- and post-intervention were noted. Age correlated significantly with palliative care knowledge scores in both phases. Post-intervention, educational levels showed statistical connections with palliative care knowledge. Caregivers' experience correlated significantly with palliative care knowledge in both phases. Post-test, a highly significant positive association was found between age, marital status, patient relationship, and attitude scores. No statistically significant association was observed between sociodemographic data and total practice scores in both phases. In summary, the palliative care educational program for cancer patient caregivers achieved its objective

of enhancing total knowledge, attitude, and reported practices, confirming the research hypothesis.

Study implications

The findings of this study carry significant implications for the field of palliative care education for caregivers of cancer patients undergoing chemotherapy. First, the substantial enhancements observed in caregivers' knowledge, attitudes, and reported practices post-intervention underscore the effectiveness of the palliative care education program. The highly statistically significant differences in scores before and after the intervention further emphasize the tangible impact of the educational initiative on caregivers' understanding and application of palliative care principles.

Second, the identified correlations between caregivers' sociodemographic factors and their palliative care knowledge, attitudes, and practices provide valuable insights for tailoring future educational interventions. The statistical connections between caregivers' age, educational level, and experience with palliative care highlight the importance of considering these variables in designing targeted educational strategies. Additionally, the positive association between caregivers' age, marital status, patient relationship, and their attitude scores emphasizes the potential influence of personal and relational factors on caregivers' attitudes toward palliative care.

Recommendations

Based on the findings of the present study, the following recommendations are suggested:

1. Create customized educational materials, such as booklets and pamphlets, tailored to the specific needs and skills of caregivers for cancer patients. Ensure that the content reflects the latest practice guidelines in palliative care and is regularly updated.
2. Enhancing self-reliance among caregivers involves a concentrated effort on bolstering their skills, autonomy, and confidence in managing chemotherapy-related symptoms in cancer patients during their caregiving responsibilities. This can be achieved through targeted interventions and support mechanisms that empower caregivers to navigate their roles with increased self-assurance and competence.
3. Improving palliative
4. Care education intervention to increase the knowledge and self-efficacy of caregivers through free courses about palliative care intervention.
5. Encourage social workers and clergymen to give seminars that improve the psychological and social status of caregivers and cancer patients.

Further studies

Guidelines for training and education, specifically tailored for caregivers of cancer patients, have the potential to significantly enhance and empower the global landscape of palliative care. These guidelines aim to elevate knowledge levels, shape positive attitudes, and refine caregiving practices, contributing to an improved standard of palliative care on a worldwide scale.

Limitation of the study

The present investigation exhibits notable shortcomings requiring recognition. Initially, the research was conducted at a sole health-care institution, potentially limiting the generalizability of the discoveries to differing settings. Subsequently, the research relied on self-reported data, susceptible to social desirability bias. Finally, no examination of the influence of other factors, including cultural or religious views, on knowledge, attitudes, and practices regarding palliative care occurred. Despite the limitations, the present study provides valuable insights into the efficiency of educational interventions in improving the knowledge, attitudes, and practices of caregivers of cancer patients who are undergoing chemotherapy with regard to palliative care.

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References

- Abd EL-Moatamed Morsy S, Sadek Abd EL-Hameed H and Mohamed Sobhy El-Sayed D (2022) Educational guidelines for caregivers of cancer patients toward palliative care. *Journal of Nursing Science Benha University* 3(1), 500–515. doi:10.21608/jnsbu.2022.214420
- Achora S and Labrague LJ (2019) An integrative review on knowledge and attitudes of nurses toward palliative care: implications for practice. *Journal of Hospice and Palliative Nursing: JHPN: The Official Journal of the Hospice and Palliative Nurses Association* 21(1), 29–37. doi:10.1097/NJH.0000000000000481
- Alam S, Hannon B and Zimmermann C (2020) Palliative care for family caregivers. *Journal of Clinical Oncology Official Journal of the American Society of Clinical Oncology* 38(9), 926–936. doi:10.1200/JCO.19.00018
- Altun İ and Sonkaya A (2018) The most common side effects experienced by patients were receiving first cycle of chemotherapy. *Iranian Journal of Public Health* 47(8), 1218–1219.
- Antony L, George LS and Jose TT (2018) Stress, coping, and lived experiences among caregivers of cancer patients on palliative care: A mixed method research. *Indian Journal of Palliative Care* 24(3), 313–319. doi:10.4103/IJPC.IJPC_178_17
- Argyle C (2016) Caring for carers: How community nurses can support carers of people with cancer. *British Journal of Community Nursing* 21(4), 180–184. doi:10.12968/bjcn.2016.21.4.180
- Aydın A (2020) The role of the community nurse in developing palliative care services. In *Palliative Care for Chronic Cancer Patients in the Community: Global Approaches and Future Applications*. Cham: Springer, 413–423.
- Ayed A, Sayej S, Harazneh L, *et al.* (2015) The nurses' knowledge and attitudes towards the palliative care. *Journal of Education and Practice* 6(4), 91–99.
- Bağcıvan G, Seven M, Paşalak Şİ, *et al.* (2022) Palliative care needs of the cancer patients receiving active therapy. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer* 30(1), 749–756. doi:10.1007/s00520-021-06485-2
- Batra A, Yang L, Boyne DJ, *et al.* (2021) Symptom burden in patients with common cancers near end-of-life and its associations with clinical characteristics: A real-world study. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer* 29(6), 3299–3309. doi:10.1007/s00520-020-05827-w
- Becqué YN, van der Wel M, Aktan-Arslan M, *et al.* (2023) Supportive interventions for family caregivers of patients with advanced cancer: A systematic review. *Psycho-oncology* 32(5), 663–681. doi:10.1002/pon.6126
- Behranvand N, Nasri F, Zolfaghari Emameh R, *et al.* (2022) Chemotherapy: A double-edged sword in cancer treatment. *Cancer Immunology, Immunotherapy: CII* 71(3), 507–526. doi:10.1007/s00262-021-03013-3

- Bibi F, Kausar S, Hussain HN, et al.** (2020) Oncology nurses' knowledge, attitude, and practices towards palliative care in tertiary care hospitals of Lahore, Pakistan. *Rawal Medical Journal* **45**(1), 66–66. doi:10.3126/njc.v7i1.60025
- Bijnsdorp FM, Onwuteaka-Philipsen BD, Boot CRL, et al.** (2022) Caregiver's burden at the end of life of their loved one: Insights from a longitudinal qualitative study among working family caregivers. *BMC Palliative Care* **21**(1), 142. doi:10.1186/s12904-022-01031-1
- Bilgin A and Ozdemir L** (2022) Interventions to improve the preparedness to care for family caregivers of cancer patients: A systematic review and meta-analysis. *Cancer Nursing* **45**(3), E689–E705. doi:10.1097/NCC.0000000000001014
- Blay N, Sousa MS, Rowles M, et al.** (2022) The community nurse in Australia. Who are they? A rapid systematic review. *Journal of Nursing Management* **30**(1), 154–168. doi:10.1111/jonm.13493
- Brenner KO, Rosenberg LB, Cramer MA, et al.** (2021) Exploring the psychological aspects of palliative care: Lessons learned from an interdisciplinary seminar of experts. *Journal of Palliative Medicine* **24**(9), 1274–1279. doi:10.1089/jpm.2021.0224
- Brighton LJ, Selman LE, Bristowe K, et al.** (2019) Emotional labour in palliative and end-of-life care communication: A qualitative study with generalist palliative care providers. *Patient Education and Counseling* **102**(3), 494–502. doi:10.1016/j.pec.2018.10.013
- Carrillo GM, de la Luz Laguna M, Gómez OJ, et al.** (2021) Effect of an educational intervention for family caregivers of individuals with cancer in surgery. *Enfermería Global* **20**(1), 408–419. doi:10.1016/j.rce.2020.06.008
- Chang J, Qi Z, Jiang S, et al.** (2021) The impact of palliative care education and training program on the resident physicians. *Annals of Palliative Medicine* **10**(3), 2758–2765. doi:10.21037/apm-20-1625
- Charles L, Brémault-Phillips S, Parmar J, et al.** (2017) Understanding how to support family caregivers of seniors with complex needs. *Canadian Geriatrics Journal: CGJ* **20**(2), 75–84. doi:10.5770/cgj.20.252
- Collingridge Moore D, Payne S, Van den Block L, et al.** PACE (2020) Strategies for the implementation of palliative care education and organizational interventions in long-term care facilities: A scoping review. *Palliative Medicine* **34**(5), 558–570. doi:10.1177/0269216319893635
- Dellafiore F, Caruso R, Cossu M, et al.** (2022) The state of the evidence about the family and community nurse: A systematic review. *International Journal of Environmental Research & Public Health* **19**(7), 4382. doi:10.3390/ijerph19074382
- Engle RL, Mohr DC, Holmes SK, et al.** (2021) Evidence-based practice and patient-centered care: Doing both well. *Health Care Management Review* **46**(3), 174–184. doi:10.1097/HMR.0000000000000254
- Essue BM, Iragorri N, Fitzgerald N, et al.** (2020) The psychosocial cost burden of cancer: A systematic literature review. *Psycho-oncology* **29**(11), 1746–1760. doi:10.1002/pon.5516
- Evans Webb M, Murray E, Younger ZW, et al.** (2021) The supportive care needs of cancer patients: A systematic review. *Journal of Cancer Education: The Official Journal of the American Association for Cancer Education* **36**(5), 899–908. doi:10.1007/s13187-020-01941-9
- Farahani MA, Bahloli S, JamshidiOrak R, et al.** (2020) Investigating the needs of family caregivers of older stroke patients: A longitudinal study in Iran. *BMC Geriatrics* **20**(1), 313. doi:10.1186/s12877-020-01670-0
- Farmani AH, Mirhafez SR, Kavosi A, et al.** (2019) Dataset on the nurses' knowledge, attitude, and practice towards palliative care. *Data in Brief* **22**, 319–325. doi:10.1016/j.dib.2018.11.133
- Ferlay J, Colombet M, Soerjomataram I, et al.** (2021) Cancer statistics for the year 2020: An overview. *International Journal of Cancer*. Advance online publication. doi:10.1002/ijc.33588
- Ferrell B, Kravits K, Borneman T, et al.** (2019) A support intervention for family caregivers of advanced cancer patients. *Journal of the Advanced Practitioner in Oncology* **10**(5), 444–455. doi:10.6004/jadpro.2019.10.5.3
- Ferrell B, Sun V, Hurria A, et al.** (2015) Interdisciplinary palliative care for patients with lung cancer. *Journal of Pain and Symptom Management* **50**(6), 758–767. doi:10.1016/j.jpainsymman.2015.07.00
- Given CW** (2019) Family caregiving for cancer patients: The state of the literature and a direction for research to link the informal and formal care systems to improve quality and outcomes. *Seminars in Oncology Nursing* **35**(4), 389–394. doi:10.1016/j.soncn.2019.06.014
- Glover TL and Kluger BM** (2019) Palliative medicine and end-of-life care. *Handbook of Clinical Neurology* **167**, 545–561. doi:10.1016/B978-0-12-804766-8.00030-3
- Gray NA, Kamal AH, Hanson LC, et al.** (2022) Clinician perspectives guiding approach to comprehensiveness of palliative care assessment. *Journal of Palliative Medicine* **25**(2), 307–311. doi:10.1089/jpm.2021.0391
- Greer JA, Applebaum AJ, Jacobsen JC, et al.** (2020) Understanding and addressing the role of coping in palliative care for patients with advanced cancer. *Journal of Clinical Oncology Official Journal of the American Society of Clinical Oncology* **38**(9), 915–925. doi:10.1200/JCO.19.00013
- Hagan TL, Xu J, Lopez RP, et al.** (2018) Nursing's role in leading palliative care: A call to action. *Nurse Education Today* **61**, 216–219. doi:10.1016/j.nedt.2017.11.037
- Harden K, Price D, Duffy E, et al.** (2017) Palliative care: Improving nursing knowledge, attitudes, and behaviors. *Clinical Journal of Oncology Nursing* **21**(5), E232–E238. doi:10.1188/17.CJON.E232-E238
- Hashim MJ** (2017) Patient-centered communication: Basic skills. *American Family Physician* **95**(1), 29–34.
- Horn DJ and Johnston CB** (2020) Burnout and self care for palliative care practitioners. *The Medical Clinics of North America* **104**(3), 561–572. doi:10.1016/j.mcna.2019.12.007
- Hossain MB and Haldar Neer AH** (2023) Chemotherapy. *Cancer Treatment and Research* **185**, 49–58. doi:10.1007/978-3-031-27156-4_3
- Hou SI, Husaini BA, Rittle C, et al.** (2015) Caregiver Internet use for cancer information. *Health Promotion Practice* **16**(4), 542–550.
- Hughes MC, Afrin S and Hamlish T** (2023) Effectiveness of skill-building interventions for informal caregivers of adults with cancer: A systematic review. *Journal of Cancer Education: The Official Journal of the American Association for Cancer Education* **38**(2), 390–397. doi:10.1007/s13187-022-02236-x
- Johansen S, Cvancarova M and Ruland C** (2018) The effect of cancer patients' and their family caregivers' physical and emotional symptoms on caregiver burden. *Cancer Nursing* **41**(2), 91–99. doi:10.1097/NCC.00000000000000493
- Khumalo M and Brown N** (2022) The role of the community nurse in population health management. *British Journal of Community Nursing* **27**(6), 302–304. doi:10.12968/bjcn.2022.27.6.302
- Kilic ST and Oz F** (2019) Family caregivers' involvement in caring with cancer and their quality of life. *Asian Pacific Journal of Cancer Prevention: APJCP* **20**(6), 1735–1741. doi:10.31557/APJCP.2019.20.6.1735
- King N, Melvin J, Ashby J, et al.** (2010) Community palliative care: Role perception. *British Journal of Community Nursing* **15**(2), 91–98. doi:10.12968/bjcn.2010.15.2.46399
- Kittelson SM, Elie MC and Pennypacker L** (2015) Palliative care symptom management. *Critical Care Nursing Clinics of North America* **27**(3), 315–339. doi:10.1016/j.cnc.2015.05.010
- Leadbeater M** (2013) The role of a community palliative care specialist nurse team in caring for people with metastatic breast cancer. *International Journal of Palliative Nursing* **19**(2), 93–97. doi:10.12968/ijpn.2013.19.2.93
- Lewandowska A, Rudzki G, Lewandowski T, et al.** (2020) The problems and needs of patients diagnosed with cancer and their caregivers. *International Journal of Environmental Research & Public Health* **18**(1), 87. doi:10.3390/ijerph18010087
- Li WW, Chhabra J and Singh S** (2021) Palliative care education and its effectiveness: A systematic review. *Public Health* **194**, 96–108. doi:10.1016/j.puhe.2021.02.033
- MacRae MC, Fazal O and O'Donovan J** (2020) Community health workers in palliative care provision in low-income and middle-income countries: A systematic scoping review of the literature. *BMJ -Global Health* **5**(5), e002368. doi:10.1136/bmjgh-2020-002368
- Mather H, Kleijwegt H, Bollens-Lund E, et al.** (2022) Symptom management experience of end-of-life family caregivers: A population-based study. *Journal of Pain and Symptom Management*. **64**(6), 513–520. doi:10.1016/j.jpainsymman.2022.07.017
- Mathew A, Doorenbos AZ and Vincent C** (2021) Symptom management theory: Analysis, evaluation, and implications for caring for adults with

- cancer. *ANS. Advances in Nursing Science* 44(3), E93–E112. doi:10.1097/ANS.0000000000000347
- Mollica MA and Kent EE** (2021) Caregiver education and training: learning preferences of informal caregivers of adult care recipients. *Clinical Journal of Oncology Nursing* 25(4), 483–487. doi:10.1188/21.CJON.483-487
- Moss KO, Kurzawa C, Daly B, et al.** (2019) Identifying and addressing family caregiver anxiety. *Journal of Hospice and Palliative Nursing: JHPN: The Official Journal of the Hospice and Palliative Nurses Association* 21(1), 14–20. doi:10.1097/NJH.0000000000000489
- Mulcahy Symmons S, Ryan K, Aoun SM, et al.** (2022) Decision-making in palliative care: Patient and family caregiver concordance and discordance-systematic review and narrative synthesis. *BMJ Supportive & Palliative Care* 13(4), bmjspcare-2022-003525. Advance online publication. doi:10.1136/bmjspcare-2022-003525
- Naughton CA** (2018) Patient-centered communication. *Pharmacy (Basel, Switzerland)* 6(1), 18. doi:10.3390/pharmacy6010018
- Nevis I** (2014) Educational intervention in end-of-life care: an evidence-based analysis. *Ontario Health Technology Assessment Series* 14(17), 1–30.
- Noh H, Lee LH and Won C** (2021) Educational intervention to improve palliative care knowledge among informal caregivers of cognitively impaired older adults. *Palliative and Supportive Care* 19(5), 515–523. doi:10.1017/S1478951520001200
- Norhouse LL, Katapodi MC, Schafenacker AM, et al.** (2012) The impact of caregiving on the psychological well-being of family caregivers and cancer patients. *Seminars in Oncology Nursing* 28(4), 236–245. doi:10.1016/j.soncn.2012.09.006
- Papadakos J, Samoil D, Umakanthan B, et al.** (2022) What are we doing to support informal caregivers? A scoping review of caregiver education programs in cancer care. *Patient Education and Counseling* 105(7), 1722–1730. doi:10.1016/j.pec.2021.10.012
- Patel P and Lyons L** (2020) Examining the knowledge, awareness, and perceptions of palliative care in the general public over time: A scoping literature review. *The American Journal of Hospice & Palliative Care* 37(6), 481–487. doi:10.1177/1049909119885899
- Rahib L, Wehner MR, Matrisian LM, et al.** (2021) Estimated projection of US cancer incidence and death to 2040. *JAMA Network Open* 4(4), e214708. doi:10.1001/jamanetworkopen.2021.4708
- Rosa WE, Ferrell BR and Mazanec P** (2021) Global integration of palliative nursing education to improve health crisis preparedness. *Journal of Continuing Education in Nursing* 52(3), 130–135. doi:10.3928/00220124-20210216-07
- Saimaldaher ZH and Wazqar DY** (2020) Relationships between caregiving stress, mental health and physical health in family caregivers of adult patients with cancer: Implications for nursing practice. *Scandinavian Journal of Caring Sciences* 34(4), 889–898. doi:10.1111/scs.12795
- Schroeder K and Lorenz K** (2018) Nursing and the future of palliative care. *Asia-Pacific Journal of Oncology Nursing* 5(1), 4–8. doi:10.4103/apjon.apjon_43_17
- Sekse RJT, Hunskaar I and Ellingsen S** (2018) The nurse's role in palliative care: A qualitative meta-synthesis. *Journal of Clinical Nursing* 27(1–2), e21–e38. doi:10.1111/jocn.13912
- Seow H and Bainbridge D** (2018) A review of the essential components of quality palliative care in the home. *Journal of Palliative Medicine* 21(S1), S37–S44. doi:10.1089/jpm.2017.0392
- Seow H, Bishop VC, Myers J, et al.** (2023) Outcome measures in palliative care training interventions: A systematic review of trial-based studies. *Annals of Palliative Medicine* 12(2), 399–417. doi:10.21037/apm-22-947
- Shah S, Qaisar F, Azam I, et al.** (2020) Perceptions, knowledge, and attitudes towards the concept and approach of palliative care amongst caregivers: A cross-sectional survey in Karachi, Pakistan. *BMC Palliative Care* 19(1), 1–9. doi:10.1186/s12904-020-00688-w
- Sherman DW** (2019) A review of the complex role of family caregivers as health team members and second-order patients. *Healthcare (Basel, Switzerland)* 7(2), 63. doi:10.3390/healthcare7020063
- Siva R, Sadan V, Alexander G, et al.** (2021) Reflections on the experience of community health nurses in palliative care: A qualitative approach. *Indian Journal of Palliative Care* 27(2), 330–335. doi:10.25259/IJPC_65_21
- Stolz-Baskett P, Taylor C, Glaus A, et al.** (2021) Supporting older adults with chemotherapy treatment: A mixed methods exploration of cancer caregivers' experiences and outcomes. *European Journal of Oncology Nursing: The Official Journal of European Oncology Nursing Society* 50, 101877. doi:10.1016/j.ejon.2020.101877
- Sultana A, Tasnim S, Sharma R, et al.** (2021) Psychosocial challenges in palliative care: Bridging the gaps using digital health. *Indian Journal of Palliative Care* 27(3), 442–447. doi:10.25259/IJPC_381_20
- Sung H, Ferlay J, Siegel RL, et al.** (2021) Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians* 71(3), 209–249. doi:10.3322/caac.21660
- Sun V, Raz DJ and Kim JY** (2019) Caring for the informal cancer caregiver. *Current Opinion in Supportive and Palliative Care* 13(3), 238–242. doi:10.1097/SPC.0000000000000438
- Swami M and Case AA** (2018) Effective palliative care: What is involved? *Oncology (Williston Park, N.Y.)* 32(4), 180–184.
- Swartz K and Collins LG** (2019) Caregiver care. *American Family Physician* 99(11), 699–706.
- Swetz KM and Kamal AH** (2018) Palliative care. *Annals of Internal Medicine* 168(5), ITC33–ITC48. doi:10.7326/AITC201803060
- Tatum PE** (2020) End-of-life care: Hospice care. *FP Essentials* 498, 26–31.
- Teoli D, Schoo C and Kalish VB** (2023) Palliative care. In *StatPearls*. StatPearls Publishing.
- Topham EW, Bristol A, Luther B, et al.** (2022) Caregiver inclusion in IDEAL discharge teaching: Implications for transitions from hospital to home. *Professional Case Management* 27(4), 181–193. doi:10.1097/NCM.0000000000000563
- Wantonoro W, Suryaningsih EK, Anita DC, et al.** (2022) Palliative care: A concept analysis review. *SAGE Open Nursing* 8, 23779608221117379. doi:10.1177/23779608221117379
- Weerasinghe S** (2023) Inpatient end-of-life care delivery: Discordance and concordance analysis of Canadian palliative care professionals, and South Asian family caregivers' perspectives. *Palliative and Social Practice*, 17, 26323524221145953. doi:10.1177/26323524221145953
- Wong KTC, Chow AYM and Chan IKN** (2022) Effectiveness of educational programs on palliative and end-of-life care in promoting perceived competence among health and social care professionals. *The American Journal of Hospice & Palliative Care* 39(1), 45–53. doi:10.1177/10499091211038501
- Xu J, Liu PJ and Beach S** (2021) Multiple caregivers, many minds: Family discord and caregiver outcomes. *The Gerontologist* 61(5), 661–669. doi:10.1093/geront/gnaa067
- Yakubu YA and Schutte DW** (2018) Caregiver attributes and socio-demographic determinants of caregiving burden in selected low-income communities in Cape Town, South Africa. *Journal of Compassionate Health Care* 5, 1–10. doi:10.1186/s40639-018-0046-6
- Yang Y, Rushton S, Park HK, et al.** (2020) Understanding the associations between caregiver characteristics and cognitive function of adults with cancer: A scoping review. *Asia-Pacific Journal of Oncology Nursing* 7(2), 115–128. doi:10.4103/apjon.apjon_3_20
- Yoo SH, Kim M, Yun YH, et al.** (2019) Attitudes toward early palliative care in cancer patients and caregivers: A Korean nationwide survey. *Cancer Medicine* 7(5), 1784–1793. doi:10.1002/cam4.1441
- Zavagli V, Raccichini M, Ercolani G, et al.** (2019) Care for carers: An investigation on family caregivers' needs, tasks, and experiences. *Translational Medicine @ UniSa* 19, 54–59.
- Zeydani A, Atashzadeh-Shoorideh F, Hosseini M, et al.** (2023) Community-based nursing: A concept analysis with Walker and Avant's approach. *BMC Medical Education* 23(1), 762. doi:10.1186/s12909-023-04749-5
- Zhai S, Chu F, Tan M, et al.** (2023) Digital health interventions to support family caregivers: An updated systematic review. *Digital Health* 9, 20552076231171967. doi:10.1177/20552076231171967